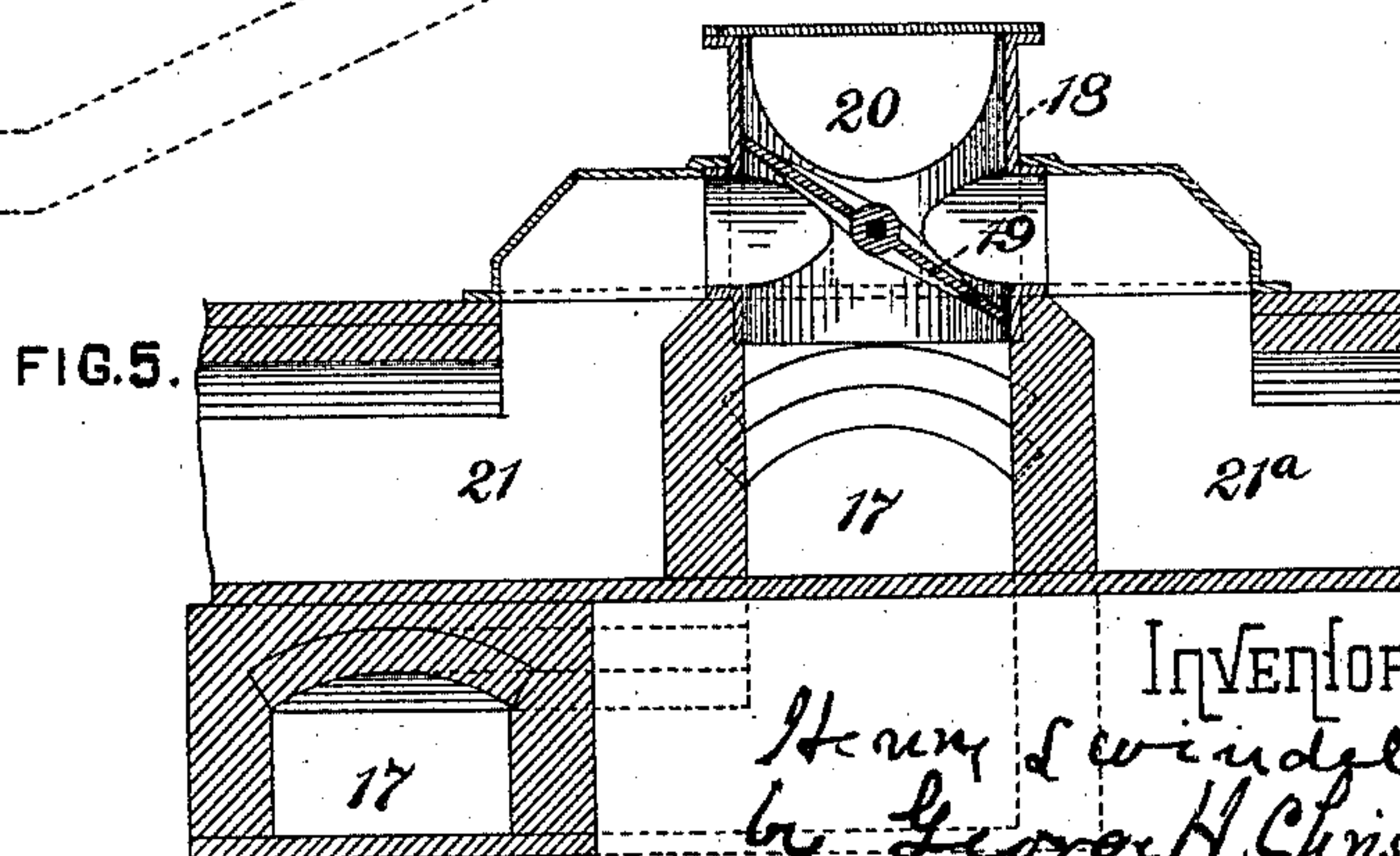
