

(No Model.)

E. A. TUTTLE.
HOT AIR FURNACE.

No. 311,153.

Patented Jan. 20, 1885.

Fig. 1.

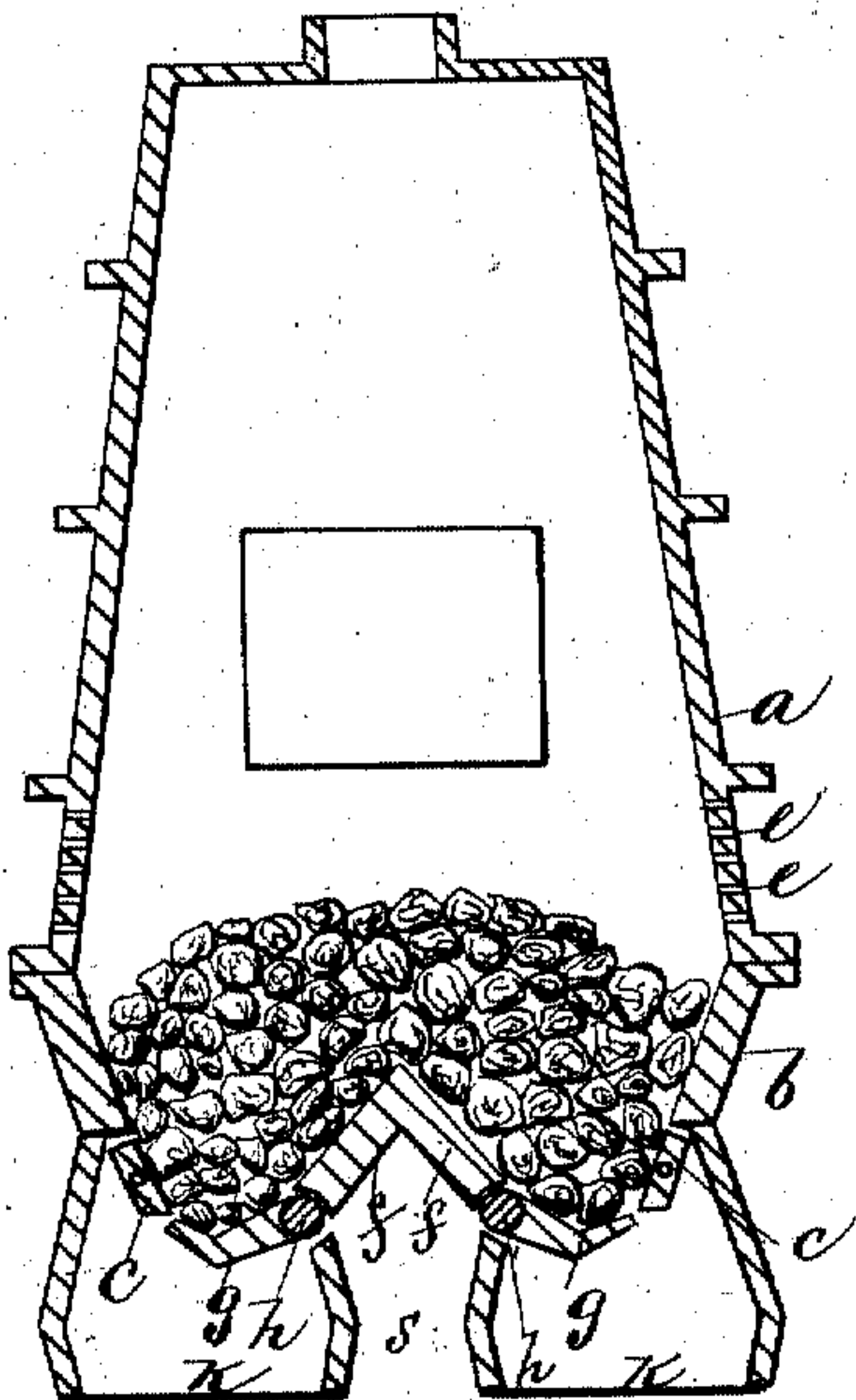


Fig. 4.

