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H. STRAND.
HOT AIR HEATER.
APPLICATION FILED APR. 20, 1911.

Patented Jan. 9, 1912.
2 SHEETS—SHEET 1.

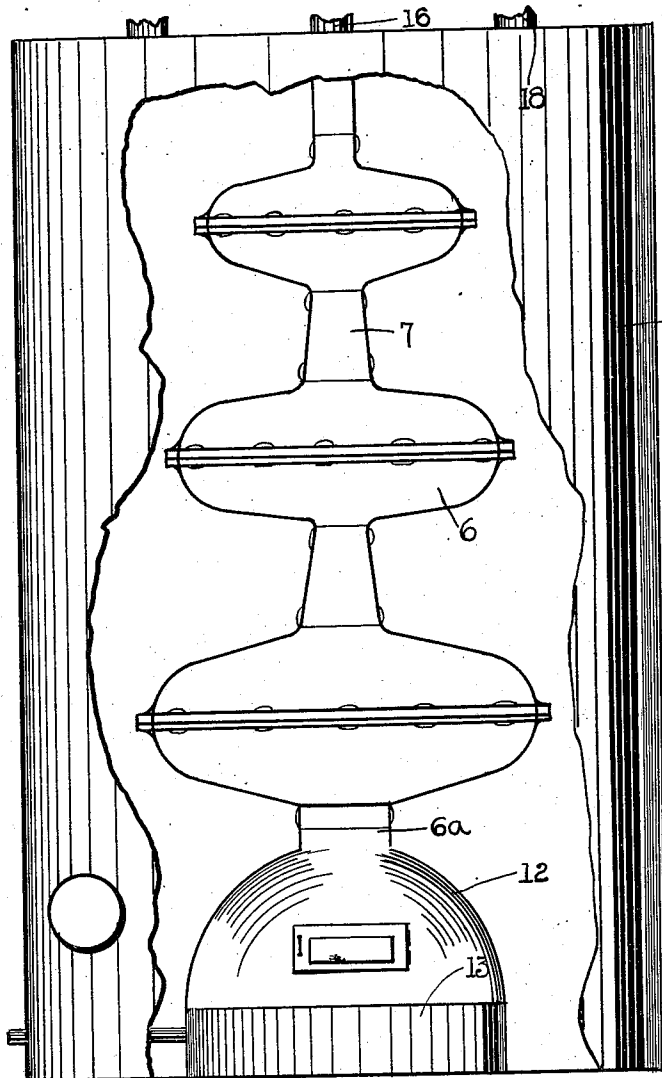


FIG. 1.

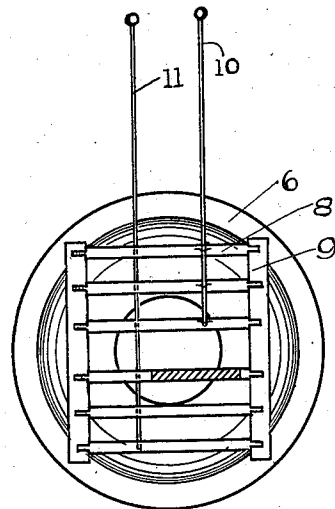


FIG. 3.

Witnesses.

