

No. 684,027.

Patented Oct. 8, 1901.

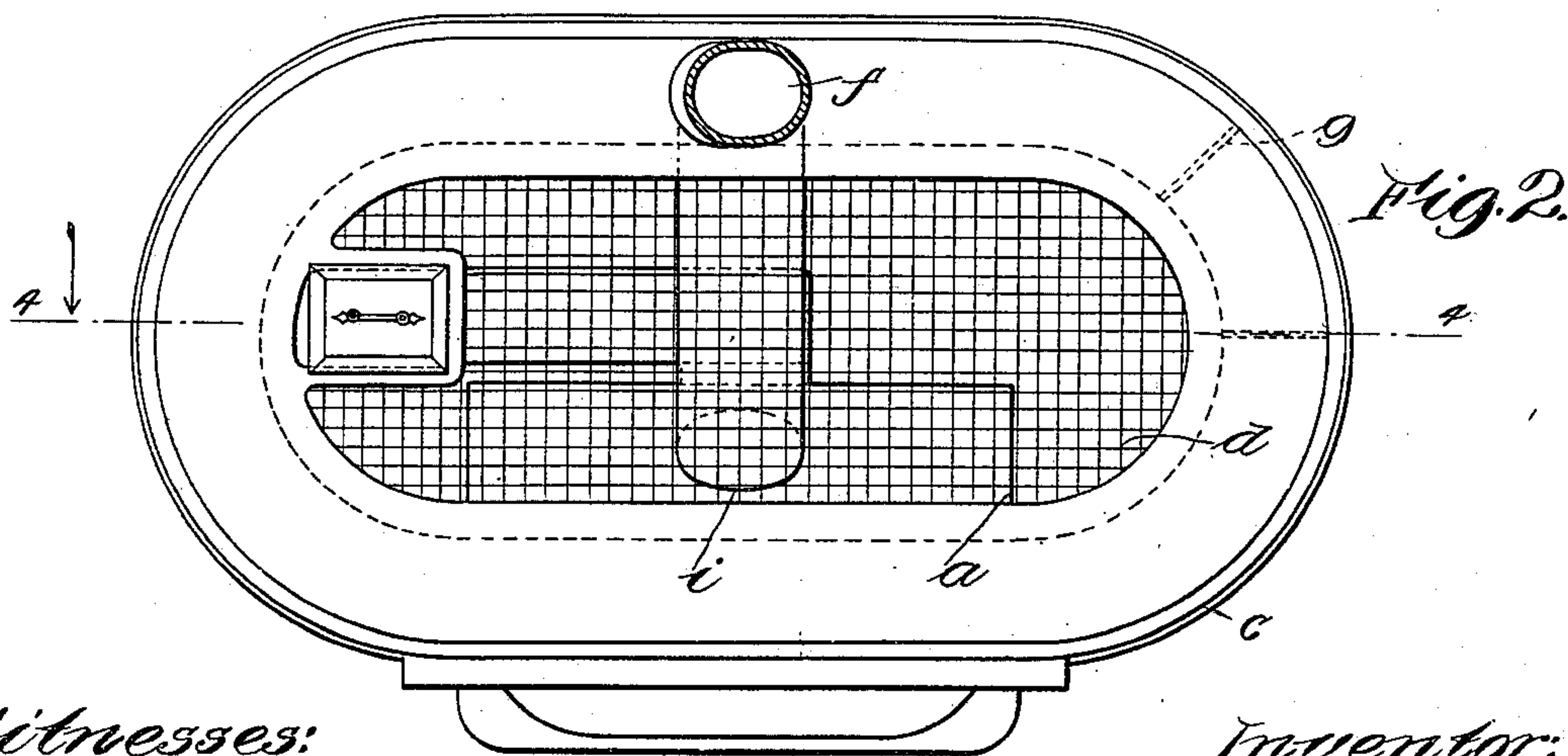
