

No. 709,107.

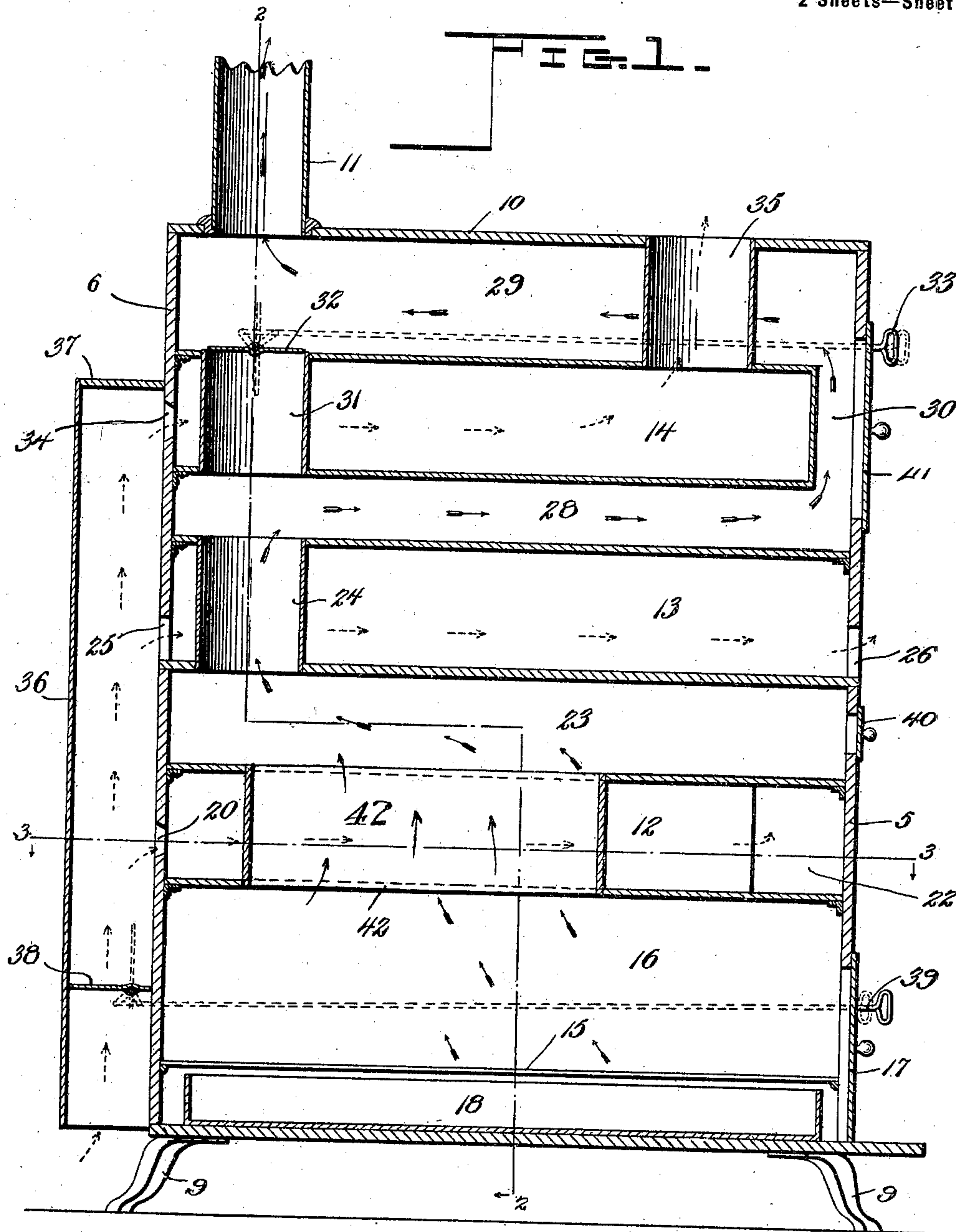
D. S. McDONALD.
FURNACE.

Patented Sept. 16, 1902.

(Application filed Jan. 10, 1902.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses:

J. Ed. Page
W. J. Benham

Donald S. McDonald, Inventor.

