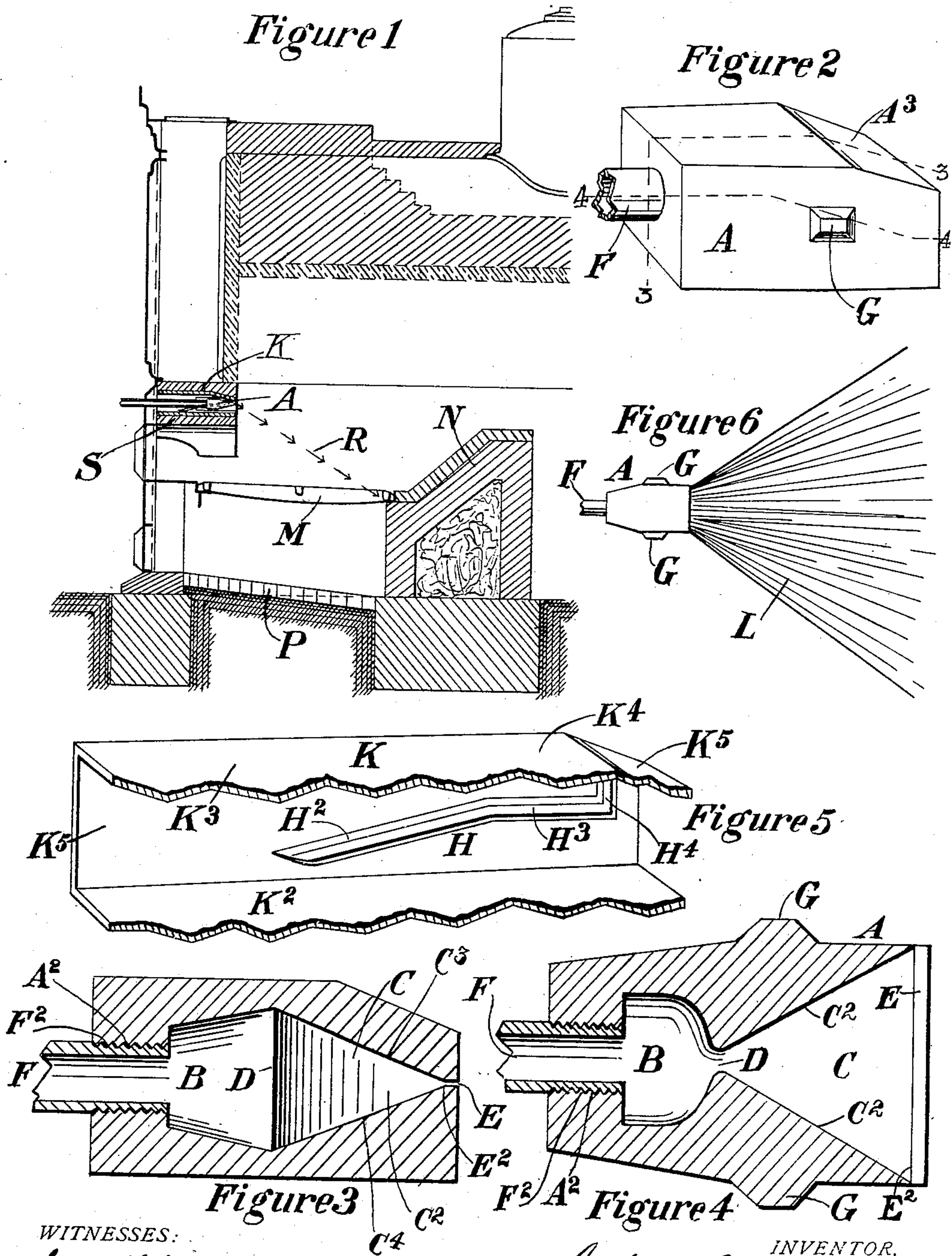


A. GROPENGLIESZER.  
 DEVICE FOR THE CONSUMPTION OF SMOKE IN FURNACES.  
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912,561.

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# UNITED STATES PATENT OFFICE.

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DEVICE FOR THE CONSUMPTION OF SMOKE IN FURNACES.

No. 912,561.

Specification of Letters Patent.

Patented Feb. 16, 1909.

Application filed February 23, 1907. Serial No. 358,981.

*To all whom it may concern:*

Be it known that I, ANDREW GROPENGLIESZER, a citizen of the United States, and a resident of the city of Cincinnati, in the county of Hamilton and State of Ohio, have invented a certain new and useful Device for the Consumption of Smoke in Furnaces, of which the following is a specification.

