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C. H. & T. P. VON MYLIUS.
SMOKE CONSUMING FURNACE.

APPLICATION FILED FEB. 23, 1906.

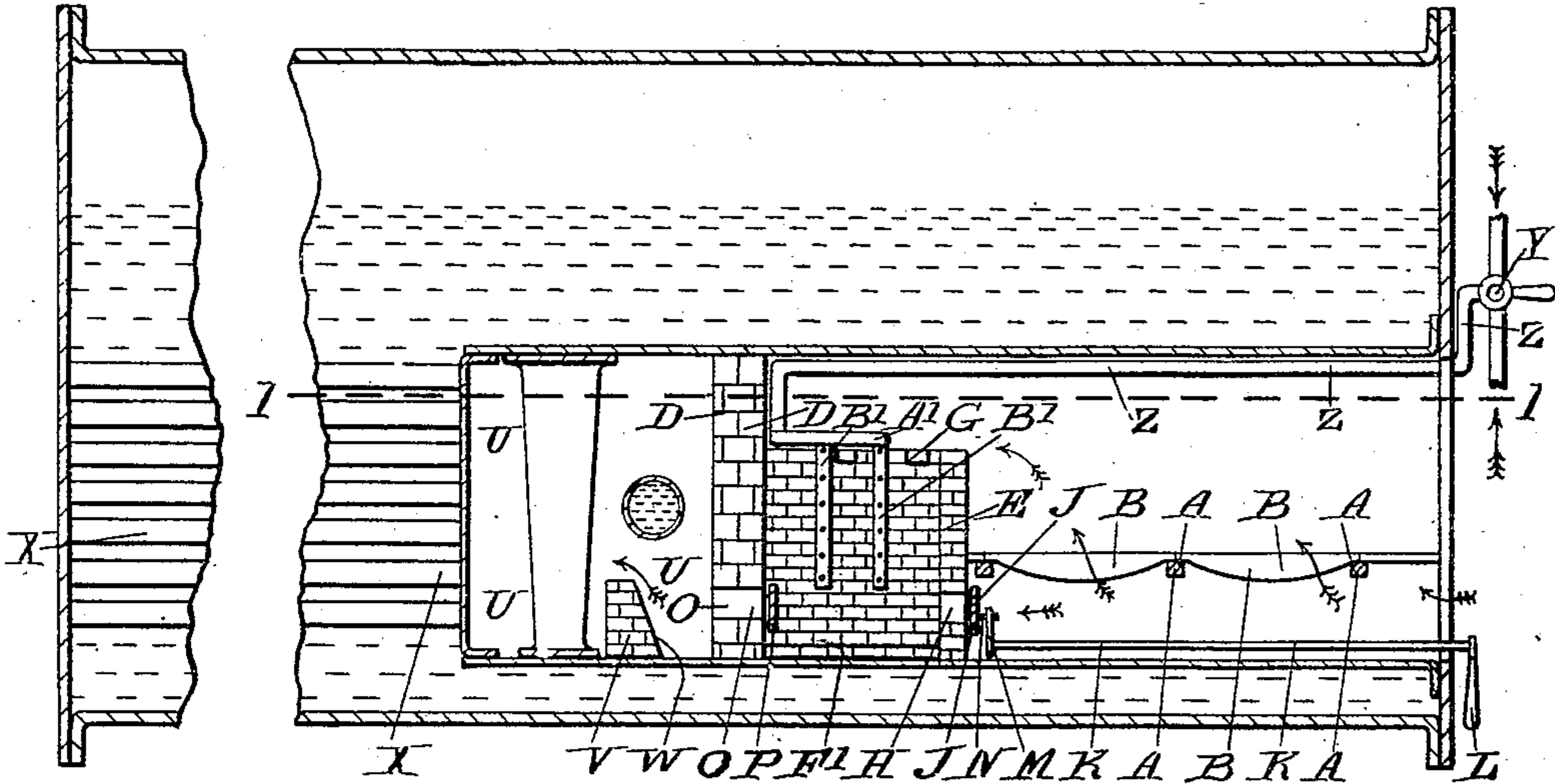


Fig. 1.

