

No. 816,275.

PATENTED MAR. 27, 1906.

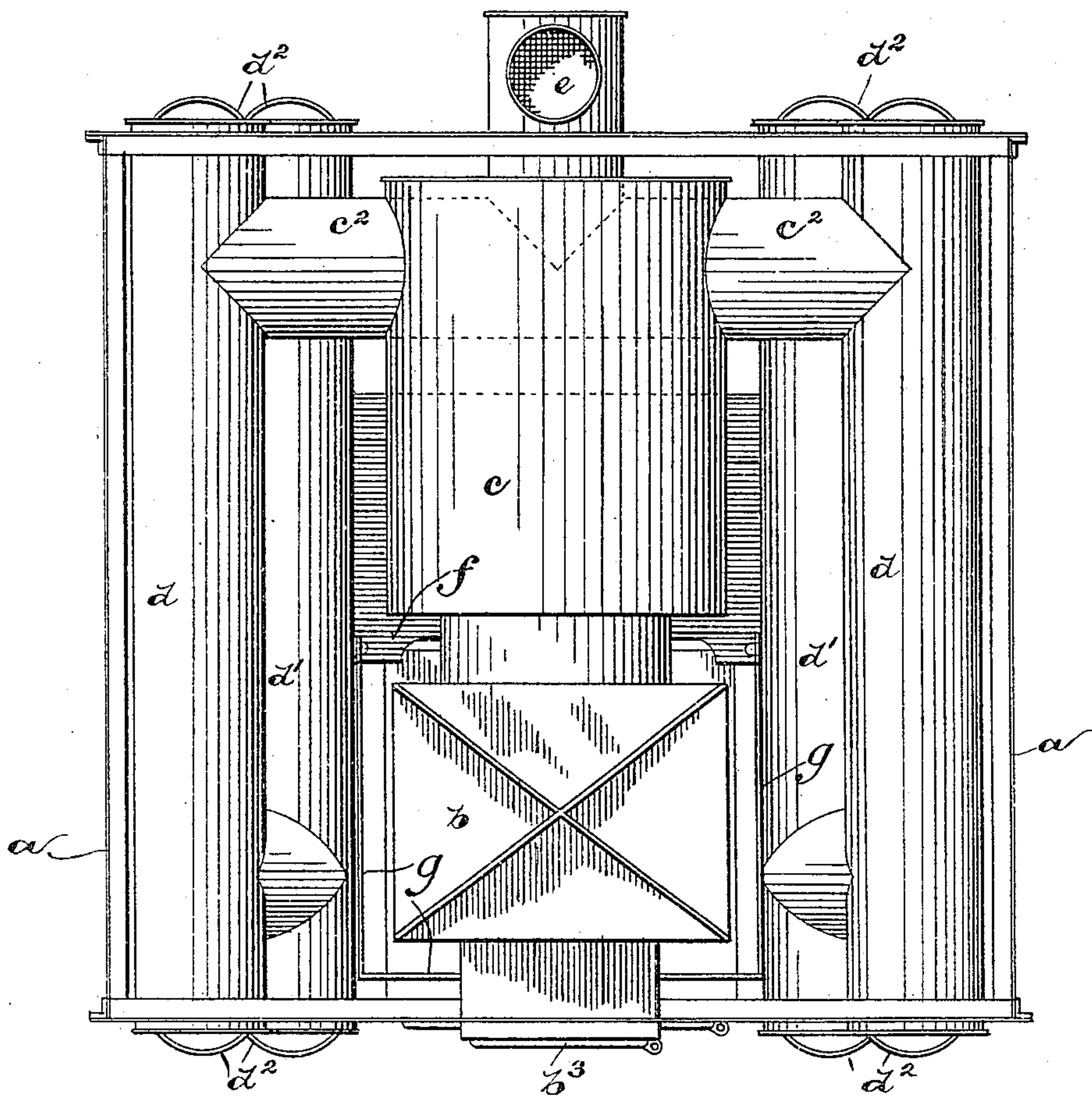
R. S. THOMPSON.

FURNACE.

APPLICATION FILED NOV. 23, 1904.