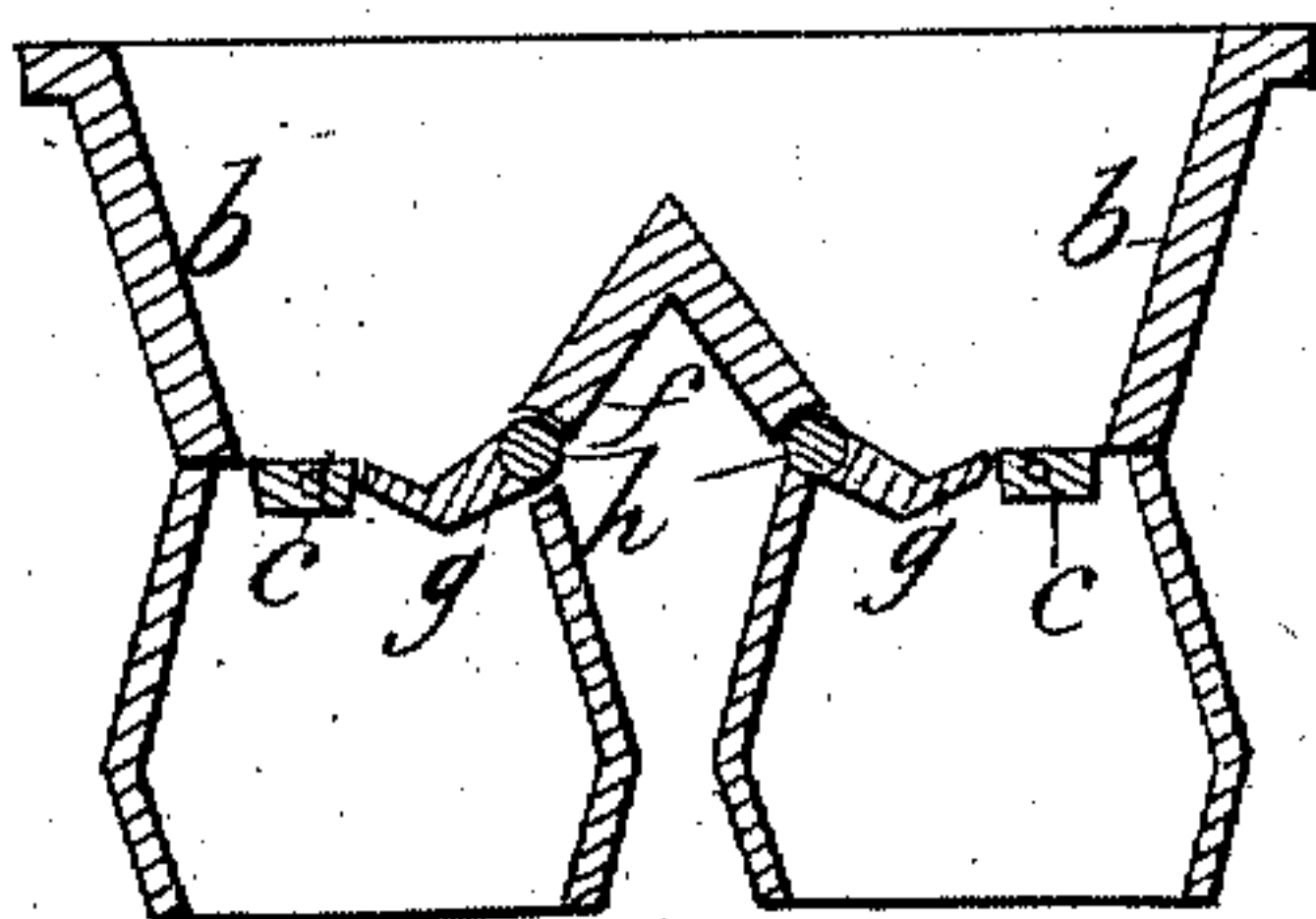