Fig. 2.

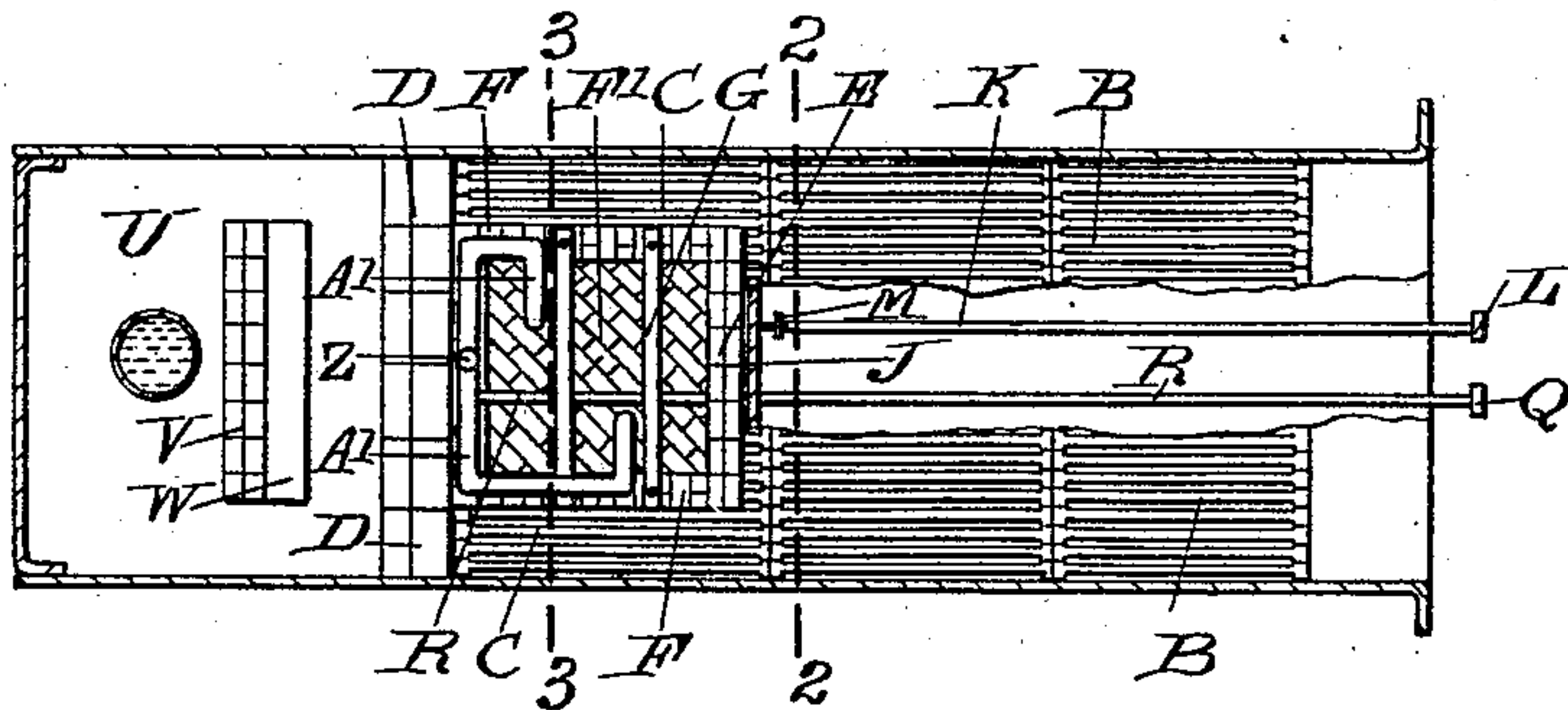
