

(No Model.)

F. C. PETELER.  
AIR SUPERHEATER.

No. 458,037.

Patented Aug. 18, 1891.

Fig. 1.

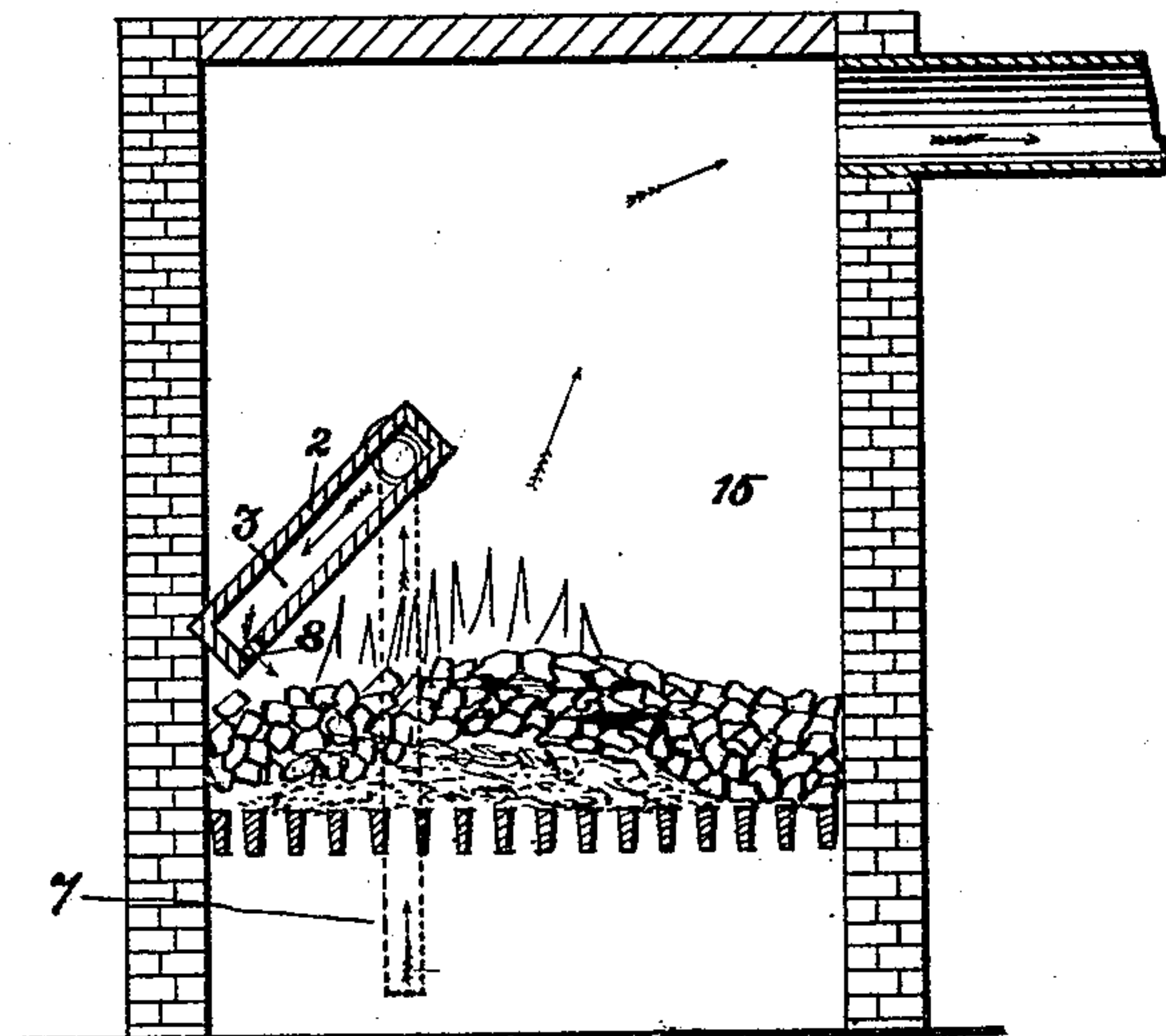


Fig. 2.