William Scheibel
C. N. Whitfield

Inventor
Henry Strand
by *Bomhardt & Co.*
Attorneys

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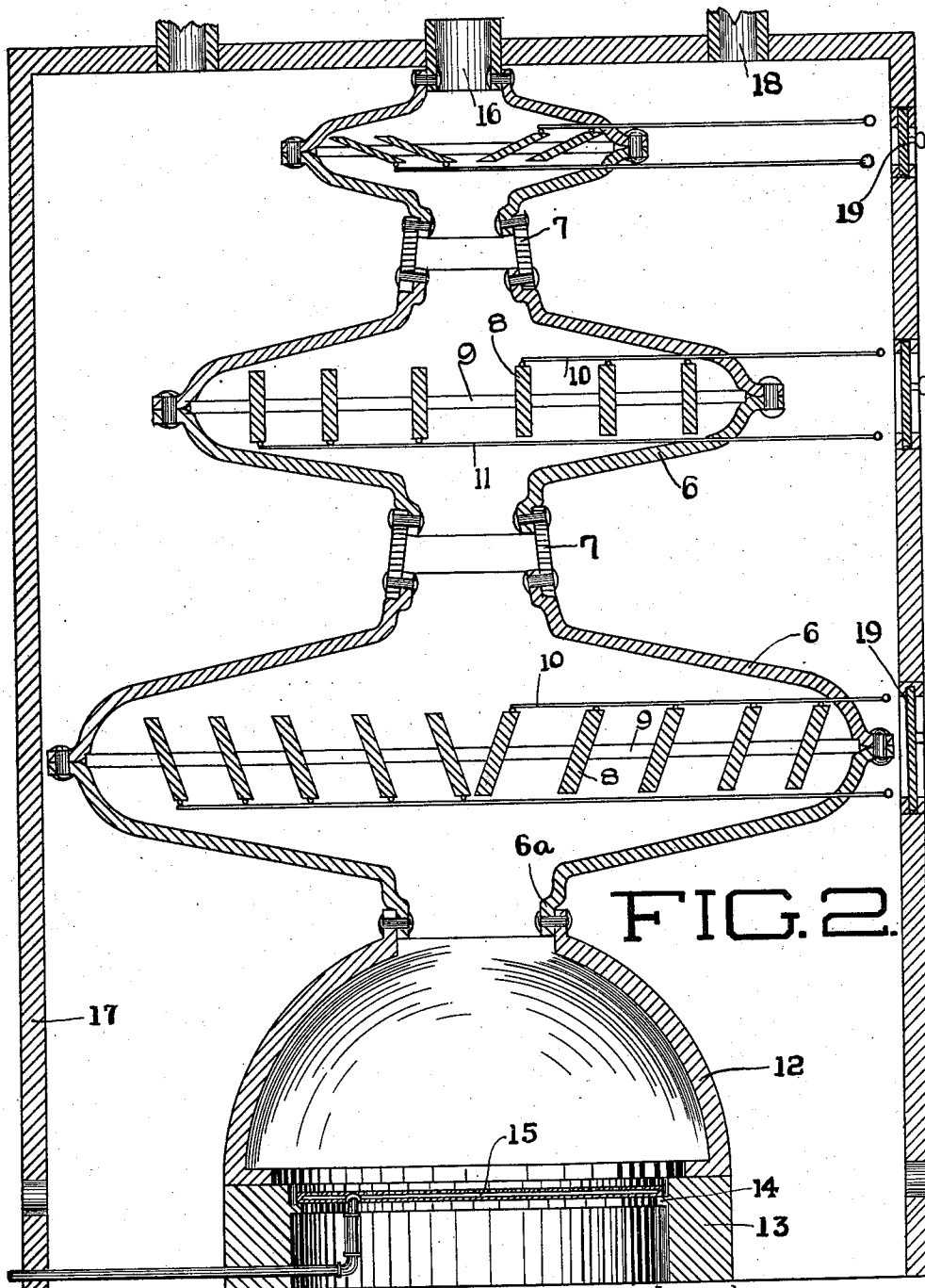


FIG. 2.

Witnesses.
William Scheibel.
C. N. Whitfield

Inventor
Henry Strand.
by *Baumgardner & Co.*
Attorneys.

UNITED STATES PATENT OFFICE.

HENRY STRAND, OF CLEVELAND, OHIO.

HOT-AIR HEATER.

1,014,347.

Specification of Letters Patent.

Patented Jan. 9, 1912.

Application filed April 20, 1911. Serial No. 622,275.

To all whom it may concern:

Be it known that I, HENRY STRAND, citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Hot-Air Heaters, of which the following is a specification.

This invention relates to hot air heaters or furnaces, and is capable of use with either gas fuel or coal, being illustrated as a gas furnace or heater.

The object of the invention is to provide a heater with improved means for distributing and controlling the products of combustion in order to produce the greatest heating effect and to effectively control the same as may be necessary or desirable according to the amount of heat desired and the kind of fuel used.

The heater embodies a series of radiating or heat distributing chambers which progressively decrease in size in accordance with the contraction of the gases incident to the cooling thereof, and these chambers or radiators are located in a casing which forms a hot air space which progressively increases in size, according to the expansion of the heated air. The flow of the products of combustion through the radiating chambers is controlled by adjustable dampers.