3 SHEETS—SHEET 1.

Fig. 1



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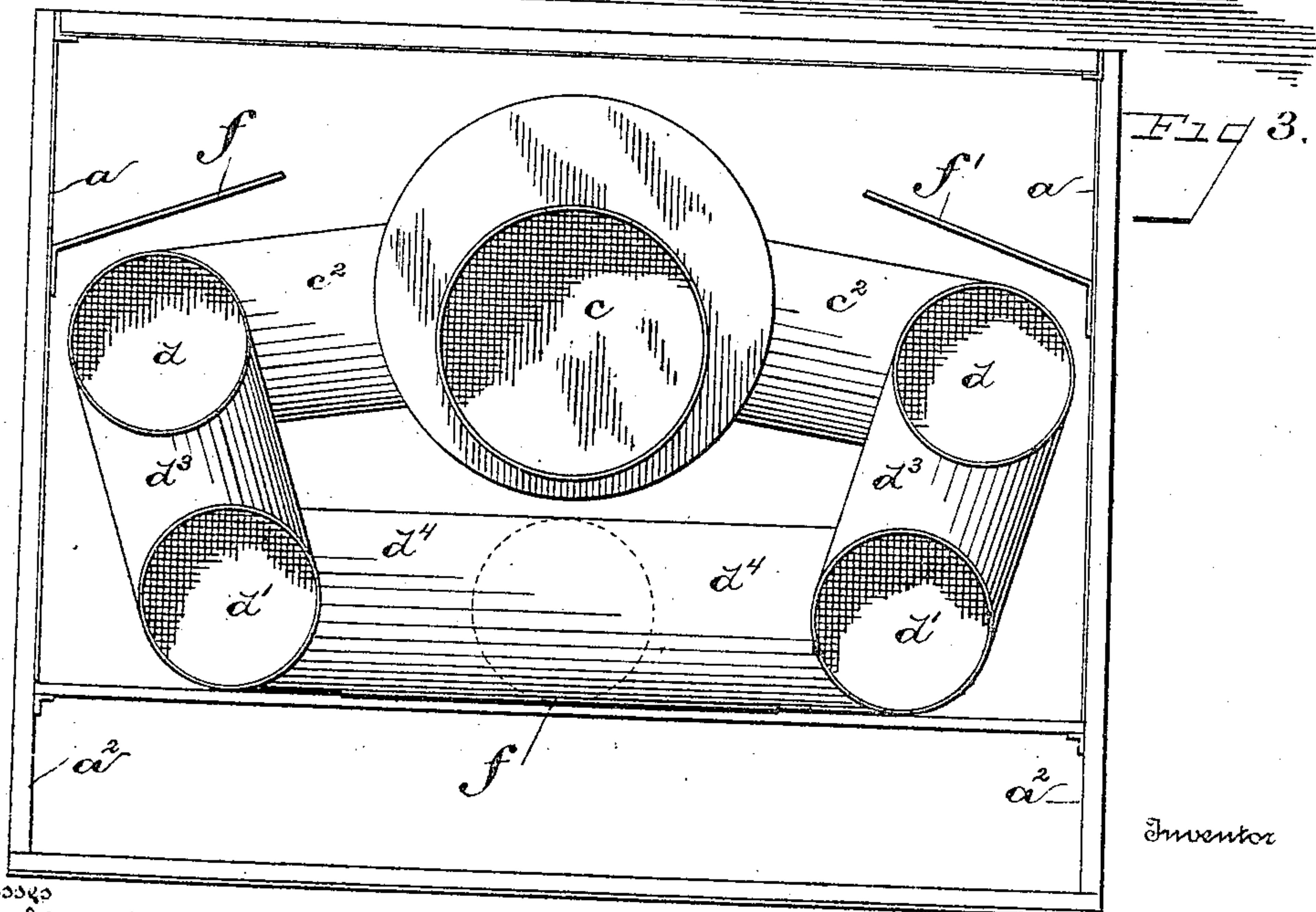
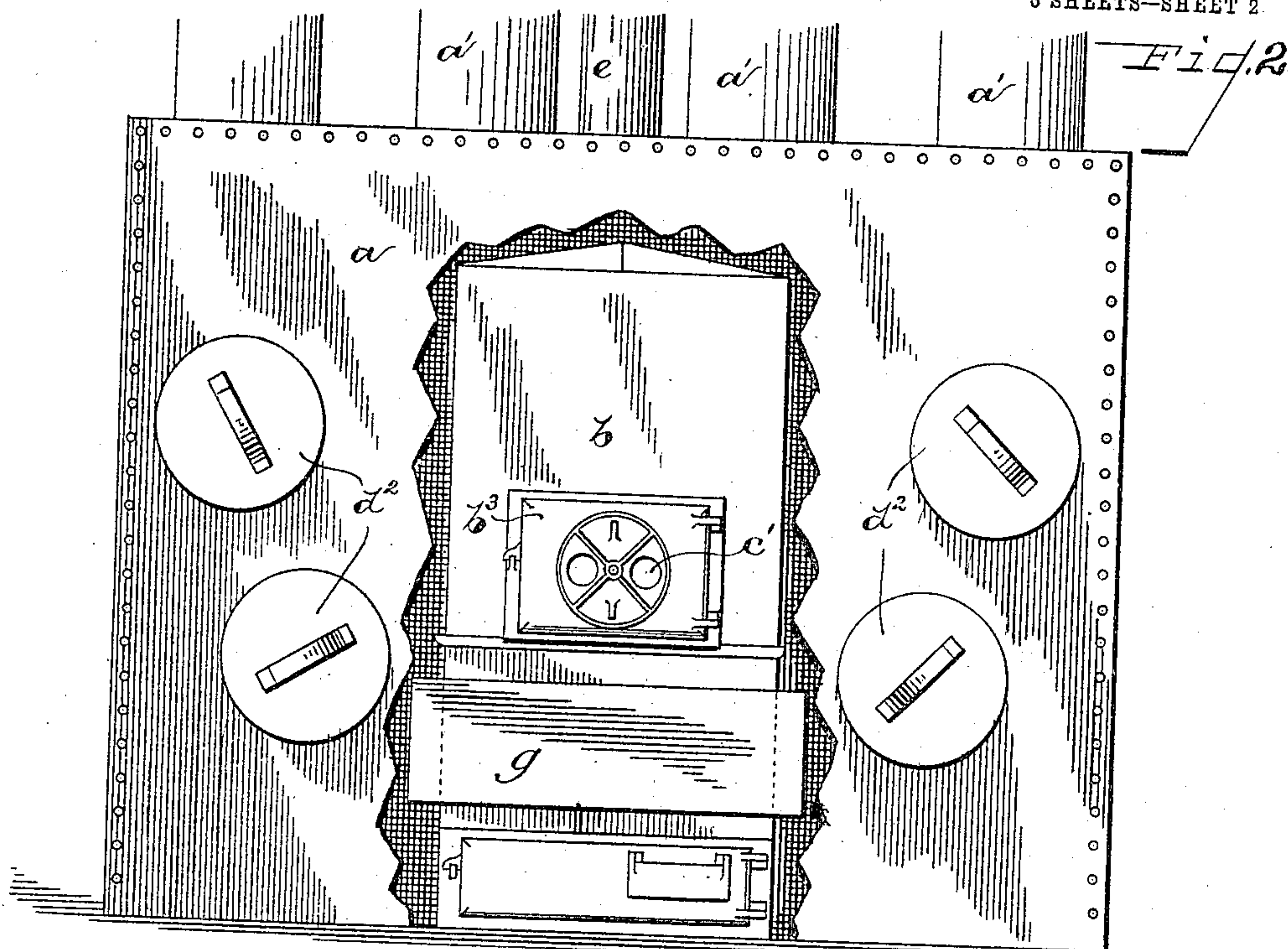
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3 SHEETS—SHEET 2.