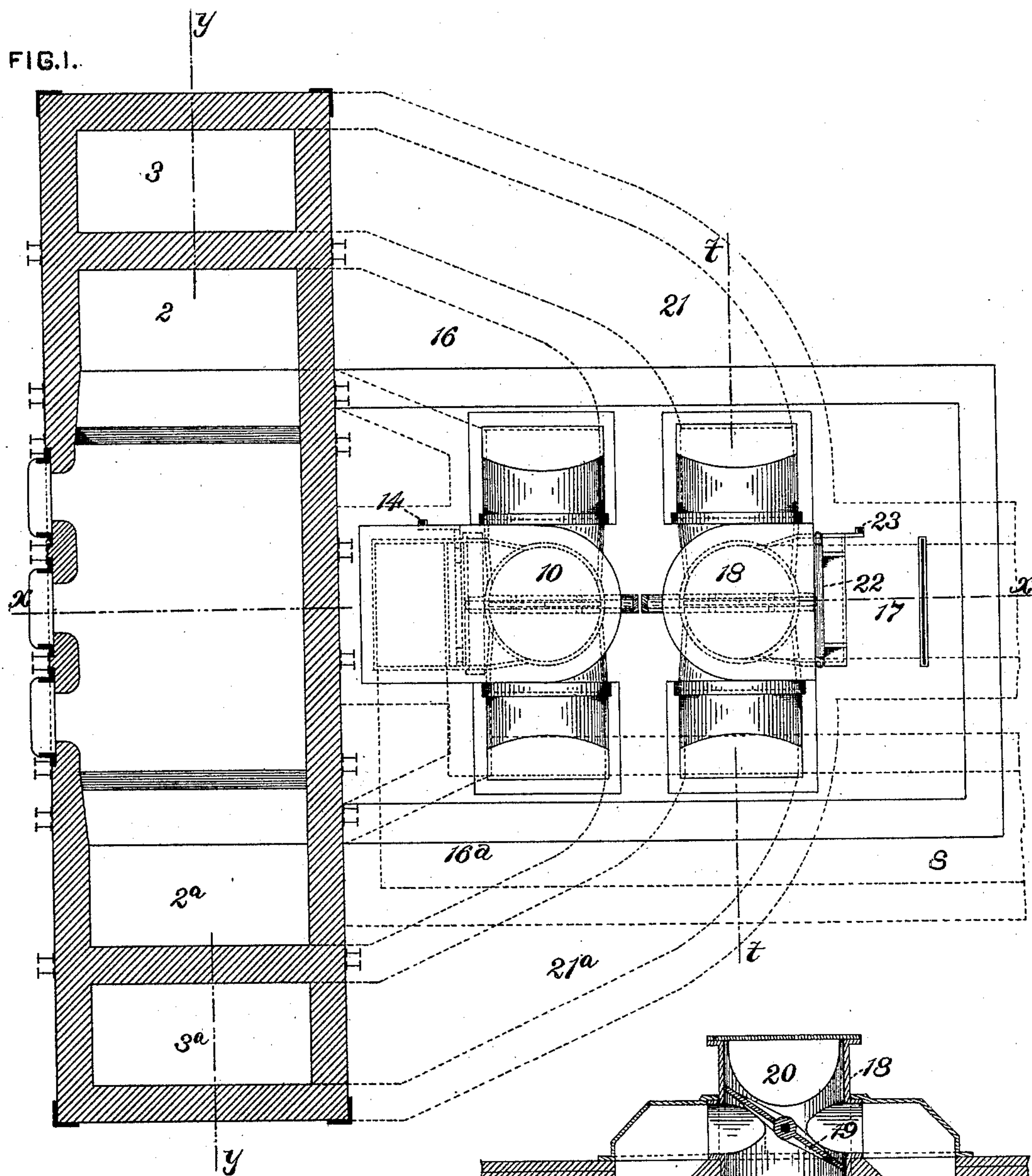


