

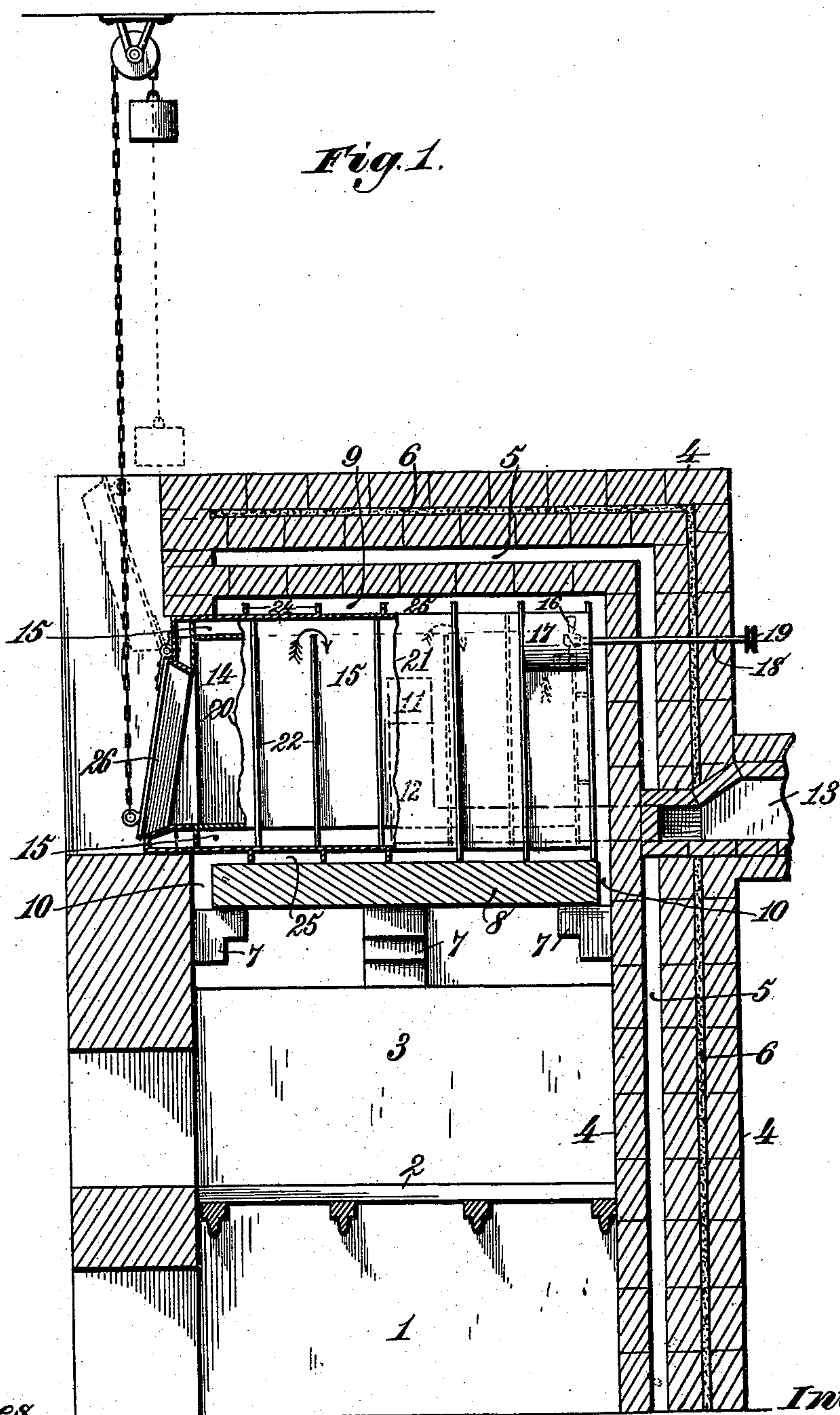
(No Model.)

2 Sheets—Sheet 1

G. F. SIMONDS.
METALLURGICAL FURNACE.

No. 507,460.

Patented Oct. 24, 1893.



Witnesses,
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W. Rea.

Inventor:
George F. Simonds.
By *Amos A. Norris,*
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(No Model.)

2 Sheets—Sheet 2.

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Fig. 2.