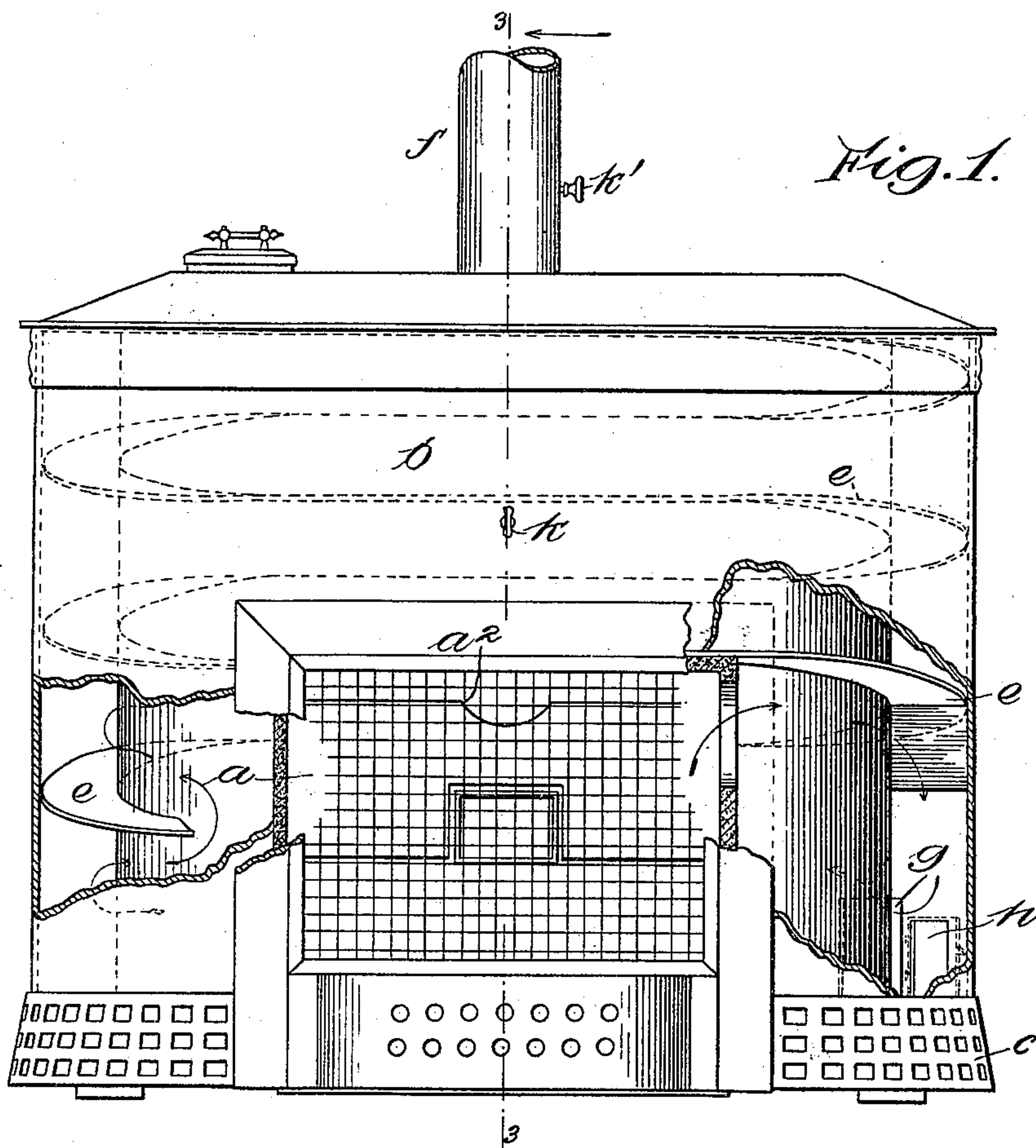
F. D. WOODRUFF.

HEATER.