3 Sheets—Sheet 1.

No. 412,936.

Patented Oct. 15, 1889.



WITNESSES

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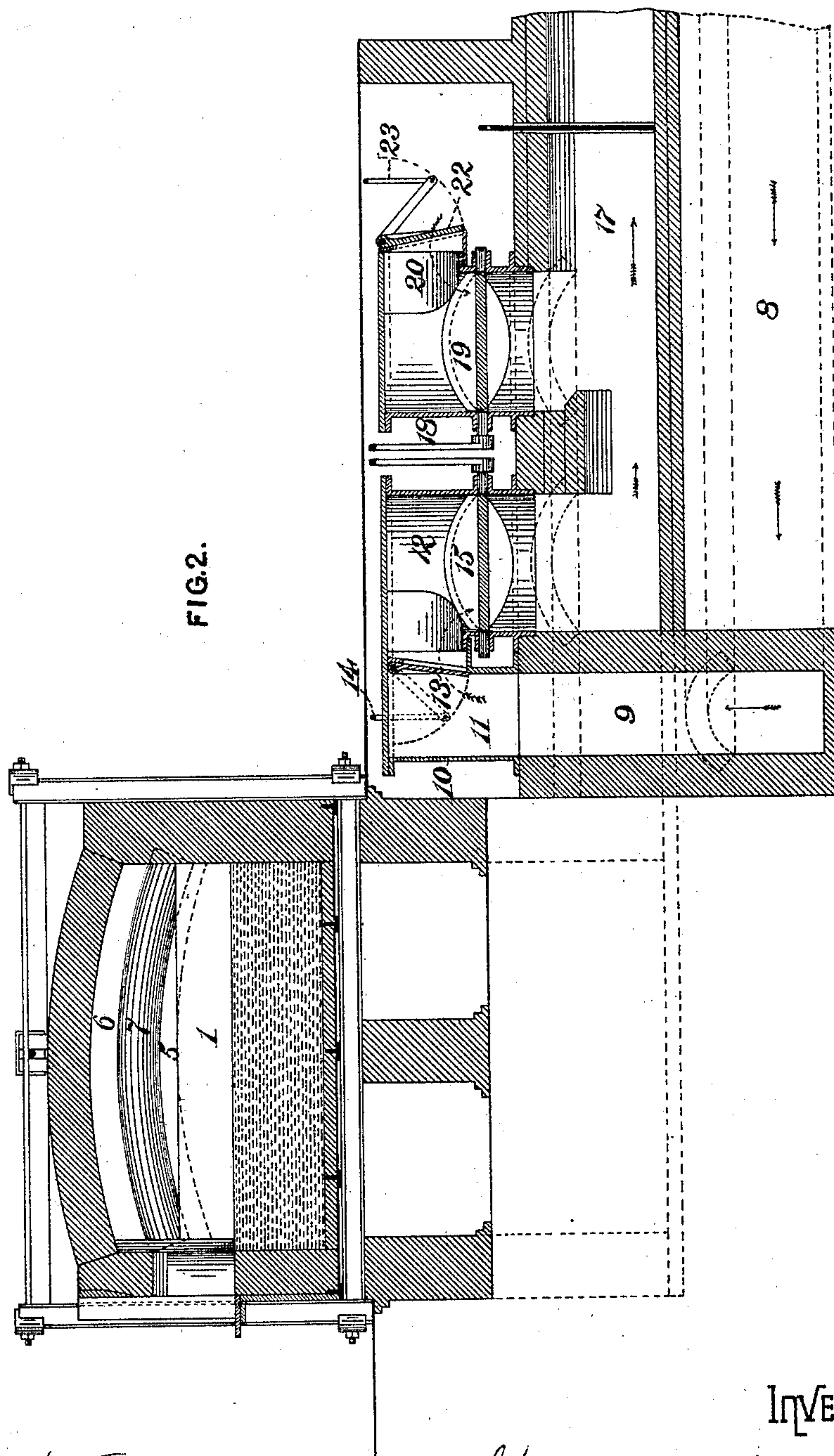
(No Model.)

3 Sheets—Sheet 2.

H. SWINDELL.  
HEATING FURNACE.

No. 412,936.

Patented Oct. 15, 1889.



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(No Model.)

3 Sheets—Sheet 3.

H. SWINDELL.  
HEATING FURNACE.

No. 412,936.

Patented Oct. 15, 1889.