One of the principal objects of my invention is to produce a device which shall operate to produce a very widely extended and diffused spray of steam wherewith to oxygenate the combustion within the furnace and near the back end of the grate surface. This object I obtain by a double chamber in the steam discharge nozzle, the conformation of the first or inlet chamber and its mode of combination with the second chamber being novel and very efficacious for obtaining the aforementioned desired results.

Another of the principal objects of my invention is to provide a shell or cylinder which is to be located in the wall of the furnace, and which is to receive the nozzle, this shell and the nozzle being so constructed that the nozzle shall be guided into the right position in the shell for effective use, and so that the nozzle can be readily inserted into place within the shell, and be readily removed therefrom.

The several features of my invention and the various advantages resulting from their use conjointly or otherwise will be apparent from the following description and claims.

In the accompanying drawing making a part of this specification, and in which similar letters of reference indicate corresponding parts,—Figure 1 is a view, on a small scale, partly in section and partly in elevation, illustrating the application of my invention to a steam boiler furnace. Fig. 2 is a view, on a larger scale and in perspective, of the spout or nozzle of the device for introducing steam into the furnace, and showing the exterior construction of it to cooperate in effectuating the purpose of a certain feature of my invention. Fig. 3 is a vertical, central longitudinal section of my improved nozzle, taken in the plane of the dotted line 3, 3 of Fig. 2. Fig. 4 represents a horizontal, central longitudinal section of this same nozzle, taken in the plane of the dotted line 4, 4 of Fig. 2. Fig. 5 is a view in perspective of one half of the shell or box, to be located in the wall of the furnace and which receives and holds the aforemen-

tioned steam nozzle and guides the nozzle to place for use. Fig. 6 shows a top view on a diminished scale and illustrates the operation of the nozzle when distributing a spray of steam.

I will now proceed to describe my invention in detail.

The nozzle has two chambers,—a chamber B and a chamber C. The pipe F is the conduit that brings steam from a suitable source and delivers it into the rear end of chamber B. The preferred connection between the rear end portion of the nozzle and this conduit F are the screw threads, one thread F<sup>2</sup> on the conduit F and the opposite thread A<sup>2</sup> on the opening of the nozzle in which the end portion of the conduit F is located. The plane of the rear wall of the chamber B is preferably at right angles to the length of the conduit F. This conformation allows the steam as it enters chamber B to instantly expand. The vertical passage or conduit connection D between chamber B and chamber C is a very narrow one. From the passage D the side walls C<sup>2</sup>, C<sup>2</sup> of the chamber C diverge rapidly as shown. On the contrary, the roof C<sup>3</sup> and the floor C<sup>4</sup> of this chamber C converge rapidly, until they almost meet at E<sup>2</sup>. From this line E<sup>2</sup>, the opening E to the end of the nozzle is simply a slit, and this slit is narrow from front to rear, but it is of great length from side to side of the nozzle. The steam after expanding in chamber B as mentioned, is contracted to pass through the narrow vertical passage D, and after passing through this passage, as it is compressed vertically, it expands laterally and issues with force and speed from the opening E. This jet rapidly diverges in a plane and forms a wide fanlike sheet, see Fig. 6. The effect of the nozzle chambered as shown is to render the speed of the issuing spray jet quite rapid, and to produce the spray jet in a shape and of a size which shall be very effective.

In order to enable my improved nozzle to be easily inserted to place in the furnace and as readily withdrawn for repairs, or cleansing, or for any other purpose, I provide first a shell or box K. This box K I build into the wall or fix in the wall in any proper manner. The box K may be in the side wall or in the front wall S. In the present illustrative instance, it is located in the latter wall S. The box is provided at



each side with a guide H. Thus there are two guides H. Each guide is composed of an inclined portion  $H^2$ , a straight horizontal portion  $H^3$  and a stop or vertical portion  $H^4$ . The straight portion  $H^3$  begins at the rear (upper) end of the inclined portion  $H^2$ , and extends forward and terminates at the vertical portion  $H^4$ .

Upon each side of the nozzle A is a lug G. When the nozzle A is inserted into the shell K, one of these lugs goes onto the inclined guide  $H^2$  on one side of the shell and the other of these lugs goes onto the inclined guide  $H^2$  on the other side of the shell. As the nozzle A is advanced, the lugs G respectively ride up on their adjacent inclines  $H^2$  and soon reach the horizontal guide  $H^3$ . They pass along these until they reach the vertical guides  $H^4$ . The latter stop their further progress. By such a movement, the nozzle is guided in the shell and lifted up and stopped at the proper place.