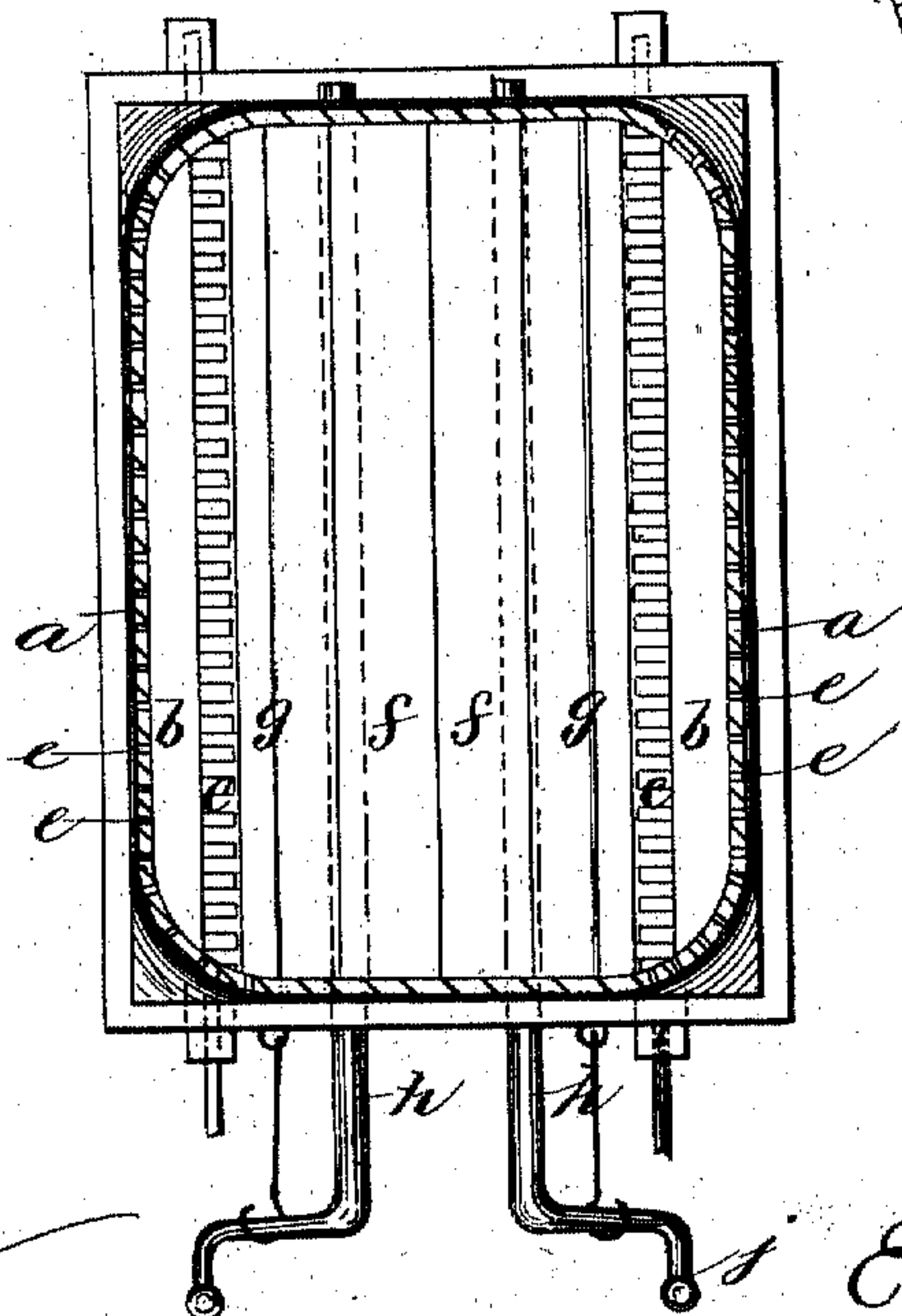