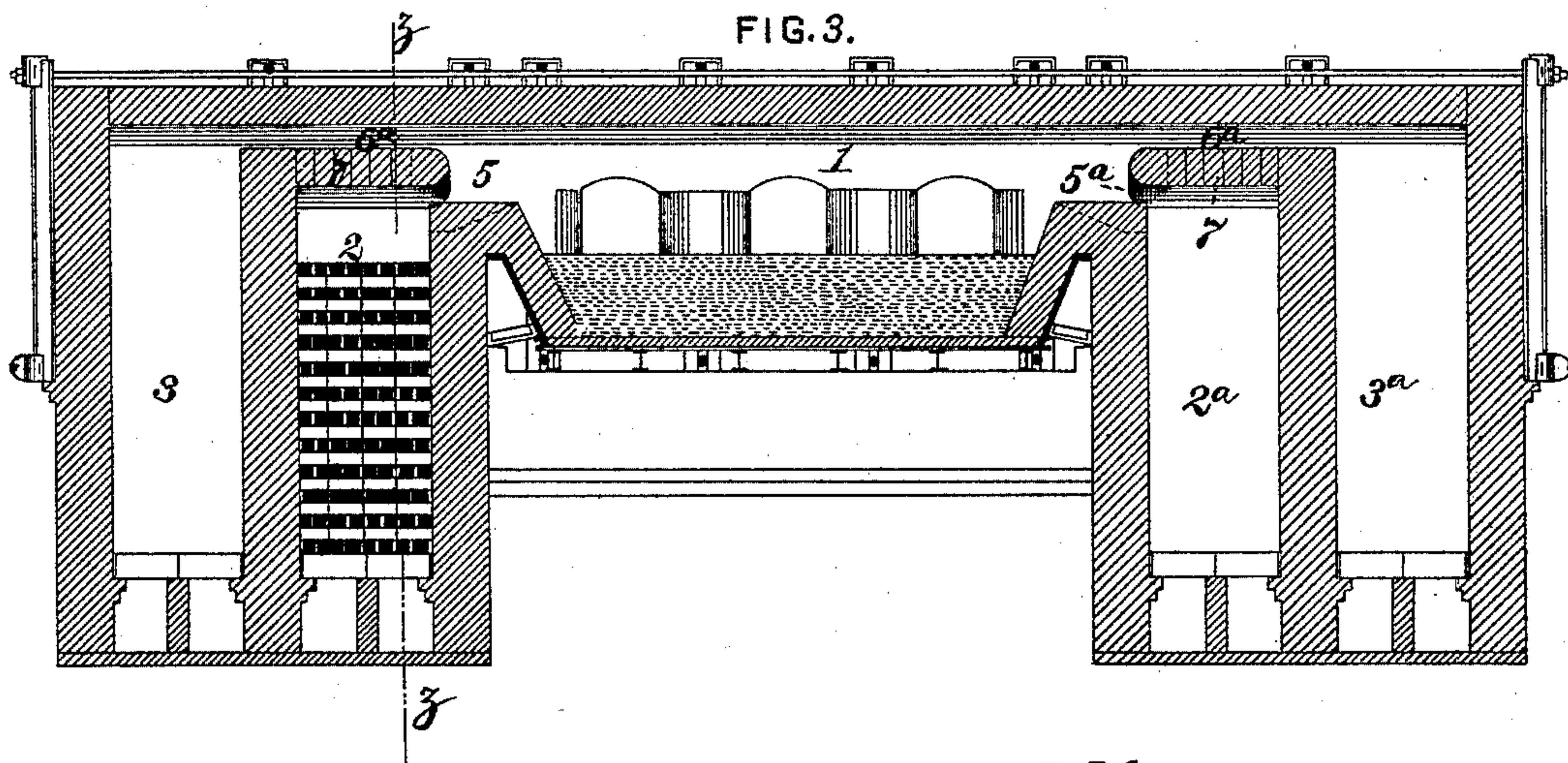


FIG. 6.