(Application filed Jan. 16, 1901.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses:  
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2 Sheets—Sheet 2.

Fig. 3.

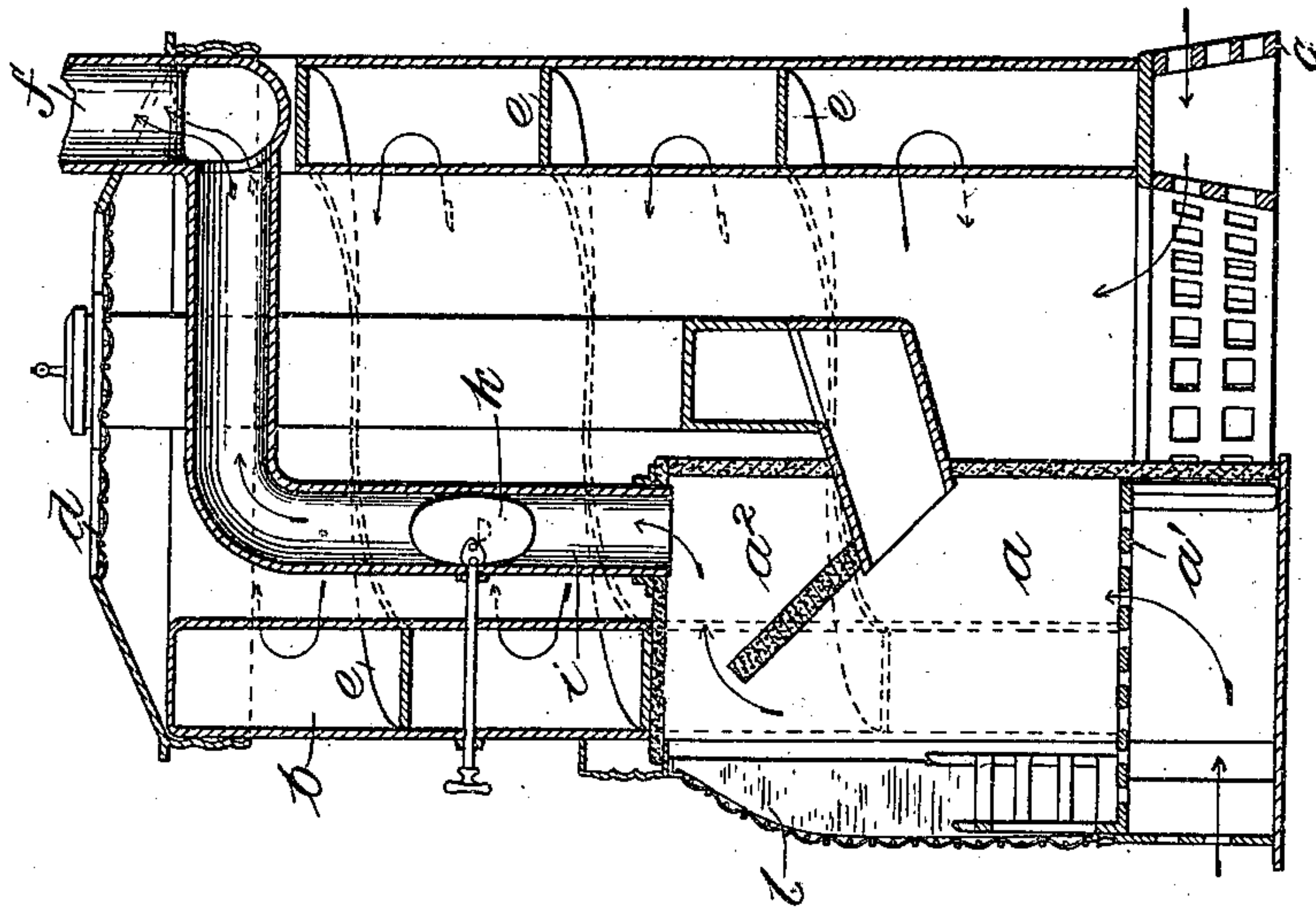
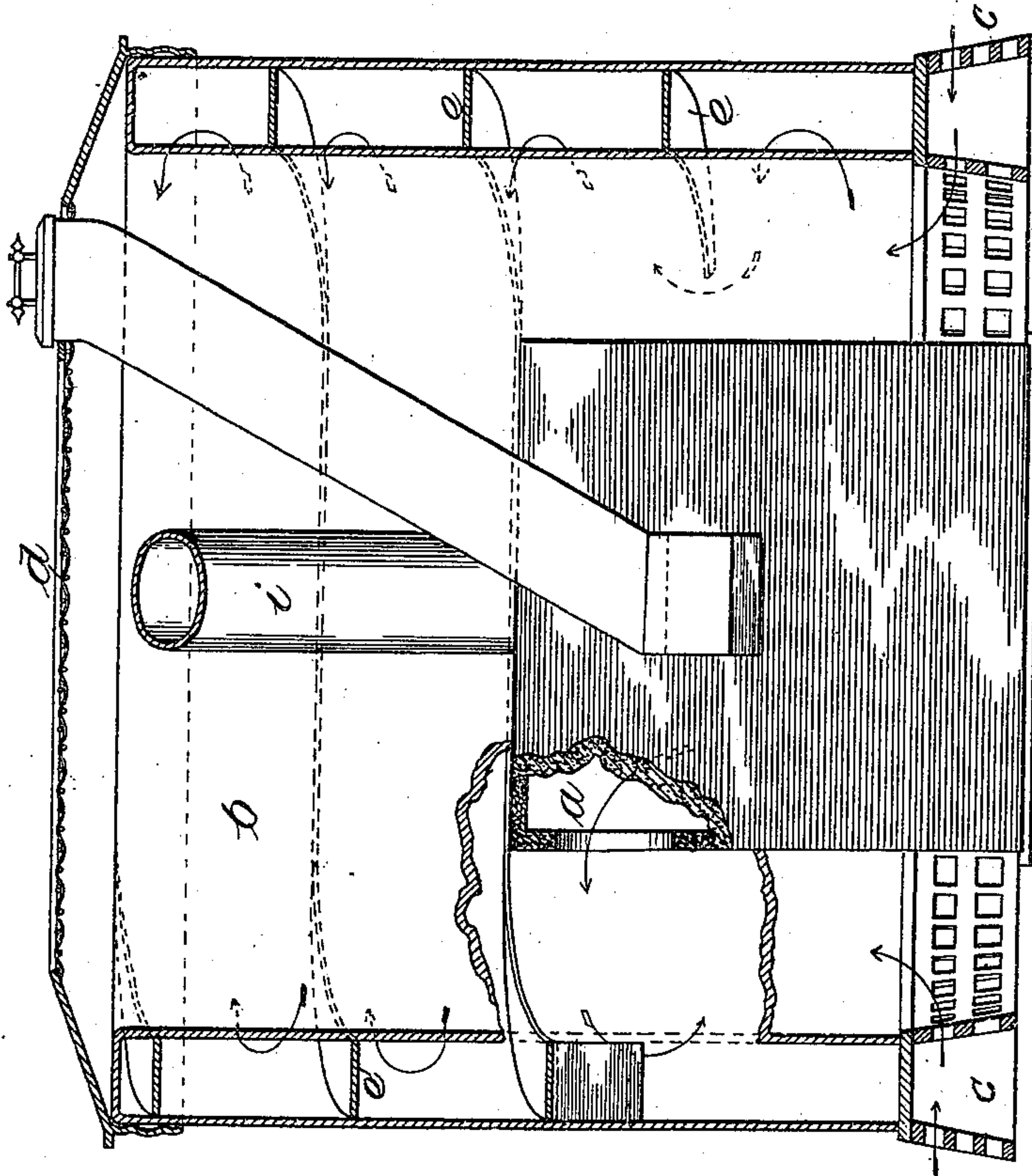


Fig. 4.