In the accompanying drawings—Figure 1 is a front elevation of the furnace, part of the outer casing being broken away. Fig. 2 is a vertical section. Fig. 3 is a plan of the lower half of one of the radiator sections.

Referring specifically to the drawings, 12 indicates a base on which the fire pot 13 rests, and this base supports a gas burner 15 on lugs 14. For use of coal as fuel the gas burner is removed and a grate substituted.

The fire pot communicates through an opening at the top with a double conical casing 6, preferably formed in upper and lower halves bolted together, the lower half having a neck 6^a fitting within a collar at the top of the fire pot 12, and bolted thereto. This lower casing is connected by means of a neck 7 with another similar casing, and this in turn is connected with a third or upper similar casing, the casings being successively smaller in size, from the bottom to the top and forming a series of chambers through which the products of combustion pass from the fire pot to the outlet or smoke pipe 16.

Each radiating casing or chamber has

therein a damper consisting of a series of pivoted blades or shutters 8 mounted to turn on cross rods 9, and the blades on opposite sides of the middle line are connected respectively to upper and lower rods 10 and 11 which can be shifted in or out, to set the blades at any angle desired.

The fire pot and radiating structure as above described are inclosed within the outer casing 17, which is preferably cylindrical in shape, so that the inner air space is greatest at the top where the air is most expanded. The service pipes 18 extend from the top of this casing for the delivery of the heated air, and a series of sliding doors 19 are provided in the wall of the casing to allow access to the rods 10 and 11 for manipulation thereof.

The lowest radiator is made largest to accord with the greater volume and heating power of the products of combustion and with the smaller volume of the cold air which enters at the bottom of the casing as usual. As the products of combustion cool they rise into the smaller radiating chambers and the heated air flows upwardly around said chambers into the larger air space at the top of the casing. The pyramidal arrangement of the radiators thus corresponds to the flow and volume both within and without the same.

In order to control the flow through the radiators the dampers are provided, so by closing the dampers the flow may be delayed, or vice versa, and the dampers are so arranged, as shown in the lower radiator in Fig. 2, that when partly closed they extend at such an inclination as to direct the products of combustion outwardly against the casing or wall of the radiator and by adjusting the dampers of the various radiators the flow can be controlled according to the state of the fire and according to the amount of heat desired. Thus in Fig. 2 the flow from the burner will be somewhat delayed in the lowest radiator, but the dampers in the upper radiators, being set wide open, will allow a free flow therein, and the maximum heating efficiency will be attained by partly closing the dampers in all of the radiators.

When gas is used as fuel it will be found desirable to close one or more of the dampers, in order to reduce the draft, but when coal is used a greater draft is essential and therefore the dampers will be

opened more or less. This arrangement enables the furnace to be economically used with either gas or solid fuel, and the flow through the heating drums or radiators can be controlled both according to the draft and the heating effect desired. Any dirt or soot which is deposited on the blades of the dampers can be readily dislodged by shaking the same, and the dirt will fall to the bottom of the furnace.

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

1. In an air heater, the combination of an outer casing, and a succession of enlarged radiators located therein one above another and successively smaller in size, with contracted connecting necks, and an inlet for products of combustion at the bottom and an outlet for the same at the top, and independently adjustable deflectors in each radiator, comprising a plurality of blades spaced apart and adjustable to various inclinations to permit a direct flow

from one neck to the neck above and to direct more or less of the products of combustion, entering through the necks, toward the peripheral portion of the radiators.

2. In an air heater, the combination of an outer casing, a fire box in the lower part thereof, a plurality of radiators mounted in communication one above the other and upon said fire box, the radiators decreasing successively in size, toward the top, and an independently operable damper controlling the flow in each radiator, each damper comprising a plurality of blades extending across the radiator and adjustable to vary the flow of the products of combustion through said radiator, whereby the effective heating action of each radiator may be independently varied.

In testimony whereof, I do affix my signature in presence of two witnesses.

HENRY STRAND.

Witnesses:

JOHN A. BOMMARDT,
STEDMAN J. ROCKWELL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."