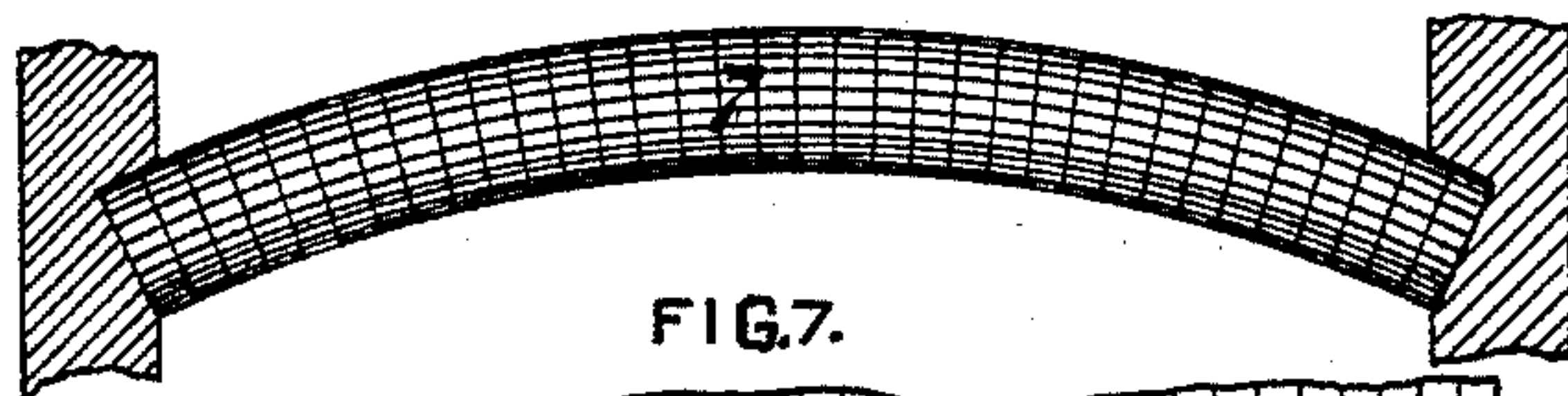


FIG. 7.