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# UNITED STATES PATENT OFFICE.

FREDERICK D. WOODRUFF, OF MAYWOOD, ILLINOIS.

## HEATER.

SPECIFICATION forming part of Letters Patent No. 684,027, dated October 8, 1901.

Application filed January 16, 1901. Serial No. 43,486. (No model.)

*To all whom it may concern:*

Be it known that I, FREDERICK D. WOODRUFF, a citizen of the United States, residing at Maywood, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Heaters, (Case No. 2,) of which the following is a full, clear, concise, and exact description.

My invention relates to a heater; and my object is to provide a heater of new and attractive design which may be placed directly in the room to be warmed and from which a maximum amount of heat will be obtained from a given consumption of fuel.

I will describe my invention in connection with the accompanying drawings, which illustrate the preferred embodiment thereof, and the features which I regard as new will be pointed out in the appended claims.

Figure 1 is a front elevation of the heater. Fig. 2 is a plan view thereof. Fig. 3 is a transverse vertical sectional elevation on line 3 3 of Fig. 1, and Fig. 4 is a sectional elevation taken on line 4 4 of Fig. 2.

The same letters of reference are used to designate the same parts wherever they are shown.

One of my objects has been to produce a heating-stove which would have the combined advantages of an ordinary stove and an open-grate fire, and I have therefore constructed the fire-pot *a* in the form of an open grate, as shown most clearly in Figs. 1 and 3. The general shape of this fire-pot is rectangular, like a box, with the front open. The fire-grate *a'*, upon which the fuel is to be burned, is set in the fire-pot a distance above the floor thereof, leaving an ash-pit underneath. A deflector-plate *a''* is placed diagonally in the fire-pot, as shown most clearly in Fig. 3, said deflector-plate extending from the rear wall of the fire-pot a few inches above the grate *a'* outward and upward, slanting toward the open front of the fire-pot and terminating a few inches below the roof of the fire-pot to leave an open passage between the plate and the roof, through which the products of combustion may pass.

The body portion of the stove is in the form of a double-walled drum *b*, between the inner and outer walls whereof the products of combustion are led in spiral flues, which I

shall presently describe. An oblong open court is left in the center of the drum, through which air may rise and receive the heat from the drum. This court communicates with the outside of the stove at the bottom through the perforated base-plate *c* and at the top through the grating *d*. The fire-pot projects some distance into this court, so that the air rising through the court is heated by the rear wall of the fire-pot, as well as by the heated products of combustion passing through the drum. Spiral partitions *e e* are provided between the double walls of the drum *b*, forming flues through which the products of combustion from the fire-pot are led. These partitions are peculiarly arranged to take the greatest advantage of the heat given off from the fire-pot. The flue leads from the right-hand upper corner of the fire-pot, as seen in Fig. 1, and passes in a spiral downward course around the drum to the left-hand side of the fire-pot near the bottom. The partition which forms the roof of the flue at this point is cut away a little distance from the side wall of the fire-pot, so that, in effect, a flue is made which meeting the fire-pot near the lower edge rises vertically along the left-hand wall to the top and then passes back over itself in a spiral course to the other side of the fire-pot and thence along over the roof of the fire-pot in the front wall of the stove. The flue continues ascending spirally between the double walls of the drum until it terminates in a connection leading to the chimney *f*. In this way it will be seen that the heat radiated from all four sides and the top of the fire-pot is utilized, that from the front being thrown out directly into the room, that on the two sides and the top serving to superheat the gases passing around between the double walls of the drum, while the rear wall adds its heat to the air rising within the court, which is also warmed by the products of combustion circulating spirally through the drum.