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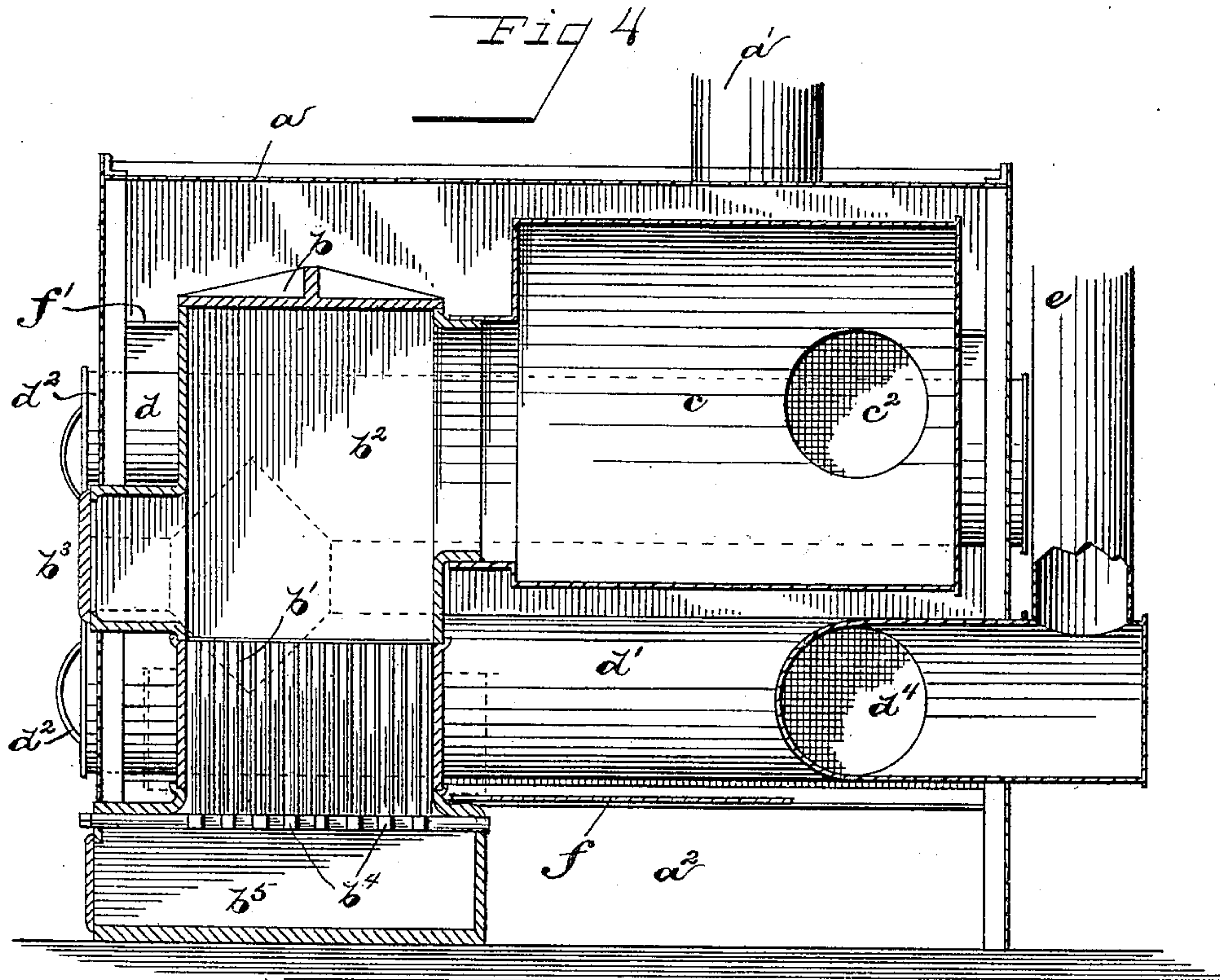
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