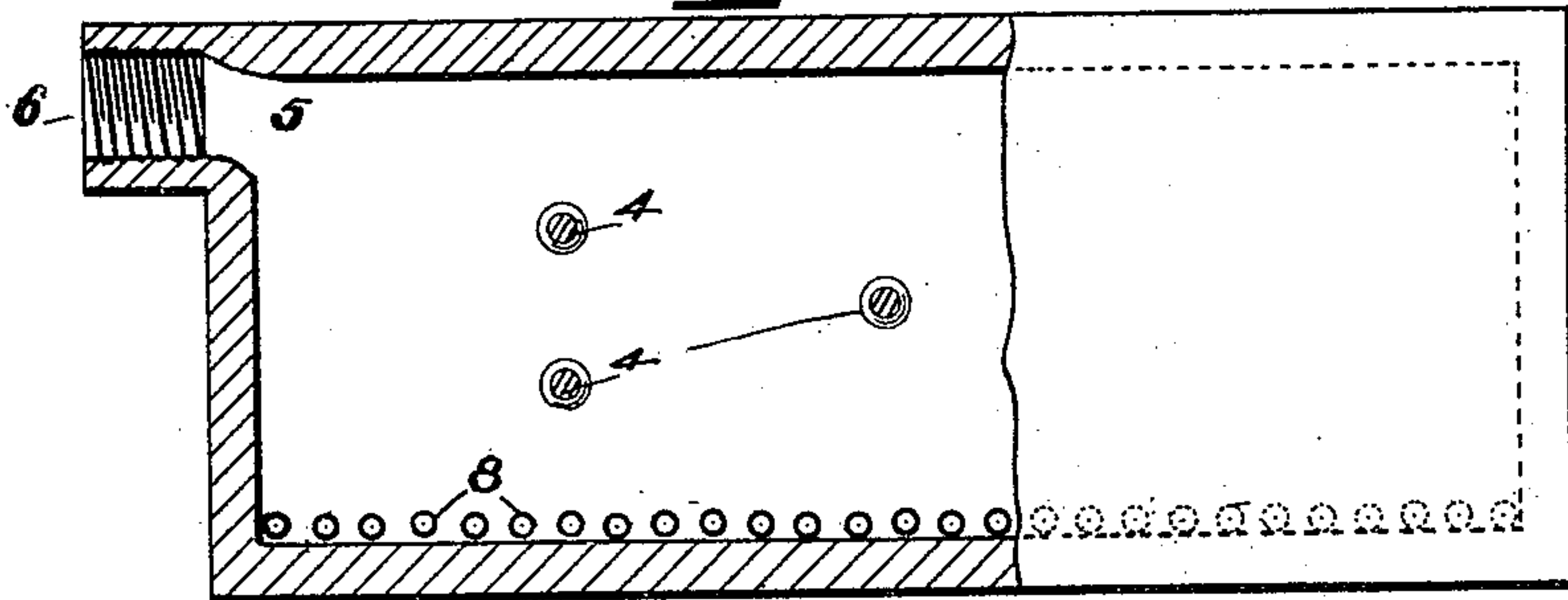


Fig. 3.

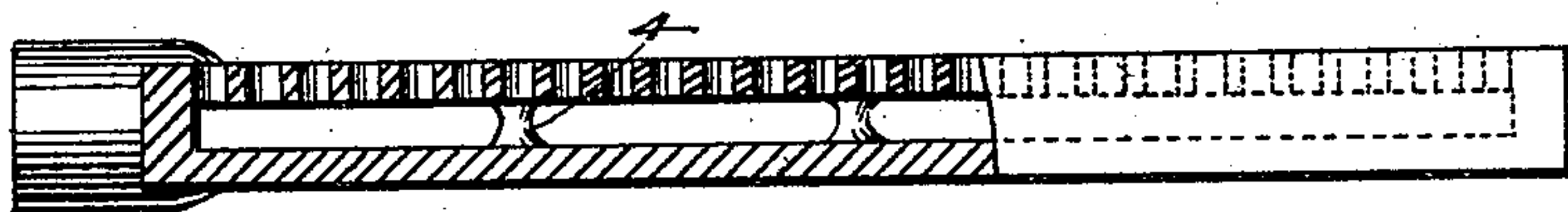
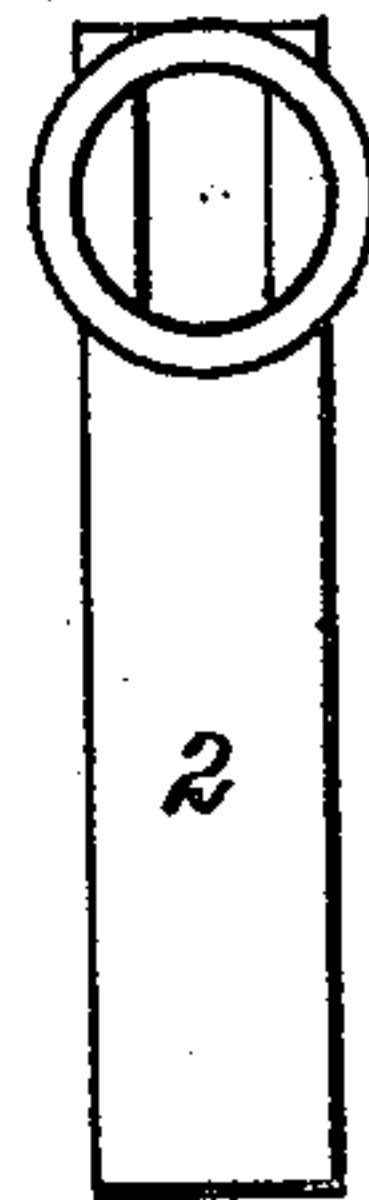


Fig. 4.