I preferably provide the dust-arresting plate *g* in the lower part of the flue a short distance after it leaves the fire-pot, which plate serves not only to retain the products of combustion for a longer time within the flue, but also to catch and hold particles of soot and light solids which have been drawn into the flue without being entirely consumed. A door *h*



is provided in the lower part of the drum, through which the dust and soot may be removed from time to time as may be necessary.

The fuel which I prefer to use in my heater is coal, and I have provided a coal-chute leading from the top of the stove at the left in a diagonal direction down to the fire-pot, opening into the fire-pot on a line with the lower edge of the deflector-plate  $a^2$ . A hole is cut in the deflector-plate, through which the mouth of the coal-chute projects. In the operation of the stove the chute may be filled with coal, which will automatically feed itself down upon the fire as fast as the coal in the grate is consumed.

For starting the fire I have provided a direct-draft flue  $i$ , leading from the rear edge of the roof of the fire-pot directly to the chimney  $f$ . A damper  $k$  is provided in this flue, so that it may be closed after the fire is well under way. The usual check-damper  $k'$  may be provided in the stovepipe.

To prevent the inflow of cold air over the top of the fire, I preferably provide a mica front or screen  $l$ , which may be set in the grate in the manner of a "blower." This has all of the advantages of a blower, with the additional advantage that the light of the fire can be seen through it from the room and may be used or not, as desired.

In the operation of the stove the smoke and products of combustion rising from the grate are thrown forward by the deflector-plate  $a^2$  and passing through the narrow throat left near the roof of the fire-pot enter the flue, which is formed by the spiral partitions  $e e$ . The course of the gases at first is downward around the back of the drum to the other side wall of the fire-pot near the bottom, thence up alongside this wall to the top, then running back to the other side, passing over the top of the fire-pot and following a spiral course around the drum to the chimney.

Having thus described my invention, I claim as new, and desire to secure by Letters Patent, the following:

1. In a heating-stove, the combination with a double-walled drum having a central open court, of a fire-pot or open grate  $a$  set into the side of the drum and extending into the open court, a flue being provided around the drum between the walls thereof, whereby the products of combustion circulating in the

drum are reheated by both sides and the top of the fire-pot, and the air in the open court is heated by the rear wall of the fire-pot as well as by the drum, substantially as set forth.

2. In a heating-stove, the combination with a fire-pot  $a$ , of a heat-radiating flue connected with the fire-pot on one side, passing around back of the fire-pot to the other side thereof, rising alongside the fire-pot, then passing back over itself and continued spirally upward, passing over the top of the fire-pot and finally terminating in a chimney connection, said flue forming an inclosed court or heating-drum with the fire-pot set in the side thereof, substantially as described.

3. In a heating-stove, the combination with a tubular drum having a central court open at the top and communicating with the air at the bottom, of a fireplace or open grate set into the side of the drum, said drum having an opening or flue through which products of combustion pass from the fireplace into the drum, and partitions in the drum forming a flue leading spirally around the drum and communicating with the chimney connection at the top, substantially as described.

4. In a heating-stove, the combination with the fire-pot or grate, of a flue leading from the side of said fire-pot in a downward path around the back of the fire-pot to the opposite side thereof, and thence in a reversed spiral path upward to the chimney connection forming a central court, the said court communicating with the air at the top and bottom, whereby air entering at the bottom of the court is heated by the spiral flue and passes out at the top to warm the room, as described.

5. In a heating-stove, the combination with a fire-pot consisting of a fireplace or open grate, of a heat-radiating flue connected with the fire-pot on one side, passing around back of the fire-pot and ascending spirally to a chimney connection, the said flue forming a central court communicating with the air at the top and bottom, the fire-pot being set into the side of the central court so formed, substantially as set forth.

In witness whereof I hereunto subscribe my name this 14th day of January, A. D. 1901.

FREDERICK D. WOODRUFF.

Witnesses:

DE WITT C. TANNER,  
W. W. LEACH.