Fig. 2.



Witnesses.

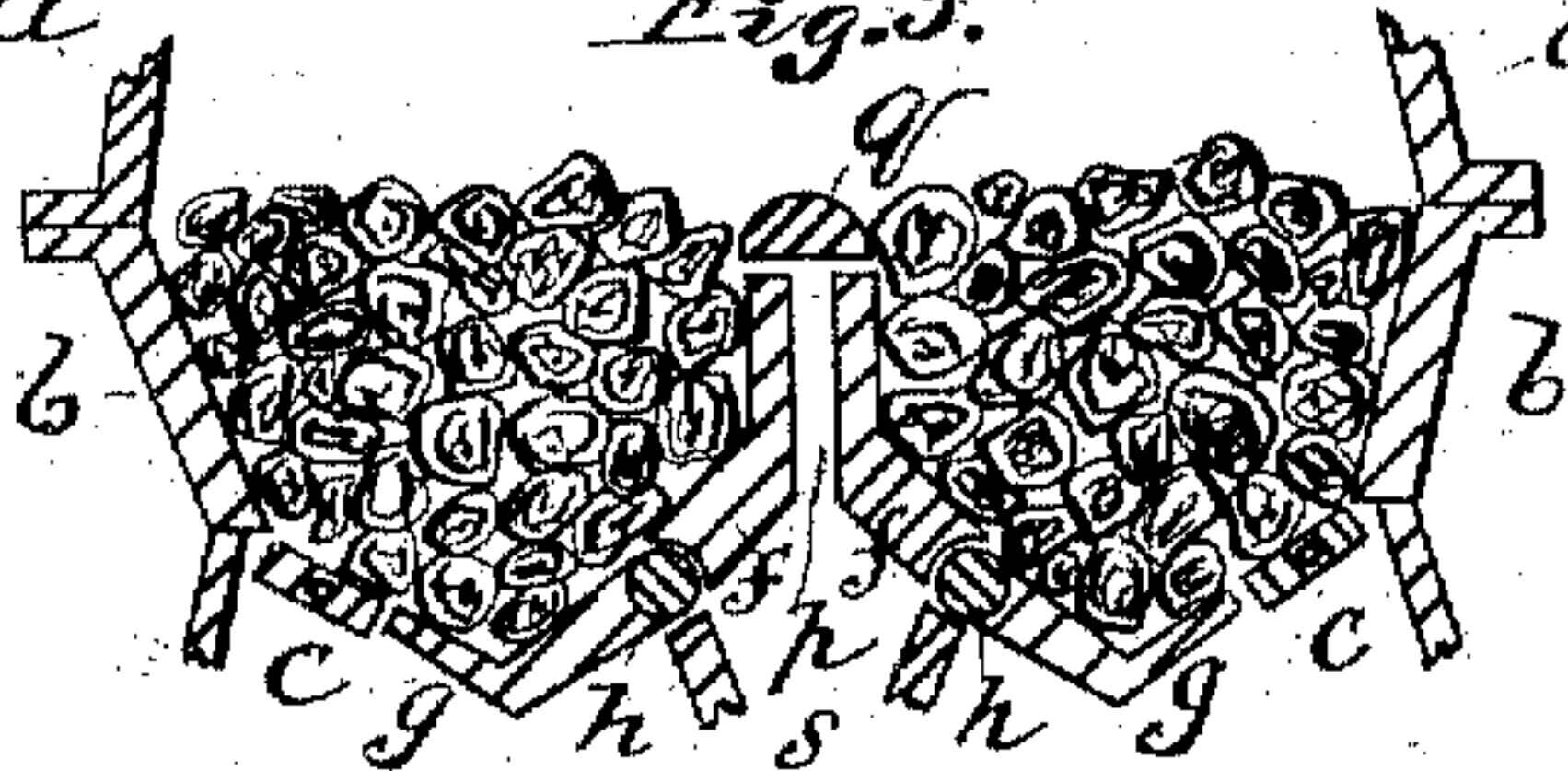
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S. A. Morgan, a

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By A. P. Thayer
att'y

Fig. 3.