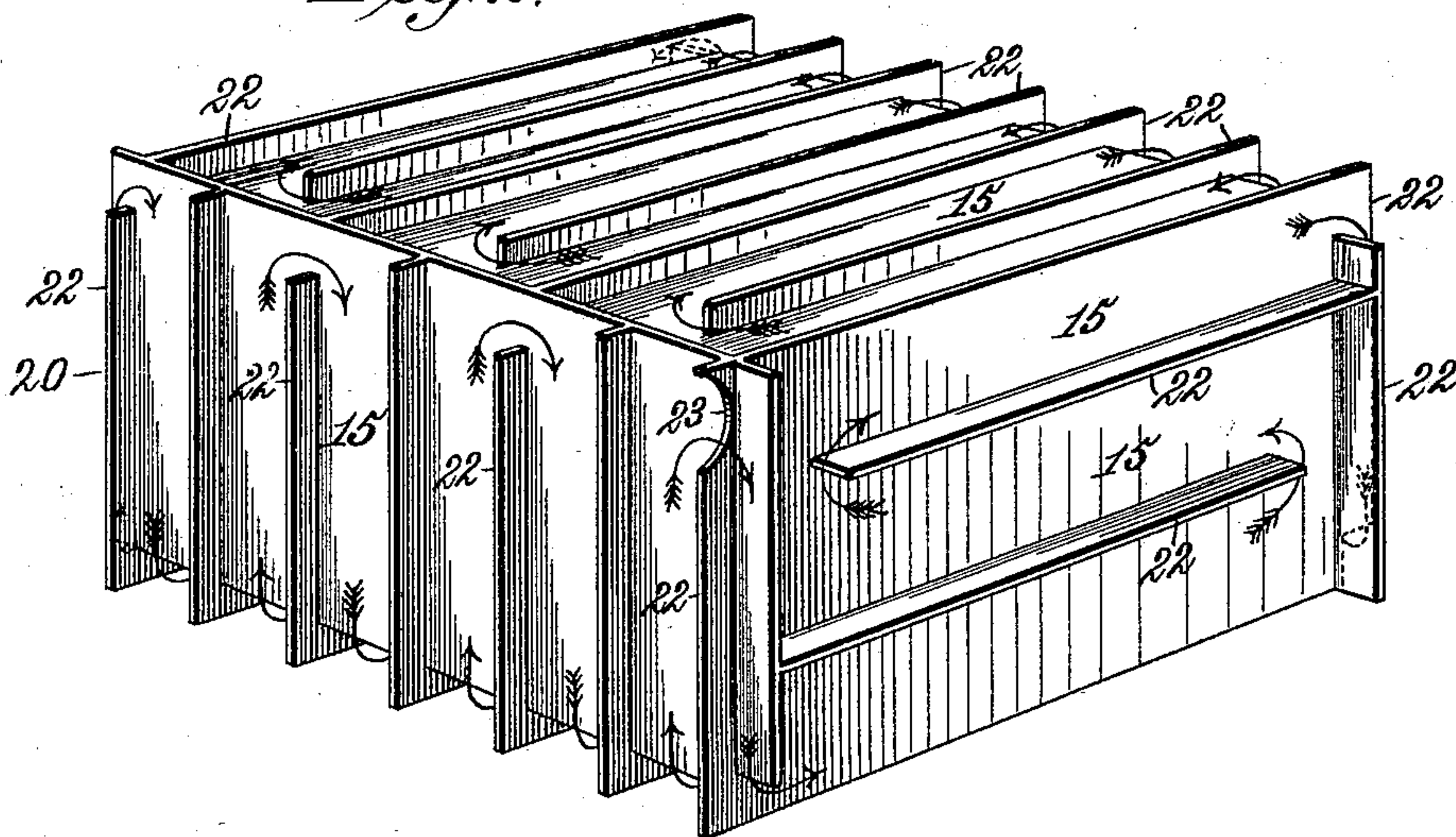


Fig. 3.