Fig. 5.

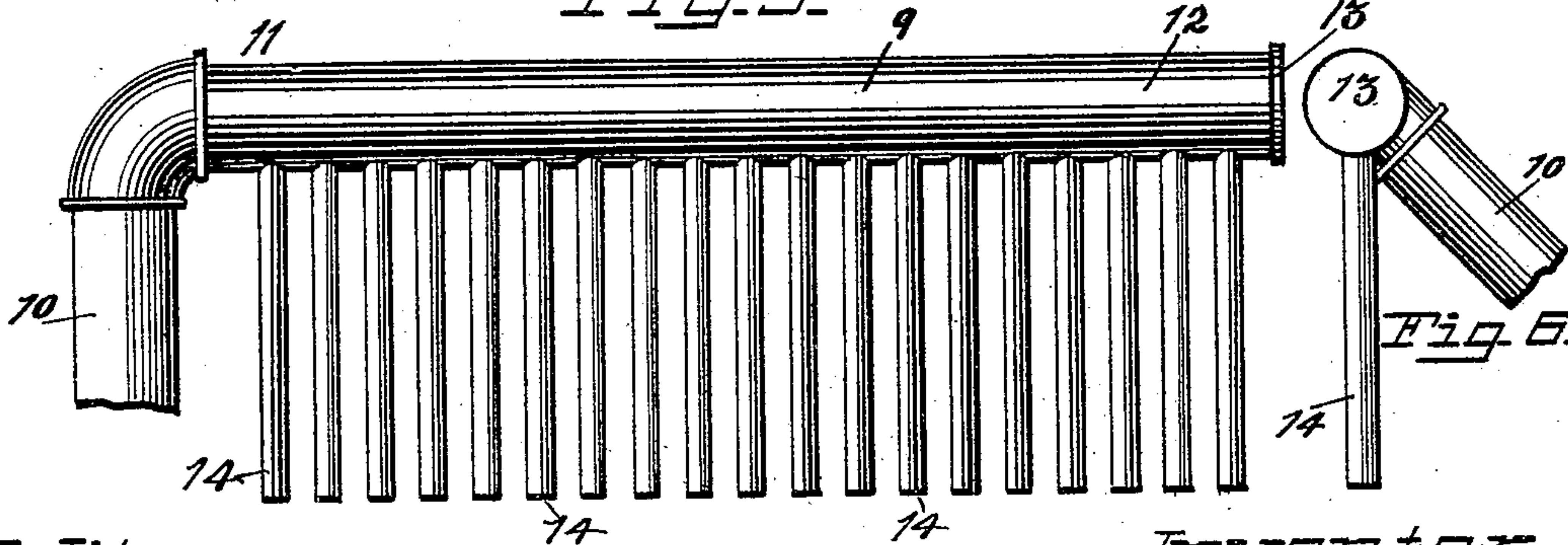


Fig. 6.

Witnesses.

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# UNITED STATES PATENT OFFICE.

FRANK. C. PETELER, OF MINNEAPOLIS, MINNESOTA.

## AIR-SUPERHEATER.

SPECIFICATION forming part of Letters Patent No. 458,037, dated August 18, 1891.

Application filed August 15, 1890. Serial No. 362,063. (No model.)

*To all whom it may concern:*

Be it known that I, FRANK. C. PETELER, of Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain Improvements in Air-Superheaters for Use in Connection with Furnaces, of which the following is a specification.

My invention relates to means whereby the air is heated to an intense degree and introduced above the burning fuel in the furnace fire-box, whereby all of the gases and smoke thrown off by the fuel are consumed and a much greater heat generated by the furnace.

My invention consists in a hollow box or casting provided with a suitable inlet in its upper edge and with suitable outlet-openings in its lower edge placed in a slanting position above the fire-box, the lower edge thereof being placed at one side of the fire-box and just above the coals, whereby the air brought in at the inlet by the draft of the furnace is heated while in the box and discharged through the lower openings to mingle with the gases arising from the burning fuel, so that the same are more successfully consumed and a greater heat generated. I preferably provide an inlet-pipe connected with said inlet and extending downwardly to a level below the fire-box.

My invention consists in the use of any apparatus whereby the air is heated within the furnace and drawn down to the level of the upper surface of the fire or coals and there discharged upon the same.