UNITED STATES PATENT OFFICE.

EDWARD A. TUTTLE, OF NEW YORK, N. Y.

HOT-AIR FURNACE.

SPECIFICATION forming part of Letters Patent No. 311,153, dated January 20, 1885.

Application filed November 14, 1883. (No model.)

To all whom it may concern:

Be it known that I, EDWARD A. TUTTLE, a citizen of the United States, residing at New York city, in the county and State of New York, have invented new and useful Improvements in Hot-Air Furnaces, of which the following is a specification.

My invention consists of improved arrangements of the fire-box and grate of a hot-air or other furnace for heating purposes, designed to improve the combustion and increase the radiation of the heat, the said improvements being a continuance whereby proportionately larger area of radiating-surface is obtained for a given amount of grate-surface than in other furnaces, and a better means of effecting a properly-distributed supply of air above the fire-bed for the combustion of the gases is obtained; and it also consists of a duplex arrangement of the fire-box, whereby a part of the fire-box may be used independently of the other part when the whole capacity is not needed, and the whole may be used when so required, all as hereinafter fully described, reference being made to the accompanying drawings, in which—

Figure 1 is a transverse sectional elevation of my improved furnace. Fig. 2 is a plan view of the grate and fire-box. Fig. 3 is a section with an air-inlet through the bottom of the fire-box. Fig. 4 is a vertical section showing a modified form of the grate.

I construct the body *a* of the furnace in the lower portion, and the fire-box *b* in oblong form in horizontal section, and arrange the grate *c* along the two long sides of the fire-box, said grate extending the whole length of said sides, but only extending a short distance toward the center of the fire-box, and preferably being arranged in the steep inclines represented in Fig. 1, but it may be horizontal, the grate and the sides of the fire-box being thus extended and the breadth of the grate diminished, so that much larger heating-surface of the fire-box is exposed to the air and a much larger proportion of the fire impinges upon the heating-surface, so that with the increased area of heating-surface and the more intimate and extended distribution of the heat produced upon the said heating-surfaces much better results will probably be

gained in respect of economy of coal and the heating-power of the furnace.

Another important advantage of the disposition of the fire in narrow breadth and great length along the furnace-plate is the facility it affords for the introduction of oxygen above the fire-bed for the combustion of the carbonic oxide, in the necessary equal distribution to effect the intimate contact and uniform admixture for affording the requisite supply throughout the whole space without an oversupply that chills the fire and defeats the object of its introduction, as when larger volumes enter in fewer places and under less favorable conditions for equal distribution. This more uniform mixture of the air is effected by the long lines of fine perforations *e*, extending along the plates the whole length of the prolonged fire-grate, and by the narrow opening *p* along the apex of the bottom of the fire-box, through which the air is distributed to the thin volumes of gas, so as to supply the same with fresh oxygen in much greater proportion to the whole volume of gas than when the body of the fire is thicker, and the whole interior space is filled with gas to which the requisite amount of air for said interior cannot penetrate without being in too large volume for the gas in the nearer space, and thereby chilling it, and thus preventing its combustion. The space back of the fire-grate is to serve as a magazine for the supply of coal to the grate by descending the inclines *f* of the Λ -shaped middle imperforate section of the bottom of the fire-box, which I provide for the purpose, said inclines descending to the level of the lower ends of the grate-bars, or thereabout, but terminating a suitable distance therefrom to allow a door, *g*, to be introduced for opening sufficiently to allow the clinkers to be raked out from below and for dumping the whole contents of the fire-box when required. The doors are fixed on a pivot-shaft, *h*, having suitable bearings at the ends of the fire-box, and having a crank, *j*, at one end, suitably prolonged to project beyond the inclosing-wall of the furnace, for use in working the doors. The cranks will be supported by hooks or other means to hold up the doors, and the grates will in practice have bearings at the ends, allowing them to be shifted lengthwise