By *Marion Marion*

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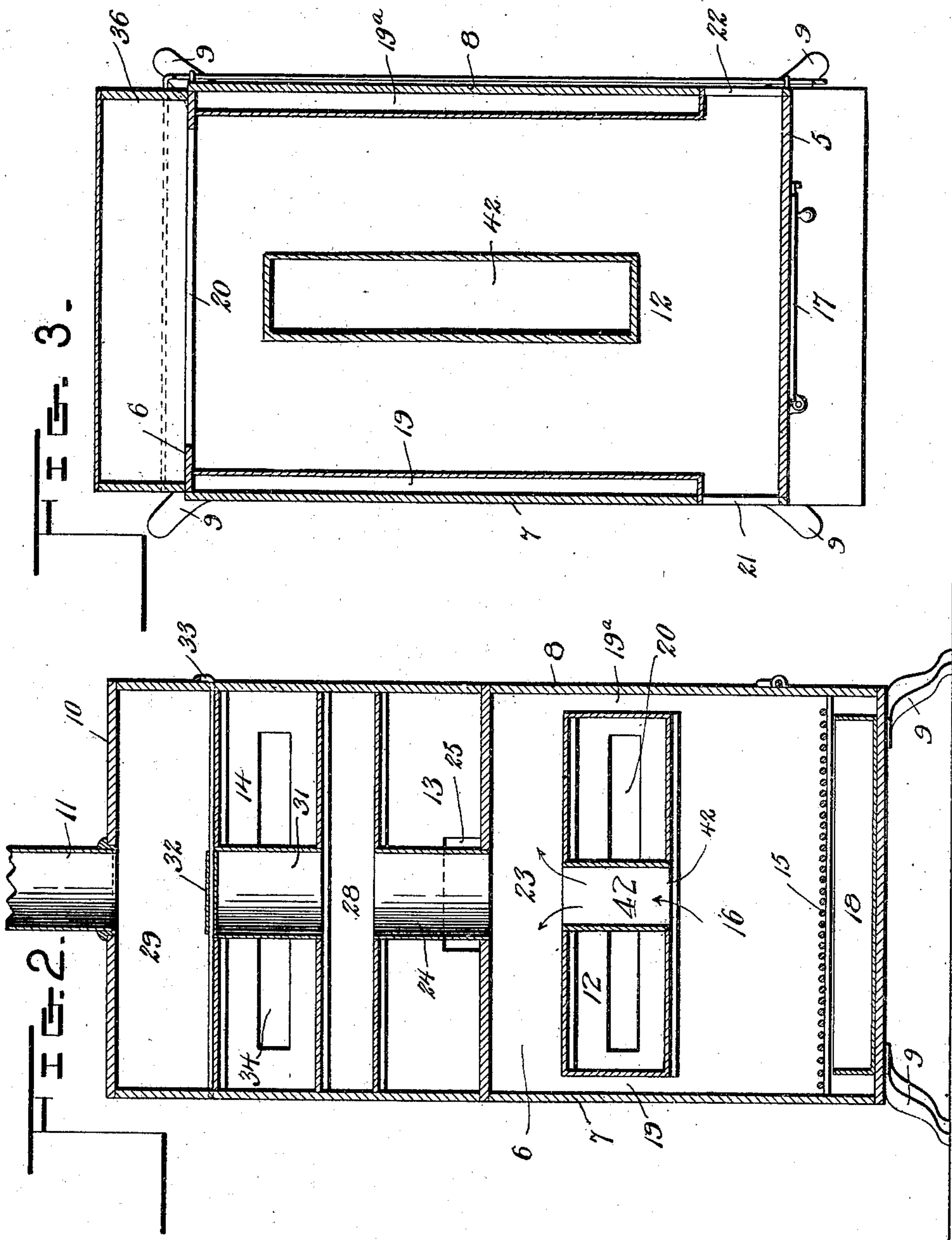
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Witnesses:

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UNITED STATES PATENT OFFICE.

DONALD SKINNER McDONALD, OF MABOU, CANADA.

FURNACE.

SPECIFICATION forming part of Letters Patent No. 709,107, dated September 16, 1902.

Application filed January 10, 1902. Serial No. 89,109. (No model.)

To all whom it may concern:

Be it known that I, DONALD SKINNER McDONALD, a subject of the King of Great Britain, residing at Glendyer, Mabou, county of Inverness, Cape Breton, Province of Nova Scotia, Canada, have invented certain new and useful Improvements in Furnaces; and I do hereby declare that the following is a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in furnaces of that class known to the art as "hot-air" furnaces; and the object in view is the provision of a simple and compact construction arranged to receive pure cold air from the outside of a house to heat the same to the required temperature and provide for equable distribution to a series of conveying-flues, as well as to insure the circulation of smoke and other products of combustion in a manner to heat the series of chambers. Provision is also made for controlling the circulation of air and of the products of combustion to suit the demands of the service.