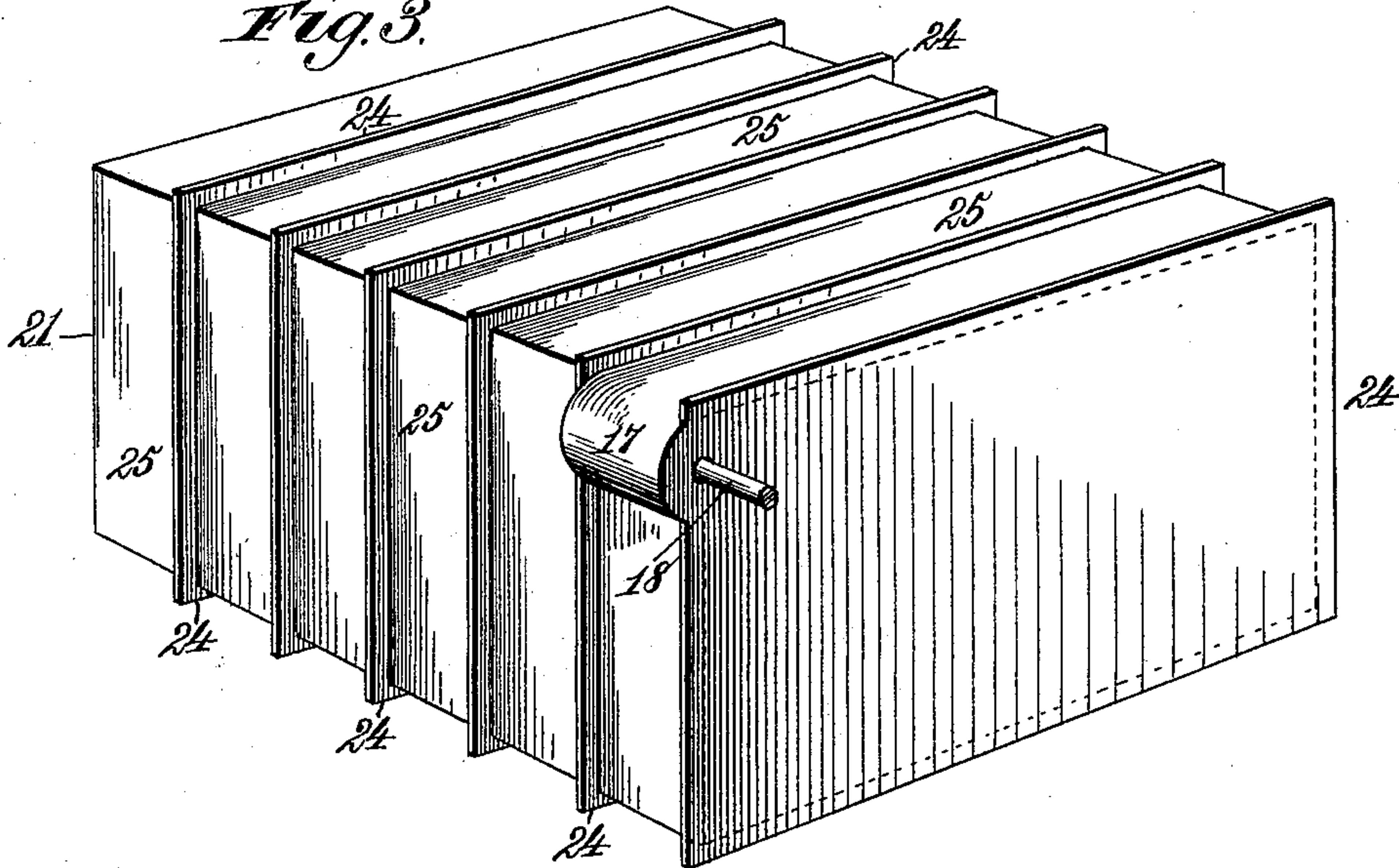
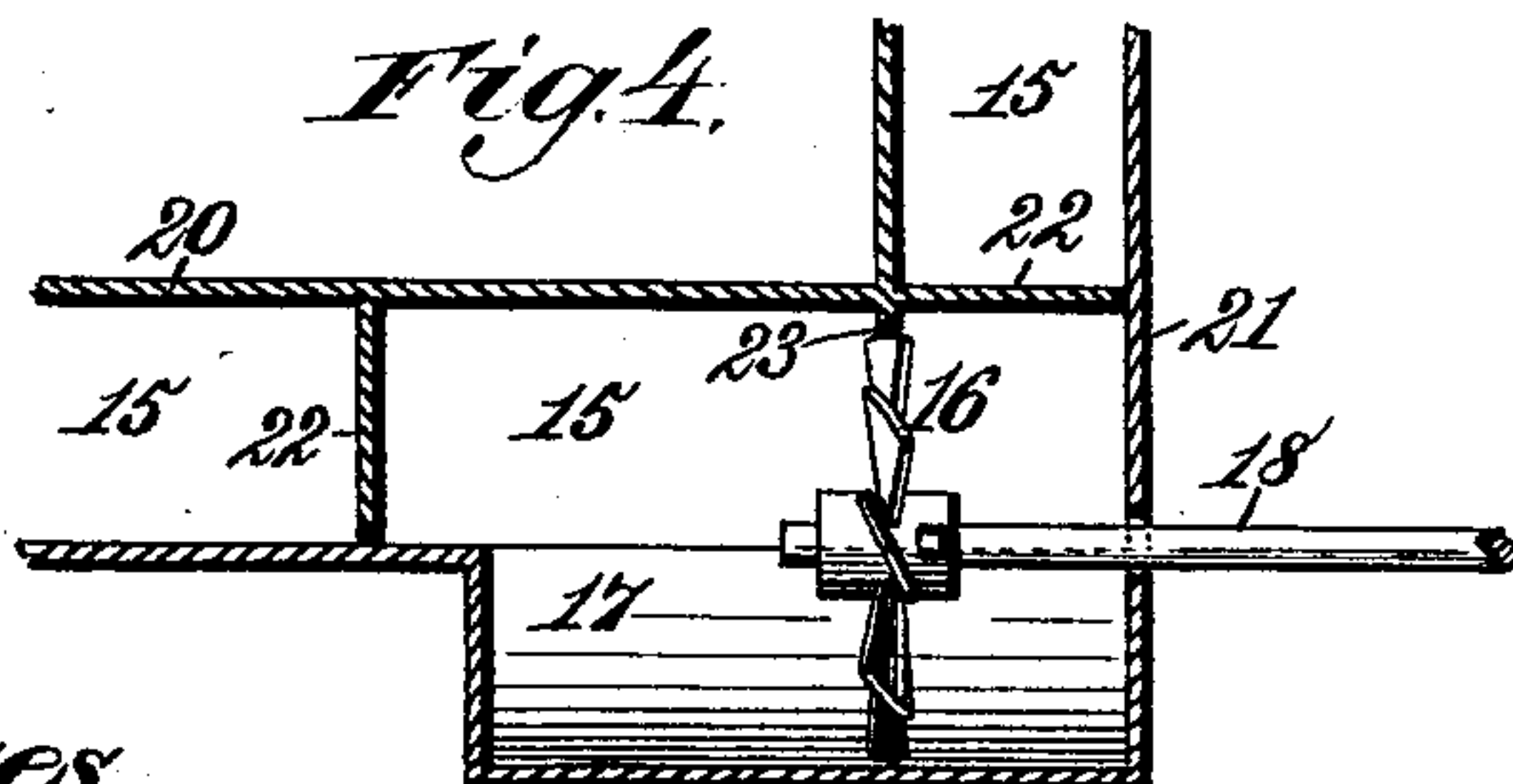