to shake the fire. In this example I have represented a double arrangement of the furnace—that is, a fire-grate along each side—which is the most desirable; but it is to be understood that the grate may be limited to one side only, when less heating-power will serve, and in such case the bottom *f* will have only one incline, and said bottom will be extended up to the side wall of the fire-box not having the grate. The air is to be allowed to circulate freely under the bottom *f*, for being heated, and for cooling the bottom for its protection, and for supplying air to the gases above the coal-bed. The ash-chambers *k* under the grates are to be suitably partitioned from the air-spaces for preventing the ashes from mixing with the air; but the inclosing furnace-wall will have suitable openings to said spaces for discharging the ashes.

It is to be observed that the duplex arrangement of the fire-grate herein represented, together with the Λ -shaped bottom between the two parts, enables a single fire to be made in one side of the fire-box on one grate only, or a double fire may be made on both sides, according to the amount of fire required, and the separation of the two grates by the bottom *f* is such that fire will not communicate from one side to the other, particularly as with separated ash-pits, as here represented, one may be closed to cut off the air-supply. The air-inlet passage *p* through the apex of the imperforate bottom *f* may be extended to the top of the fire-bed, or thereabout, to prevent the issue of the air below the surface of the fire-bed, and a cap, *q*, may be placed over the passage *p*, to prevent ashes from falling through into the air-space *s* below. This passage *p* may be used alone or together with the inlets *e* for the supply of air to burn the gases above the coal-bed. In some cases it may be preferred to dispense with the inlets *e*, to avoid the possibility of gases escaping through them into the air to be heated.

I am aware of the patent to Hershey, No. 189,218, in which there is a Λ -shaped middle section of the fire-grate a part of which is imperforate; but that is not a contrivance of two grates in one fire-box separated by an imperforate Λ -shaped bottom adapted to maintain a fire on one side only, because the air passing through said middle section, either the sides or top, will cause combustion over the whole grate, whereas the imperforate bottom of my contrivance is adapted to separate the two grates, so that fire may be retained on one grate alone, when desired; besides, in my arrangement the principal production of heat is along next to the sides and lowest parts of the fire-box, so that the greatest heat is produced where it is most effective.

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

1. In a heating-furnace, the fire-grate *c*, arranged along and projecting inward from the side of the fire-box, in combination with the door *g*, below or inside of the fire-grate, and the sloping bottom *f* of the fire-box back of the door, substantially as described.

2. In a heating-furnace, the fire-grates *c*, arranged along and projecting inward from the opposite sides of the fire-box, in combination with a door, *g*, below or inside of each grate, and with the inverted- V -shaped bottom *f*, arranged between said grates and doors, substantially as described.

3. In one and the same fire box or chamber, two separate fire-grates separated by the Λ -shaped imperforate bottom, substantially as described.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

EDWARD A. TUTTLE.

Witnesses:

W. J. MORGAN,
S. H. MORGAN.

It is hereby certified that in Letters Patent No. 311,153, granted January 20, 1885, upon the application of Edward A. Tuttle, of New York, New York, for an improvement in "Hot-Air Furnaces," an error appears in the printed specification requiring the following correction, viz: In line 13, page 1, the word "continuance" should read *contrivance*; and that the Letters Patent should be read with this correction therein to make it conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 10th day of February, A. D. 1885.

[SEAL.]

M. L. JOSLYN,
Acting Secretary of the Interior.

Countersigned:

BENJ. BUTTERWORTH,
Commissioner of Patents.