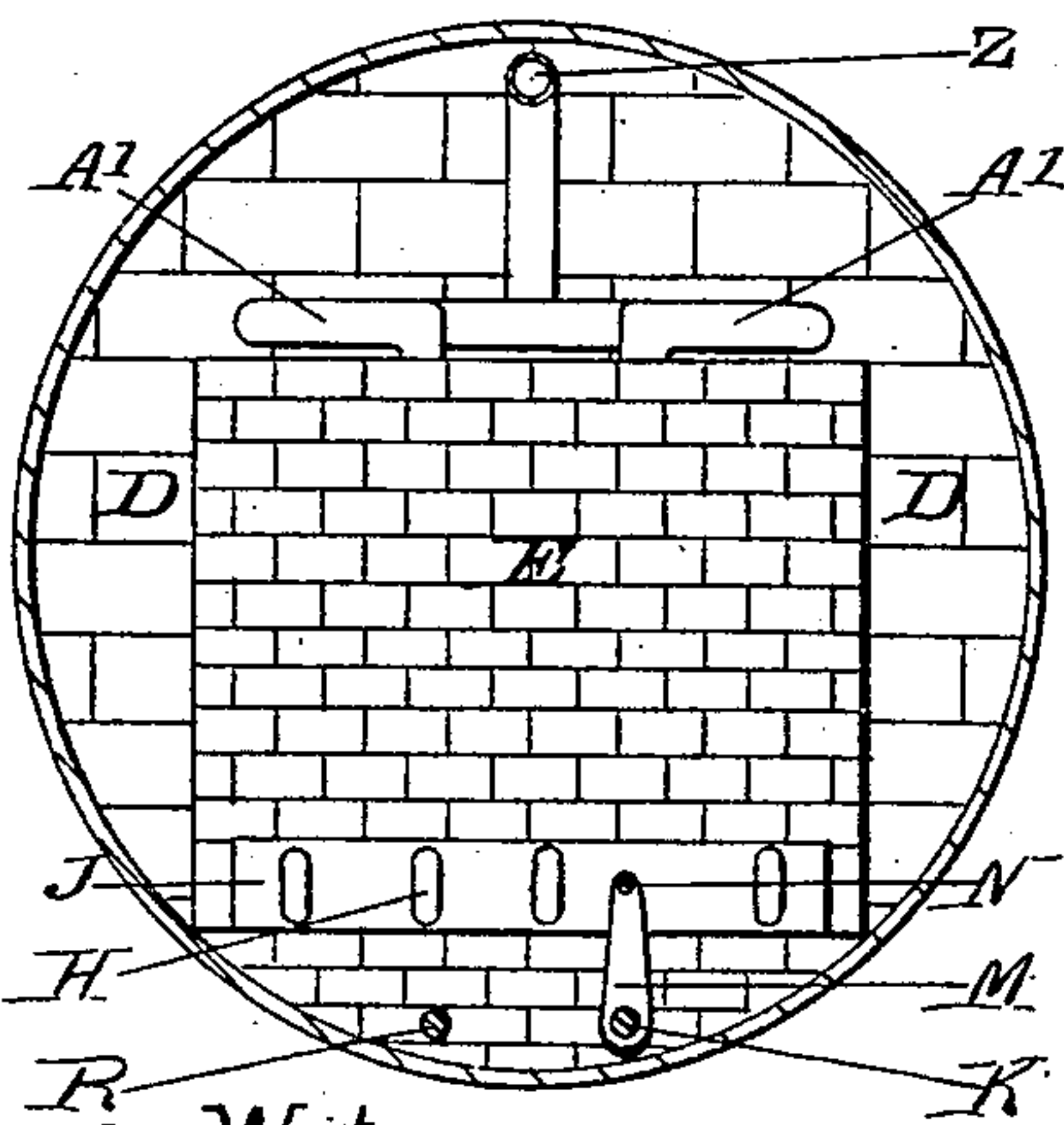