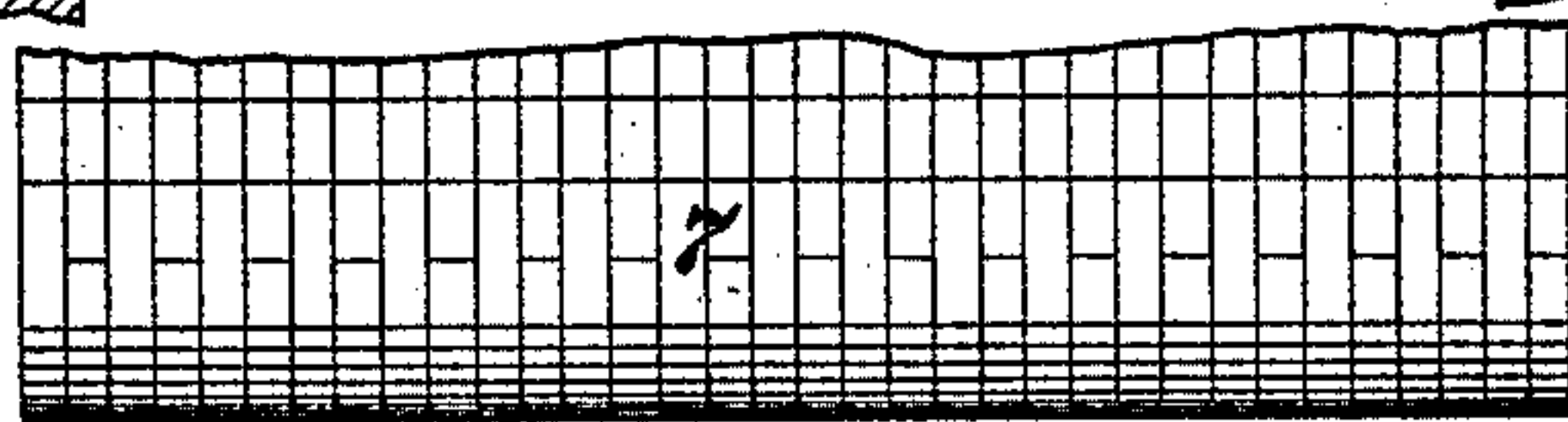
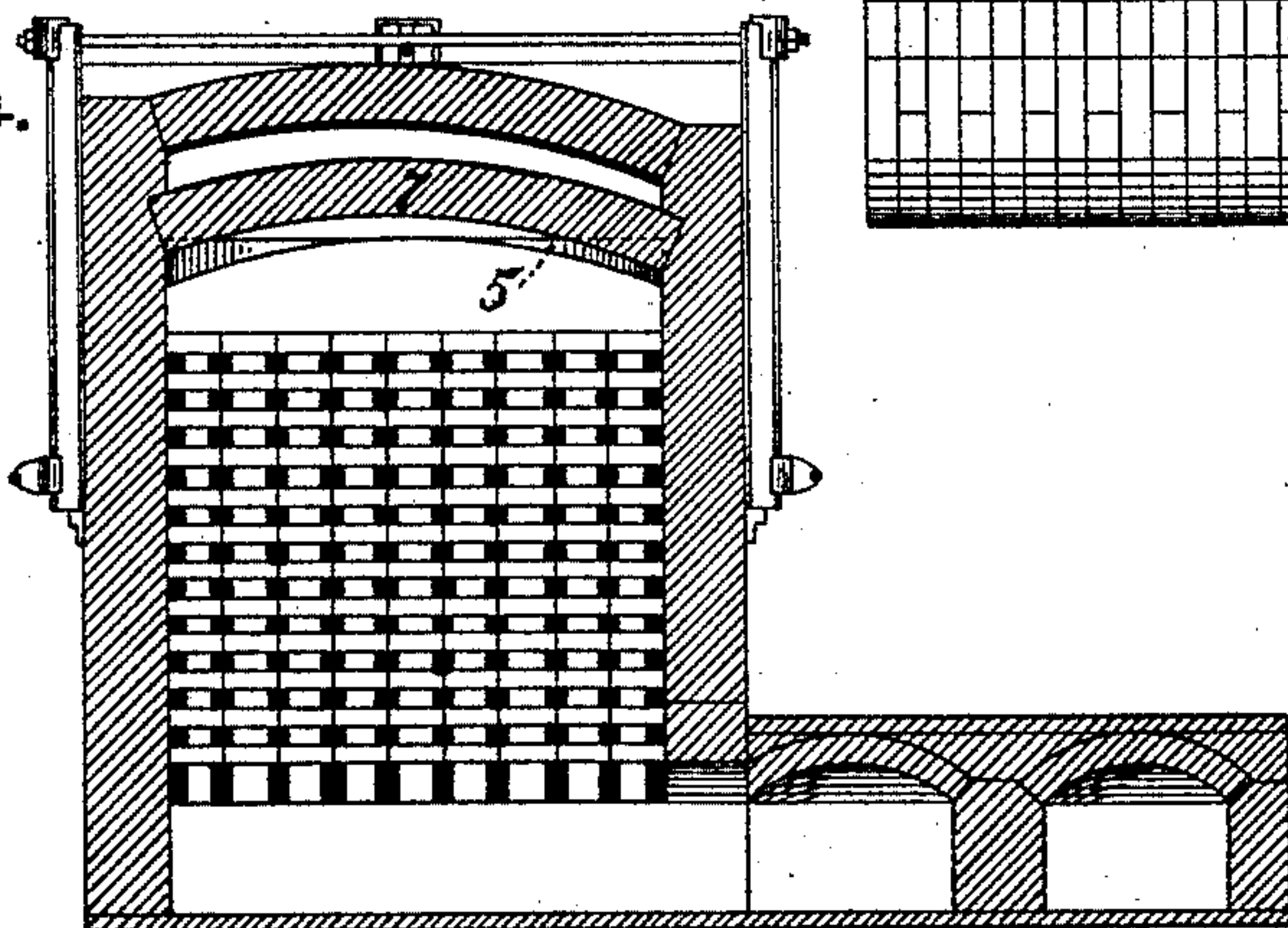


FIG. 4.



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# UNITED STATES PATENT OFFICE.

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## HEATING-FURNACE.

SPECIFICATION forming part of Letters Patent No. 412,936, dated October 15, 1889.

Application filed April 3, 1889. Serial No. 305,878. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY SWINDELL, a citizen of the United States, residing at Allegheny, in the county of Allegheny and State of Pennsylvania, have invented or discovered certain new and useful Improvements in Heating-Furnaces, of which improvements the following is a specification.