Further objects and advantages of the invention will appear in the course of the subjoined description, and the novelty in the construction and arrangement of parts will be defined by the claims.

In the drawings hereto annexed, forming a part of this specification, Figure 1 is a vertical central sectional elevation through a hot-air furnace embodying my invention. Fig. 2 is a vertical section at right angles to Fig. 1 and in the plane indicated by the irregular line 2 2 on Fig. 1. Fig. 3 is a sectional plan view taken in the plane of the dotted line 3 3 on Fig. 1.

The same numerals of reference denote like parts in each figure of the drawings.

5 designates the front of the furnace, 6 is the rear, and 7 8 are the sides. These parts may be constructed of metal in any suitable style and dimensions, and the casing thus provided is supported at a proper elevation by means of the feet 9. The top 10 of the casing is provided with a smoke-outlet 11.

12, 13, and 14 designate a series of boxes forming a series of chambers within the casing, and the lowermost box 12 is arranged di-

rectly above the grate 15, so as to form therewith an intermediate combustion-chamber 16. Access to this combustion-chamber is obtained through the fuel-door 17, and the ashes are adapted to fall into the pan or tray 18. The lowermost box 12 extends the full length of the casing, so that it will abut against the front and rear walls 5 and 6, respectively; but this box 12 is not equal in width to the surrounding casing, because the sides of the box lie within and parallel to the sides 7 8 of the casing, (see Figs. 2 and 3,) thereby forming the updraft side flues 19 19^a. The cold air is supplied to the chamber of the lower box 12 through an inlet-opening 20, which is provided in the rear wall 6 in the plane of the chamber of said hot-air box 12. Lateral outlet-openings 21 22 are provided at the sides of the hot-air box 12 and at the opposite end thereof from the air-inlet 20, said exit-openings 21 22 extending through the sides 7 8 of the casing. (See Fig. 3.) The second hot-air box 13 is disposed above the box 12, so as to leave an intermediate circulation-space 23 for the heat and products of combustion, and this box 13 extends the full length and width of the external casing. To provide for the passage therethrough of the heat and products of combustion, this intermediate hot-air box 13 is provided with the smoke-tube 24, the latter being arranged in a vertical position near one end of the box 13 and substantially in the vertical plane of the smoke-outlet 11. The cold air is supplied to the box 13 through an inlet-opening 25, which is provided in the rear wall 6, and the warm air is permitted to escape from this intermediate box by an opening 26, which is provided in the front 5 of the inclosing casing.

The top hot-air box 14 is arranged above the box 13, so as to form an intermediate flue 28, and it lies below the top 10 of the casing in a position to form the uppermost flue 29. This top box is equal to the full width of the casing, but it extends from the rear wall to a point near the front wall, thereby producing an updraft connecting-flue 30 beyond the front end of the box, said flue 30 serving to establish communication between the flues 28 29. The hot-air box 14 is furthermore provided near its rear end with a vertical smoke-tube 31, which is disposed in the plane of the

smoke-tube 24, and with the smoke-outlet 11; but the passage of the smoke through this tube 31 is adapted to be checked by closing the damper 32, the latter being controlled by the damper-rod 33, whereby the escaping products of combustion from the tube 24 may be caused to pass through the flue 28 up the flue 30 and then back through the flue 29 and finally through the smoke-outlet 11. The cold air is admitted to the top box 14 through an inlet-opening 34, which is provided in the rear wall 6, and the air is permitted to escape from this top box by means of an outlet-pipe 35, the latter extending through the top 10 of the furnace.

36 designates a cold-air conduit which is attached to the back wall 6 of the casing in a position to inclose the inlet-openings 20, 25, and 34 to the hot-air boxes 12, 13, and 14, respectively. The upper end of this cold-air conduit is closed by a head 37; but the lower end of said conduit is open, so that cold air may readily flow thereinto. In this conduit and below the opening 20 of the lowermost box 12 is arranged a damper 38, which is adapted to be manipulated by the rod 39.

