H. PAULING.

ELECTRIC FURNACE FOR TREATING GASES.

APPLICATION FILED MAR. 27, 1911.

999,587. Patented Aug. 1, 1911.

Fig. 1.

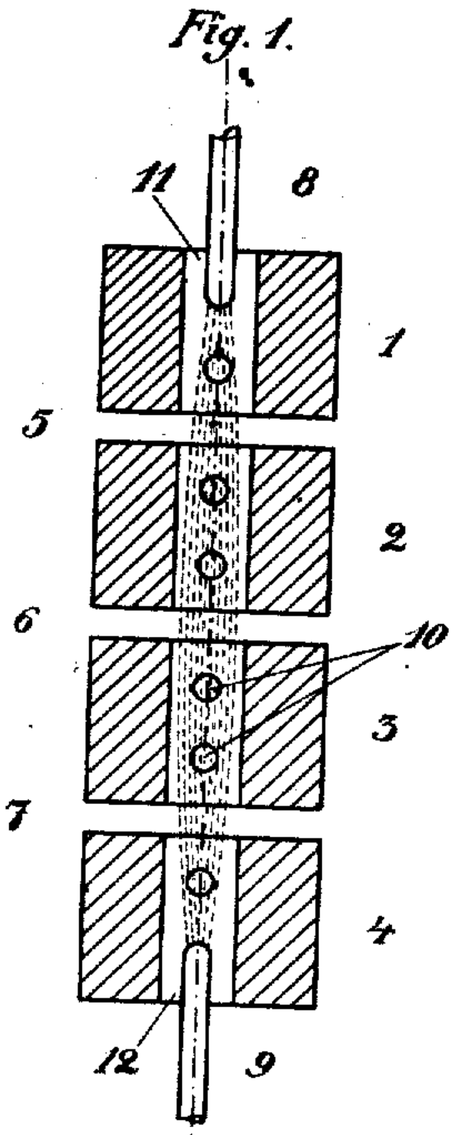


Fig. 3.