Fig. 4.



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UNITED STATES PATENT OFFICE.

GEORGE F. SIMONDS, OF FITCHBURG, MASSACHUSETTS.

METALLURGICAL FURNACE.

SPECIFICATION forming part of Letters Patent No. 507,460, dated October 24, 1893.

Application filed December 17, 1892. Serial No. 455,483. (No model.)

To all whom it may concern:

Be it known that I, GEORGE F. SIMONDS, a citizen of the United States, residing at Fitchburg, in the county of Worcester and State of Massachusetts, have invented new and useful Improvements in Metallurgical Furnaces, of which the following is a specification.

This invention relates to furnaces for tempering or annealing and other operations requiring a working chamber or oven that can be uniformly heated throughout and in which the desired uniform temperature can be maintained.

My invention consists in a furnace having a working chamber surrounded by a heating chamber and an intermediate closed dead air space, preferably in the form of a tortuous passage, in contact with substantially all sides of the working chamber and with which a fan communicates for the purpose of causing a constant circulation of heated air throughout said intermediate closed space or tortuous passage and thereby maintaining a uniform temperature in all parts of the working chamber.

The invention also consists in the features of construction and novel combinations of parts in a tempering or annealing furnace as hereinafter set forth.

In the annexed drawings illustrating the invention—Figure 1 is a sectional side-elevation of my improved furnace with portions of the inner and outer walls of the working chamber broken away. Fig. 2 is a perspective of the box or shell forming the inner wall of the working chamber. Fig. 3 is a similar view of the box or shell forming the outer wall of the working chamber. Fig. 4 is a horizontal section of one corner of the working chamber and surrounding dead air spaces or passages.

Referring to Fig. 1, the numeral 1 designates the ash-pit; 2 the grate and 3 the combustion chamber. The furnace is constructed with non-conducting inner and outer walls of fire brick 4, preferably having a dead air space or spaces 5 between the inner and outer walls and a coating or filling 6 of cement or suitable non-conducting material inclosed in the outer walls.