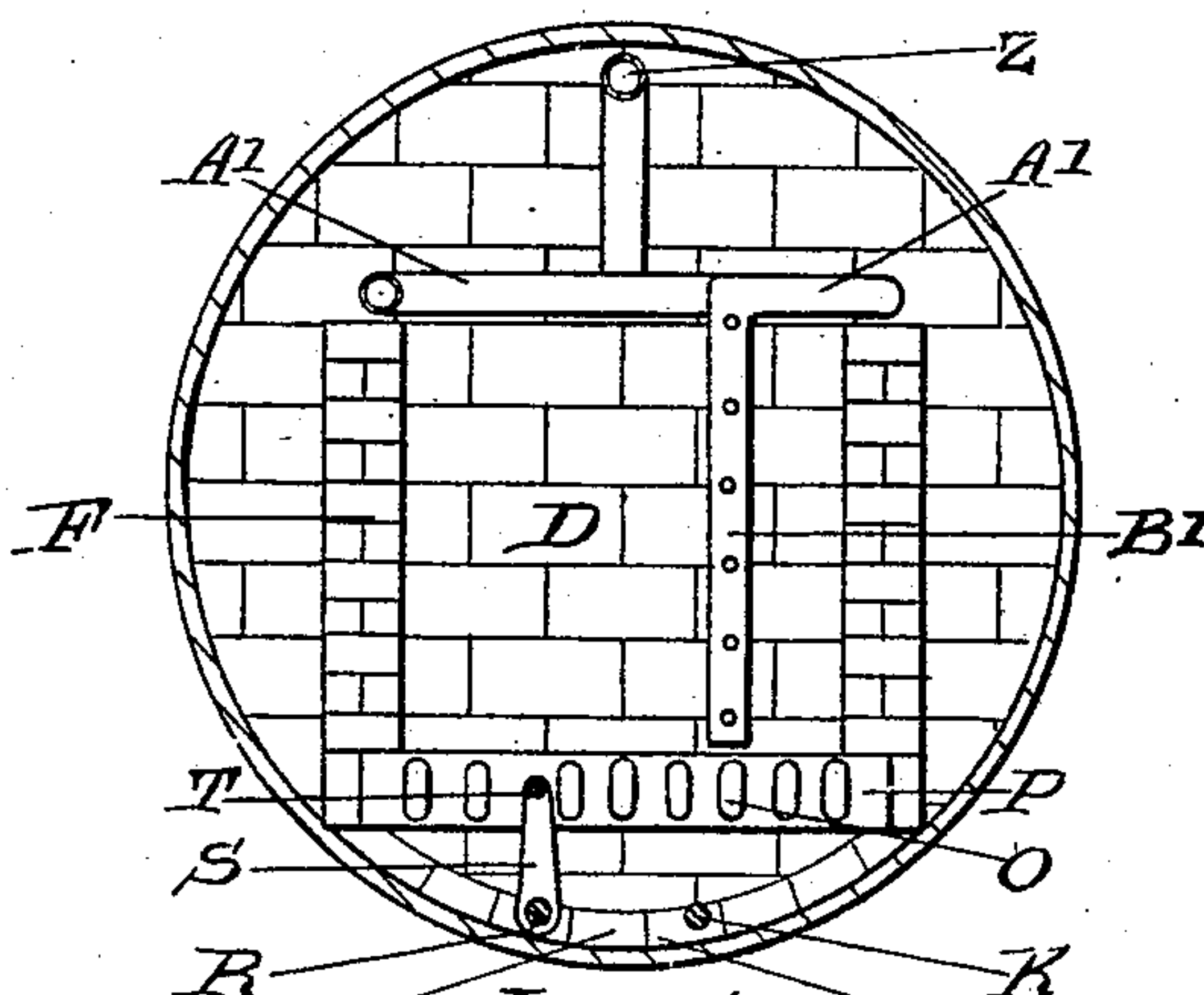