It is to be noted that the roof piece  $K^5$  is inclined downward and forward, and that the forward portion  $A^3$  of the top of the nozzle is likewise inclined. When the nozzle is in place, this roof-piece  $K^5$  assists in maintaining the nozzle A in position, because this roof-piece  $K^5$  bears down upon the piece  $A^3$  of the nozzle. The rest of the roof indicated by  $K^3$  and  $K^4$  is preferably horizontal. When thus in place, there is a large air space below it (the nozzle) and the bottom of the shell. As the steam issues from the nozzle A, it creates a draft and induces a current of air which latter is drawn through the large space beneath the bottom of the nozzle and the bottom of the shell and follows beneath the spreading jet of steam, the current of air likewise spreading over the fire.

When the nozzle is located in the front wall S of the furnace, the spray L is preferably directed down and toward the rear portion of the fire grate M as shown by R in Fig. 1. This accomplishes, I find, the best results.

P indicates one form of the bottom of an ash pit.

For a furnace of ordinary width, that is about six feet wide within, two such nozzles are amply sufficient to supply the fuel with all of the oxygen necessary for the complete consumption of the fixed and the volatile carbon therein.

N indicates the bridge wall.

My invention is primarily designed to be used with furnaces heating steam boilers, but it is applicable to other furnaces, where steam is furnished to the nozzle from another source.

What I claim as new, and of my invention and desire to secure by Letters Patent, is:—

1. In a smoke consuming device, a shell

for location in the furnace wall, having on each inner side the compound guide H, consisting of the inclined guide piece  $H^2$ , horizontal guide piece  $H^3$ , and vertical stop guide  $H^4$ , and the nozzle A provided at each side with a lug adapted to engage the guide H on its adjacent side, substantially as and for the purposes specified.

2. In a smoke consuming device, the shell for the furnace wall, provided on each side with the guide H, and having the forward portion of its roof inclined, and the nozzle having the side lugs respectively engaging the adjacent guides H, and having in its roof the inclined forward portion engaging said inclined forward portion of the roof of the shell, substantially as and for the purposes specified.

3. In a smoke consuming device, the combination of the furnace wall shell, having the side guides H, and inclined front roof  $K^5$ , and the two chambered nozzle, whose chambers are connected by the narrow vertical passage, and the roof and floor of the front chamber gradually approach each other toward the delivery end of the nozzle, and the top of the forward part of the nozzle inclined as is the roof of the chamber below, and adapted to engage the forward portion of said roof, substantially as and for the purposes specified.

4. In a smoke consuming device, the combination of the shell for location in the wall of the furnace, said shell provided in each inner side with a guide H, and having the inclined roof  $K^5$ , and the nozzle whose delivery chamber C is formed by a top and bottom which gradually approach each other and terminate in a slit, and whose exterior front portion is inclined downward and forward to fit with and engage the inclined roof  $K^5$  of the shell, for enabling the discharge of steam spray to be always properly maintained, substantially as and for the purposes specified.

5. In a smoke consuming device, the chambered nozzle, having the receiving chamber B and the chamber C provided with the narrow horizontal exit opening E, these chambers being connected by a conduit in the shape of a narrow vertical slit formed by the converging vertical walls of the two chambers, the roof and floor of chamber C converging from top and bottom to the narrow exit opening E and the vertical walls of chamber C diverging at each side to said exit opening, substantially as and for the purposes specified.

6. In a smoke consumer, the chambered nozzle having the receiving chamber B and the chamber C provided with the narrow horizontal exit opening E, these chambers being connected by a conduit in the shape of a vertical narrow slit, a steam feed pipe entering the chamber B, the plane of that wall



of this latter chamber which is next this feed pipe being at right-angles to the length of this pipe, the chambers B and C being connected by a narrow vertical slit formed  
5 by the converging walls of the two chambers, the top and bottom of the chamber C converging to the narrow exit opening E and the side walls diverging at each side to said exit opening, substantially as and for  
10 the purposes specified.

7. In a smoke consuming device, the chambered nozzle having the receiving chamber B and the chamber C provided with the narrow horizontal exit opening E,  
15 these chambers being connected by a conduit in the shape of a vertical narrow slit, a

steam feed pipe entering the chamber B, the plane of that wall of this latter chamber which is next the feed pipe being at right angles to the length of this pipe, the cham- 20  
bers B and C being connected by a narrow vertical slit formed by the converging walls of the two chambers, the side walls of chamber B converging abruptly to said slit, the top and bottom of the chamber C converg- 25  
ing to the narrow exit opening and the side walls diverging to said exit opening, substantially as and for the purposes specified.

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Attest:

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