RALPH S. THOMPSON, OF SPRINGFIELD, OHIO, ASSIGNOR TO THE
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FURNACE.

No. 816,275.

Specification of Letters Patent.

Patented March 27, 1906.

Application filed November 23, 1904. Serial No. 233,981.

To all whom it may concern:

Be it known that I, RALPH S. THOMPSON, a citizen of the United States, residing at Springfield, in the county of Clark and State of Ohio, have invented certain new and useful Improvements in Furnaces, of which the following is a specification.

My invention relates to heating apparatus, and particularly to hot-air furnaces adapted to use as fuel coal, coke, wood, or gas.

The object of my invention is to simplify the construction of such devices whereby they are not only cheapened but are rendered more efficient in operation by providing a structure wherein a high percentage of heat units usually lost by escape through the chimney may be utilized. This is accomplished by the arrangement of the circulation of the smoke and gaseous products of combustion on the way to the chimney and of the air as it passes through the furnace-casing on its way to enter the hot-air pipes. The relation of these is such that all the heat contained in these gaseous products, except a small per cent. which is necessary in order to maintain the draft, is taken from them by the air and used to heat the building.

A further object is to provide a structure in which there will be a more perfect combustion of fuel.

With the above primary and other incidental objects in view my invention consists of the means, construction, and mode of operation hereinafter described, and set forth in the claims.

In the drawings, Figure 1 is a plan view of my improved heating apparatus, the top of the casing being removed. Fig. 2 is a front elevation of the apparatus, a portion of the casing being broken away to expose the fire-box. Fig. 3 is a front elevation of the apparatus with the front of the casing and fire-box removed. Fig. 4 is a longitudinal sectional view of the apparatus.

Like parts are indicated by similar characters of reference throughout the several views.