Fig. 3.

Fig. 4.



Witnesses:
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UNITED STATES PATENT OFFICE.

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SMOKE-CONSUMING FURNACE.

No. 859,004.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that we, CHARLES HENRY VON MYLIUS and THOMAS PROBIN VON MYLIUS, subjects of the King of Great Britain and Ireland, both residing at Adam street, Burnley, in the county of Bourke, State of Victoria, Commonwealth of Australia, have invented certain new and useful Improvements in Smoke-Consuming Furnaces, of which the following is a specification.

Our invention relates to furnaces for generating steam or heat and its object is to provide a furnace the combustion in which shall be so effective that very little, if any, smoke shall be liberated from the smoke stack top. A variety of devices have been used to this end, but experiments show that there are four prerequisites to the prevention of smoking chimneys. They are (1) an adequate air supply to the fuel; (2) a thorough mixture of the air supply with the unburned gases from that fuel, (3) a suitable space in which these gases can complete their union with the oxygen of the air; (4) a temperature in that space sufficient for such union. With our invention the unburned gases, fresh from the coal, instead of striking against comparatively cold surfaces such as the walls of the furnace, the combustion chamber or the tubes and then being liberated into the chimney, impinge against the hot surface of a refractory material or fire brick. This is presented by a refractory diaphragm and also by a refractory mixture chamber. In addition to which steam (wet or superheated) and an auxiliary heated current of air is supplied to the gases in the mixture chamber which chamber provides the conservation of temperature which is essential to smokeless combustion, and effectually mixes the unburned gases from the fire, the air and the steam. But in order that our invention may be better understood, we will now refer to the accompanying sheet of drawings, which are to be taken as part of this specification and read herewith.

Figure 1 represents a side central sectional elevation of a furnace as applied to a steam boiler. As can be well understood it is applicable to other types of boilers and also to furnaces used for generating heat. For convenience of illustration the fire door is removed. Fig. 2 is a plan of our furnace through 1—1, Fig. 1, one of the Galloway tubes for the convenience of illustration being omitted. Fig. 3 is a section, on an enlarged scale, through 2—2, Fig. 2, the fire bars being removed and the air inlet holes open. The front of the refractory mixture chamber is seen and the slide controlling the air inlet holes therein. Fig. 4 is a section, on an enlarged scale of the furnace through 3—3, Fig. 2. The exit holes are open, and the wing fire bars removed.

Similar letters of reference indicate similar or corresponding parts where they occur in the several views:—

Our invention includes a furnace having a fire bot-

tom formed by fire bars supported upon bearers A. 55
These fire bars are arranged to form main fire bars as B and wing fire bars as C.

At the back end of the wing fire bars C, is a reverberatory diaphragm D. This fits the furnace and entirely closes the same. In other words, it entirely prevents 60
the passage of either the flame or gas passing direct from the fire to the combustion chamber. It can be of any material or materials, and may be dry or have a water circulation there-through. Between the wing fire bars C and the said diaphragm D is a hole in the fire bottom 65
which accommodates the refractory combustion or mixture chamber hereinafter described.

In the hole in the fire bottom and adjacent to the diaphragm is situated an open topped refractory combustion or mixture chamber, hereinafter referred to as the 70
refractory mixture chamber. The back wall of this is formed by the diaphragm D. The front wall is marked E and the side walls F. The said chamber may be rectangular, square, triangular, horse shoe, or of any other shape. It is formed of fire brick or any refractory ma- 75
terial or materials or combinations of the same. Its side and front walls extend below the fire bars to the furnace or ashpit bottom. The said walls also extend above the surface of the fire bars. The height of the said extension above the bars will depend upon circum- 80
stances. The said walls are braced or tied together by braces or ties G of any well known character. The bottom of the said open topped refractory mixture chamber is fire bricked as at F¹.

Through the front wall E of the open topped refrac- 85
tory mixture chamber and below the fire bars are air inlet holes H. These, which may be of any area or shape, admit air to the bottom of the open topped refractory mixture chamber, which air, as it passes beneath the under side of the fire bars and above the hot 90
ashes gathered in the ash pit, is heated in transit. Controlling the said inlet holes is a slide J also having holes therein. The said slide is moved longitudinally by a rod K one end of which protrudes beyond the furnace front and has a handle L thereon. The other 95
end has the inner end of a lever M attached to it, the outer end of which lever, by a pivot pin N or lugs, or other means, is pivoted to the said slide.