In the upper part of the combustion chamber 3 are brackets 7 supporting a horizontal diaphragm 8 which forms the floor of a heat-

ing chamber 9 that constitutes the upper part of the furnace. The diaphragm 8 does not extend to the walls of the furnace but is so arranged as to leave flues 10 at the front and rear and on both sides for the upward passage of the products of combustion into the heating chamber. On each side the heating chamber communicates, through an opening 11, with flues 12 built in the furnace walls and connecting with an exit flue 13 at the rear.

The heating chamber 9 contains a working chamber 14 constructed with double walls between which several series of dead air spaces 15 are inclosed. These air spaces 15 communicate with each other and with a rotary fan 16 that is arranged in an enlarged portion 17 of one of said spaces. The fan 16 is provided with a shaft 18 extended to the outside of the furnace and having a pulley 19 thereon through which the fan can be rotated for the purpose of causing a continuous circulation of the heated air inclosed in the communicating spaces 15 and thereby equalizing the temperature of all parts of the working chamber.

I prefer to construct the working chamber 14 in the form of two metallic shells or boxes, as 20, Fig. 2, and 21, Fig. 3, one arranged or nested within the other as shown in Fig. 1. These shells or boxes 20 and 21 may each have a rectangular form to correspond with the substantially rectangular interior of the heating chamber 9 in which the working chamber 14 is placed. The outside of the inner box or shell 20, forming the inner wall of the working chamber, is provided with flanges or ribbed projections 22 of varying length and disposed on all sides in such directions and at such intervals as to form with the smooth interior of the outer box, shell or wall 21 several series of communicating spaces 15 that thus constitute a tortuous passage for the inclosed heated air circulated by the fan 16 in contact with all parts of the surface of the working chamber, as indicated by the arrows in Figs. 1 and 2. It will be understood that the heated air thus circulated in the tortuous passage or communicating air spaces 15 between the double walls of the working chamber is wholly confined to said spaces and has no inlet or outlet and no communication with the atmosphere nor with any part of the furnace.

The rotary fan 16 for causing a continuous circulation of heated air in the communicating spaces 15 is preferably located in one of the rear upper corners of the outer box or shell 21, the said outer box or shell being slightly enlarged at that point to form a fan casing 17 as shown in Figs. 3 and 4. One of the flanges or ribs 22 of the inner box or shell 20 is cut away at 23, Fig. 2, for the purpose of forming a draft opening in which the fan 16 is received when the inner and outer shells are brought together.

The outer box or shell 21, forming the outer wall of the working chamber, may be provided on its outside, as shown in Fig. 3, with encircling flanges or ribbed projections 24, forming separate passages 25 which communicate directly at all points with the heating chamber 9 and thus serve to assist in equalizing the distribution of heated products of combustion in contact with all parts of the outer wall of the working chamber. By thus providing for a somewhat equalized distribution of the heated products of combustion passing through the heating chamber 9 the heat is economized and the confined air in the space or tortuous passages 15 between the walls of the working chamber will be more quickly heated. The continuous circulation of this heated air through the closed tortuous passages or spaces 15 in contact with all parts of the working chamber, by the action of the fan 16, permits the maintenance throughout said chamber of a steady and uniform temperature which is so essential in order to obtain satisfactory results in tempering or annealing and other operations in which a perfectly uniform heat is desirable.

As shown in Fig. 1, the working chamber

14 is provided with a tightly closing door 26 of any suitable non-conducting construction.

What I claim as my invention is—

1. In a furnace, the combination with a working chamber having double walls between which a dead air space is inclosed, of a rotary fan located in said dead air space for the purpose of causing a continuous circulation of heated air therein to equalize the temperature of the working chamber, substantially as described.

2. In a furnace, the combination with a working chamber, and dead air spaces surrounding said chamber and communicating with each other to form a tortuous passage for heated air, of a fan communicating with said spaces or tortuous passage for the purpose of causing a continuous circulation of heated air therein to equalize the temperature of the working chamber, substantially as described.

3. In a furnace, the combination of a combustion chamber, a heating chamber communicating with the combustion chamber, a working chamber located in the heating chamber and provided with double walls between which a closed dead air space is inclosed, and a fan communicating with said dead air space and adapted to cause a continuous circulation of heated air therein for the purpose of equalizing the temperature of the working chamber, substantially as described.

In testimony whereof I have hereunto set my hand and affixed my seal in presence of two subscribing witnesses.

GEORGE F. SIMONDS. [L. S.]

Witnesses:

GEO. W. REA,
T. A. GREEN.