In the drawings, *a* represents a rectangular metal casing preferably supported upon a suitable framework of angle-iron, as illustrated. Connected with the top of this casing *a* is a series of hot-air pipes *a'* *a'*, by which the heated air is conveyed to various parts of the house. The casing *a* is cut away

on opposite sides at *a*² to provide an air-inlet, the supply being drawn from the furnace-room. However, a connection may be made with the exterior of the building without departing from the spirit of the invention.

b is the fire-box or furnace proper, which may be of any suitable form. In the drawings is shown a rectangular fire-box having a corrugated fire-pot *b'*, a combustion-chamber *b*², a firing-door *b*³, grates *b*⁴, and an ash-pit *b*⁵. Immediately in the rear of the combustion-chamber *b*², communicating therewith through a comparatively large opening, is a secondary combustion-chamber or drum *c*, formed of sheet metal. A draft-opening *c'* in the firing-door *b*³ sends a large jet of fresh air over the bed of hot coals and into this chamber, producing perfect combustion of the smoke and gas arising from the fuel.

Adjacent to the rear end of the drum *c* and leading therefrom are lateral flues *c*² *c*², which connect with the uppermost of a series of longitudinal flues *d* *d'* or radiator-pipes, which are technically known as "separators." The separators *d* *d'* (four being shown in the drawings) extend longitudinally through the casing *a*, with their ends protruding beyond said casing both in front and rear. The protruding ends of the separators are provided with removable caps *d*², by means of which the separators may be easily opened when necessary for cleaning. The products of combustion after entering the upper separators *d* pass forward to a point in proximity to their forward ends, where there are attached downwardly-extending flues *d*³, communicating with the lower separators *d'*. Through the lower separators the products of combustion are conducted rearwardly. Near their rearward ends the lower separators are connected by the lateral arms *d*⁴ *d*⁴ of a **T**, the longitudinal arm of which communicates with a flue or smoke-stack *e*. By referring to Figs. 1 and 3 it will be seen that the upper and lower separators *d* and *d'* are not in the same vertical plane, but are somewhat staggered.

To give to the current of fresh air which enters at *a*² below the sides of the casing *a* a tortuous passage to the hot-air pipes, so as to assure the fresh air being thoroughly heated by contact with the separators and drum, deflectors *f* *f'* are provided. The deflector occupies a horizontal plane somewhat lower

than that of the lower separators and immediately below the secondary combustion-chamber *c*. The deflector *f* prevents the air rushing straight upward to the hot-air pipes, 5 in which course it would only come in contact with the shell of the combustion-chamber. By means of this deflector *f* the air is only permitted to pass upwardly at either side of the casing *a*, where it will first contact with 10 the lower separator *d'*, extracting from the spent products of combustion passing there-through any heat which still remains therein. After passing the lower separator the air-current passes over the upper separator, containing 15 live products of combustion, at a comparatively high temperature and extracting therefrom a great amount of heat.

Extending inwardly from either side of the casing *a* and above the separators *d* are the 20 deflectors *f'*, by which the air-current is directed toward the center of the casing and into contact with the combustion-chamber *c*, from which it derives a final heating, thus entering the distributing-pipes *a'* at a high degree of temperature. 25

To prevent the overheating of the lower separators where they pass in proximity to the fire-box, and, further, to prevent the overheating of the front of the casing, a deflector 30 *g*, extending around three sides of the fire-box, is provided, as shown in Figs. 1 and 2.

While in the drawings there are shown but two series of separator-pipes consisting of but two pipes each, it is to be understood that 35 either the number of series or the number of pipes in each may be increased without departing from the spirit of the invention.

It will be seen that by this construction the cold air enters the casing and is gradually 40 heated at each successive step until it reaches its highest temperature at the moment of dis-

tribution; that a very large portion of the heat units are separated from the products of combustion before the latter reach the chimney, thus affording great economy in the use 45 of fuel by producing a great amount of heat which may be utilized from a minimum amount of fuel.

Having thus described my invention, I claim— 50

In a heating apparatus as described, the combination of a rectangular casing, an air-inlet and an air-outlet in said casing, a fire-box and a combustion-chamber in said casing, a secondary combustion-chamber of comparative large size extending rearward from the primary combustion-chamber, upper and lower pairs of separator - tubes extending through said rectangular casing with their ends protruding beyond the walls thereof, 60 said upper pair of separator - tubes being more widely separated than the lower pair of separator-tubes, a connection between the secondary combustion - chamber and each separator-tube of the upper pair, a connection 65 between each upper separator-tube and its corresponding lower separator-tube, a flue and a connection between the flue and each of the lower separator - tubes, a horizontal deflector below the secondary combustion- 70 chamber, and inclined deflectors attached to the walls of said rectangular casing and overhanging the upper separator-tubes, substantially as specified.

In testimony whereof I have hereunto set 75 my hand this 16th day of November, A. D. 1904.

RALPH S. THOMPSON.

Witnesses:

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