The invention described herein relates to certain improvements in furnaces, and has for its object improvements in the construction and arrangement of the gas and air flues, whereby a more perfect combustion of the gas is obtained and a more thorough and uniform distribution of the heat and products of combustion through the hearth is effected.

The invention is more fully hereinafter described and claimed.

In the accompanying drawings, forming a part of this specification, Figure 1 is a view, partly in plan, partly in horizontal section, of a furnace embodying my improvements. Fig. 2 is a sectional elevation of the same, the plane of section being indicated by the line *x x*, Fig. 1. Fig. 3 is a similar view, the plane of section being indicated by the line *y y*, Fig. 1. Fig. 4 is a sectional elevation of a portion of the furnace, the plane of section being indicated by the line *z z*, Fig. 3. Fig. 5 is a sectional elevation taken on the line *t t*, Fig. 1; and Figs. 6 and 7 are detail views on an enlarged scale, showing the construction of the partition separating the air and gas flues.

In the practice of my invention the regenerative chambers 2 2<sup>a</sup> and 3 3<sup>a</sup> are arranged at opposite ends of the hearth 1, said chambers being connected with the hearth by flues 5 5<sup>a</sup> and 6 6<sup>a</sup>, each of said flues being made of a width approximately equal to the width of the hearth, as shown in Figs. 2 and 4, in order that the gas and air may be delivered in broad sheets into the furnace. In order to counteract the chilling of the front part of the furnace, due to opening the charging-doors, the flues 5 5<sup>a</sup> and 6 6<sup>a</sup> are made higher on the door side of the furnace, so as to insure the delivery of larger volumes

of gas and air on that side of the furnace, as will be readily understood. The arches or partitions 7, separating the gas and air flues, are formed at their inner ends by round-nosed bricks, as shown, so as to prevent any eddying of the currents of air and gas as they escape into the furnace, thereby facilitating the commingling of the air and gas. Gas is conducted from the generators (not shown) by the conduit 8 and the uptake 9 into the valve-case 10, which is divided by a partition into what may be termed a "receiving-chamber" 11, forming a part of the uptake 9 and the valve-chamber 12. Communication between these chambers is controlled by a plate-valve 13, pivotally mounted at its upper edge, as shown in Fig. 2, and operated by a rod 14. In the valve-chamber is mounted the reversing-valve 15, which is arranged to direct the gas into either one of the branch conduits 16 or 16<sup>a</sup>, leading to regenerative chambers 2 or 2<sup>a</sup>, according to the position of the valve, and the products of combustion from one of the conduits 16 or 16<sup>a</sup> into the conduit 17, leading to the stack. In the rear of the valve-case 10, and over the conduit 17, is arranged the valve-case 18, in which is mounted the reversing-valve 19, adapted, in accordance with its position, to direct the air entering by the lateral port or opening 20 in the valve-case into either one of the conduits 21 or 21<sup>a</sup>, leading to the regenerative chambers 3 3<sup>a</sup>, and the products of combustion from one of said conduits into the stack-conduit 17. The admission of air through the lateral port 20 is controlled by a plate-valve 22, pivotally mounted at its upper edge and operated by the rod 23, as shown in Fig. 2. As shown in Fig. 2, the several conduits are arranged below the floor-level, and by forming the ports for admitting the gas and air into the valve-cases 10 and 18 on the sides of said cases, rather than at the top, as is the usual practice, the size of said cases can be so reduced as to permit of the cases being arranged below the floor-level.

I claim herein as my invention—

In a furnace, the combination of a hearth having charging-doors on one side thereof,

gas and air regenerative chambers arranged  
at opposite ends of the hearth, and flues con-  
necting the hearth with said chambers, said  
flues being made of a width approximately  
5 equal to the width of the hearth and of a  
height greater at the front side of the furnace  
than at the opposite side, substantially as set  
forth.

In testimony whereof I have hereunto set  
my hand.

HENRY SWINDELL.

Witnesses:

R. H. WHITTLESEY,  
DARWIN S. WOLCOTT.