My invention will be more readily understood by reference to the accompanying drawings, in which—

Figure 1 is a sectional elevation of a furnace provided with one of my superheating devices. Fig. 2 is a side elevation of the superheating-box shown in Fig. 1, partially in section. Fig. 3 is an end elevation thereof. Fig. 4 is a sectional top view thereof. Fig. 5 is a side elevation of the header form of superheater. Fig. 6 is an end elevation of the same.

As shown in Figs. 1 to 4, inclusive, the superheating box or casting 2 is provided with the interior opening or hollow 3, the outer sides of the box being preferably braced and connected by the stays 4, (shown in Figs. 2

and 4,) the office of the same being to prevent the warping of the box. The inlet-opening 5 is arranged in the upper corner of the box 2 and is preferably provided with the threaded portion 6, into which the downwardly-projecting pipe 7 is screwed. The outlet-holes 8 are provided either in the lower part of the downward side of the box or in the end thereof and are of small diameter, the sum of all their areas being about equal to the area of the inlet-pipe 7.

The form of superheater shown in Figs. 5 and 6 consists in the long header 9, having a suitable inlet-pipe 10, similar to the pipe 7 of Fig. 1, connected to its outer end. The inner end 12 is closed by a suitable cap 13. The outlet from this header 9 is through the series of small pipes 14, leading out of the bottom of the header, as shown, the combined areas of all the small pipes being equal to that of the pipe 10, through which the air enters the header 9 from without the furnace. The position in the furnace of either of these superheaters is that of the box 2 in the furnace of Fig. 1, the angle at which the superheater-box slants being preferably forty-five degrees, though any convenient position may be given the superheater. The lower end or edge of the box 2 is preferably embedded in the wall of the furnace or otherwise inclosed, so that the air escaping from the lower holes 8 will be compelled to find an exit beneath the superheater-box and to flow across the bed of coals to thoroughly mix with the gases arising therefrom.

In the use of the header form of superheater the lower ends of the pipe may be projected beneath a suitable shield which serves to direct the air properly upon the fire. I preferably place the superheater so that the lower openings will be within the direct line of draft passing to the smoke-flue, so that the greatest possible quantity of the hot air escaping from the lower holes will be compelled to cross the fire-pot.

One or more of the superheaters of varying sizes may be employed within the same fire-box, the essential point being that the discharge-opening 8 or the lower and open ends of the pipes shall be just above the edge of the fire pot or box and just above the coals.



In the practical use of my superheater it is found that the air brought through the inlet-pipe and heated to a very high degree in the superheater will be discharged from the lower  
5 holes 8 with considerable velocity, and that when hard coal is used in the fire-pot a flame of over a foot in height will cover the burning coals, while with bituminous coal a larger flame will be produced. It will thus be seen  
10 that the heat obtained from the fuel will be many times increased. In the ordinary furnace the flames from hard coal are of a bluish tinge and small, while if the same furnace is provided with my superheater a much larger  
15 flame of an intense white will be produced, thus showing that practically all the gases were burned and the greatest possible degree of heat obtained from the fuel.

Having thus described my invention, I  
20 claim as new and desire to secure by Letters Patent—

1. The combination, in a device of the class described, of the superheater provided with the inlet-opening in its upper portion, with a  
25 series of outlet-openings provided in the lower portion of the superheater, said superheater being arranged to bring said outlet-openings substantially on a level with the burning fuel in the furnace, and an inlet-pipe communicating with inlet-opening in said superheater and  
30 adapted to conduct air thereto from a point below the level of the outlet-openings in the superheater, substantially as and for the purpose described.

2. The combination of the fire-box and fire- 35 box chamber of the usual form with the superheater-box provided with the inlet in the upper part thereof, the downwardly-projecting inlet-pipe connected therewith and adapted to conduct air thereinto from a level lower 40 than that of the bottom of said box, said box occupying a slanting position above the fire-box, the outlet-holes in the edge of said superheater-box, said lower edge of the superheater-box being placed just above the fire- 45 box, whereby hot air is introduced into the fire-box chamber at a level substantially the same as or just above the level of the coals in the fire-box, substantially as and for the purpose specified. 50

3. The combination of the fire box and chamber 15, provided with the smoke-outlet, with the superheater-box 2, provided with the inlet 5 and having the hollow portion 3, the outlet-holes 8, and the downwardly-projecting 55 inlet-pipe 7, adapted to bring air from a point below the level of the fire-pot, the lower edge of said box 2 abutting against the side of the furnace or fire-box, whereby the air is compelled to take its course across the surface of 60 the burning fuel in the fire-box, substantially as described.

In testimony whereof I have hereunto set my hand this 12th day of August, 1890.

FRANK. C. PETELER.

In presence of—

C. G. HAWLEY,  
A. M. GASKILL.