The front 5 of the inclosing casing is preferably equipped with the cleaning-doors 40 41, by which access may be obtained to the flues 23, 28, and 29 for the purpose of removing the soot and ashes which may accumulate within the furnace.

If desired, the lowermost hot-air box 12 may be provided with a central smoke flue or passage 42, the same extending longitudinally of the furnace, as clearly shown by Figs. 2 and 3, whereby the smoke and products of combustion may pass centrally through the flue 42 and on both sides of the box 12 through the flues 19 19^a, thereby increasing the heating area of the lowermost box, which is exposed directly to the heat from the bed of incandescent fuel in the combustion-chamber 16.

By reference to Fig. 1 it will be seen that the feathered arrows indicate the course of circulation of the heated products of combustion from the chamber 16 to the outlet 11, while the unfeathered arrows show the course of circulation of the cold air, which is heated in the boxes 12, 13, and 14 and is discharged by the warm-air outlets thereof. The damper 32 may be opened when it is desired to establish a direct draft from the chamber 16 to the smoke-outlet—as, for example, when starting a fire in the furnace. The closing of this damper 32 is also advantageous in the event of cutting off some of the hot air from the furnace. This object may also be accomplished by adjusting the damper 38 in the cold-air flue 36, thereby regulating the volume of air through the flue and the supply to the series of hot-air boxes 12, 13, and 14.

Changes within the scope of the appended claims may be made in the form and proportion of some of the parts while their essential features are retained and the spirit of the

invention is embodied. Hence I do not desire to be limited to the precise form of all the parts as shown, reserving the right to vary therefrom.

I claim—

1. A hot-air furnace comprising a suitable casing, a lower hot-air box having side and central smoke-flues traversing it and having a cold-air inlet and a hot-air outlet, an upper hot-air box having a smoke-tube and a hot-air outlet as well as a cold-air inlet, an intermediate hot-air box having a smoke-tube and air inlet and outlet, and a damper arranged in operative relation to the smoke-tube of the upper box, substantially as described.

2. A hot-air furnace comprising a rectangular casing, a series of hot-air boxes having horizontal flat top and bottom sides traversing the casing, each box having a cold-air inlet at one end and a hot-air outlet at the other, a fire-chamber located at the bottom of the casing, flue-chambers located between the boxes and above the uppermost one thereof, smoke-passages connecting the successive flue-chambers at opposite sides of the casing whereby to cause an alternating circulation of the flue-gases back and forth, a flue connection connecting the last one of said flue-chambers only with the chimney, and an alternative passage-way for the flue-gases having a damper therein and located immediately beneath said flue connection connecting the last two flue-chambers, whereby to regulate the circulation of the flue-gases.

3. A hot-air furnace comprising a rectangular casing, a series of hot-air boxes having horizontal top and bottom sides traversing the casing, each box having a cold-air inlet at one end and a hot-air outlet at the other, a fire-chamber located at the bottom of the casing, flue-chambers located between the boxes and above the uppermost one thereof, smoke-passages connecting the successive flue-chambers at opposite sides of the casing whereby to cause an alternating circulation of the flue-gases back and forth, a flue connection connecting the last one of said flue-chambers only with the chimney, an alternative passage-way for the flue-gases having a damper therein and located immediately beneath said flue connection connecting the last two flue-chambers, whereby to regulate the circulation of the flue-gases, and doors formed opposite each of said flue-chambers.

4. A hot-air furnace comprising a rectangular casing, a series of hot-air boxes having horizontal top and bottom sides traversing the casing, each box having a cold-air inlet at one end and a hot-air outlet at the other, a fire-chamber located at the bottom of the casing, flue-chambers located between the boxes and above the uppermost one thereof, smoke-passages connecting the successive flue-chambers at opposite sides of the casing whereby to cause an alternating circulation of the flue-gases back and forth, a flue connection connecting the last one of said flue-

chambers only with the chimney, an alternative passage-way for the flue-gases having a damper therein and located immediately beneath said flue connection connecting the last
5 two flue-chambers, whereby to regulate the circulation of the flue-gases, doors formed opposite each of said flue-chambers, and a cold-air-inlet box comprising a passage-way formed on the exterior rear wall of the casing and con-

necting the inlet-openings of said hot-air boxes, substantially as described.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

DONALD SKINNER McDONALD.

Witnesses:

WALTER GILLIS,
DONALD SMITH.