Through the bottom portion of the reverberatory diaphragm are the exit holes O. The area and shape 100
of these will depend upon conditions. Controlling the said exit holes is a slide P also having holes therein. This slide, from the furnace front, is moved longitudinally by a handle Q on a rod R which rod on its inner end has attached the inner end of a lever S, the 105
outer end of which by a pin T or other means is pivoted to the said slide.

Beyond the reverberatory diaphragm is situated

the combustion chamber U. In this is a refractory deflector V. This has an inclined face W and up it all the burned gases pass on liberation into the said combustion chamber. From this chamber they pass
5 to the tubes X, to the smoke box, flues, or any other outlet.

Outside the furnace is situated a two way cock Y attached to a water or steam pipe Z. By this cock either water or steam can be turned on to the pipe Z
10 or both of them can be cut off. The said pipe Z passes along the furnace crown till it meets with the reverberatory diaphragm D and then passes downwardly when it is divided into branches A¹. These branches pass over the top of the walls of the refractory mixture
15 chamber and from them are led depending distributors B¹. In the depending distributors B¹ are a series of orifices so arranged that steam is pointed in the required direction. If water be turned into the pipe Z wet steam issues from the orifices, whereas if steam
20 be turned into the pipe Z superheated steam escapes into the mixture chamber.

It is obvious that the air passing through the air inlet holes H may be conducted through the ash pit in any manner desired.

25 The cycle of operations with our invention is as follows:—The fire having been lighted and spread over the main as well as the wing fire bars, the flames, smoke, and other unburned material rise upwardly from the fire and are drawn towards the reverberatory diaphragm
30 against which they impinge. This diaphragm is at a high temperature. They next descend into the refractory mixture chamber, the walls of which are brick lined, and which are, therefore, at a high temperature. The third agency to quicken their com-
35 bustion is a supply of air. This is heated. The next assistant is steam. The last a deflector having an inclined face. The hot zones through which the gases pass, namely, in front of the diaphragm, inside of the

refractory mixture chamber, and in front of the deflector, effectually consume all visible volatile matter. Inside the refractory mixture chamber are effectually mixed the unburned gases liberated from the fire, the auxiliary supply of hot air and the steam. On lighting the fire we have found it desirable, as also upon other occasions, to pass water instead of
40 steam into the pipe Z. With some coals, and under some conditions, water only is passed into the pipe Z, whereas under other conditions steam only is admitted.

Having now described our invention, what we claim as new and desire to secure by Letters Patent is:— 51

1. In a smoke-consuming furnace, the combination with a fire-box bounded by a front wall, a rear reverberatory diaphragm, and side walls, of a mixing-chamber disposed in the fire-box, between said front wall and said reverberatory diaphragm, and out of contact with said side walls, and having a suitable air-inlet and restricted outlet for the mixed air and products of combustion, a combustion-chamber communicating with said mixing-chamber, and means for supplying either wet or superheated steam to said mixing-chamber. 6

2. In a smoke-consuming furnace, the combination of a fire-box, a diaphragm of refractory material closing the rear thereof and having openings near its bottom, upright walls of refractory material and a bottom of like material disposed in front of said diaphragm and forming a mixing-chamber inclosed except at the top and surrounded on three sides by the fire-box, said mixing-chamber being provided with a suitable air-inlet and having the openings in the diaphragm constituted as its outlet, means for supplying either steam or water to the mixing-chamber, a
7 combustion chamber on the other side of the diaphragm, and an inclined refractory deflector disposed to be impinged by the gases flowing through said outlet and to deflect them upward within the combustion-chamber.

In testimony whereof we affix our signatures in the presence of two subscribing witnesses. 7

CHARLES HENRY VON MYLIUS.
THOMAS PROBIN VON MYLIUS.

Witnesses:
EDWIN PHILLIPS,
CECIL M. SLASTRIER.