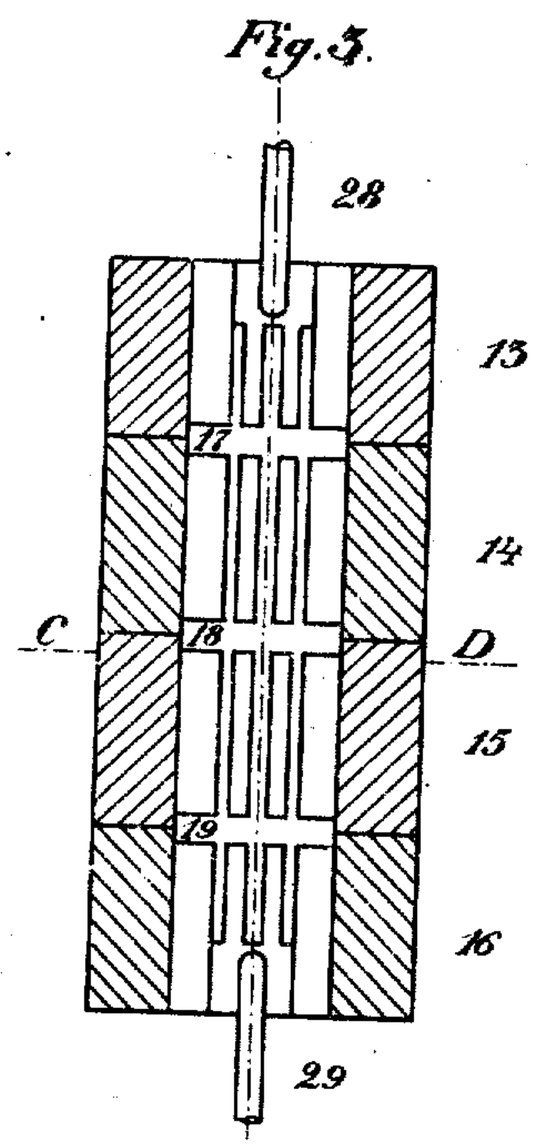


Fig. 2

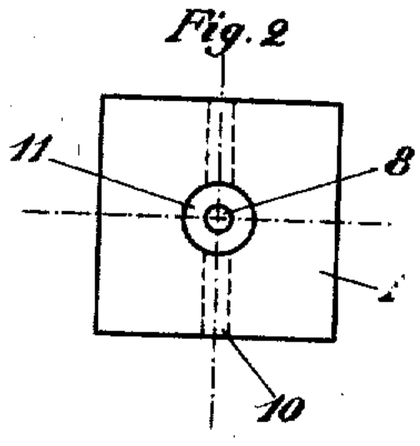
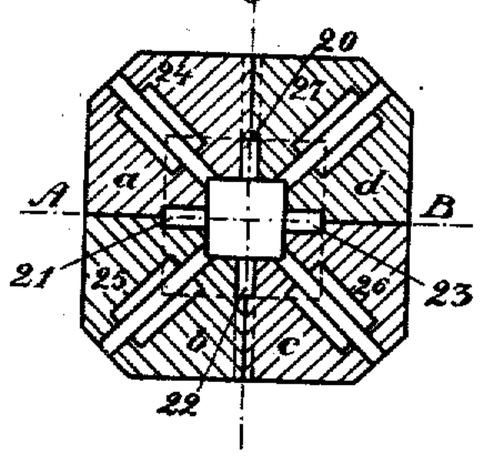


Fig. 4.



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ELECTRIC FURNACE FOR TREATING GASES.

999,587. Specification of Letters Patent. Patented Aug. 1, 1911

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To all whom it may concern:

Be it known that I, HARRY PAULING, subject of the King of Saxony, residing at Wilhelmstrasse 84, Gelsenkirchen IV, in the Kingdom of Prussia, German Empire, have invented a new and useful Improvement in Electric Furnaces for Treating Gases; and I do hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to electric furnaces for treating gases.

In treating gases with electricity it is well known that it is advantageous to prevent as far as possible loss by radiation of heat from the electric flame, by inclosing the latter in refractory materials, and also to prevent the passage of gases outside the flame, by arranging the flame as closely as possible to the furnace walls. Such an arrangement naturally increases the heating of the furnace walls, and this must not be carried to excess since with rise of temperature the walls become relatively good conductors of electricity, at least with electric pressures usually employed. Where this occurs, the current may enter and travel through the hot walls, instead of passing directly between the electrodes. According to the present invention this disadvantage is obviated, even if the temperature of the furnace walls is raised to near melting point, by subdividing the surface of the furnace walls facing the flame into a number of areas or elements, each of which is separated from the surrounding elements by gas passages which penetrate into the wall to such depth as to obviate any risk of the wall acting as a conductor when it becomes hot.

The construction of furnaces according to this invention does not present any difficulty, since the outer portion of the wall may be composed of an uninterrupted layer of material, there being no risk of the same becoming conductive, owing to the cooling action taking place there. The areas of the surface elements, or, in other words, the distances between the grooves or channels, are determined by the electric pressure which is required to cause the flame to enter into the furnace walls and to pass out of the same, *i. e.*, by what are termed the anode drop and the cathode drop, depending on the material employed in the furnace walls. Consequently the area of each surface element is made of such length and breadth as will render the sum of the anode and cathode drops greater than the fall of potential in the corresponding length of flame arc.

In the case of electric discharges of fixed direction, along which the potential falls in the stream of gas, for instance, so called stable flames, there may be employed, instead of criss-cross channels forming a network insulating the surface elements, channels which produce surface elements insulated from one another transversely to the direction of the fall of potential. An arrangement of this kind is illustrated by way of example in Figures 1 and 2 of the accompanying drawings, Fig. 1 being a longitudinal section and Fig. 2 an end view. In these figures, 8 and 9 are the electrodes, and 1, 2, 3 and 4 are the furnace wall elements which are separated from one another by the gas slits 5, 6 and 7. The wall elements are shown only of the thickness up to which they are rendered conductive by heat. They are completely inclosed by a non-conducting wall (not shown), so that no reaction gases or air can pass out through the slits 5, 6 and 7 and consequently the reaction gases are compelled to travel along determined paths; for instance, these gases may enter at the ports 11, 12 around the electrodes, or through holes 10 provided in the wall elements.

Figs. 3 and 4 illustrate the use of transverse and longitudinal channels, Fig. 3 being a section on the line A—B of Fig. 4 and Fig. 4 being a section on the line C—D of Fig. 3. The furnace in this case comprises four transversely divided sections 13, 14, 15, 16 forming a shaft with horizontal channels 17, 18, 19 and vertical channels 20, 21, 22, 23. Fig. 4 also illustrates the provision of passages 24, 25, 26, 27 for the exit of reaction gases. It will be understood that the central passage which constitutes the electric discharge chamber and determines the form of the electric discharges, need not be of circular cross section, but may have any other suitable shape. It may, for instance, be very low and wide, in which case a large number of holes 10 may be provided side by side, transversely to the direction of the fall in potential, or narrow passages may be used instead of such rows of holes, for the purpose of a convenient distribution of large quantities of gas. Further, the holes or passages for the exit of the gases from the discharge chamber may inclose, or be inclosed by, cooling devices for the purpose

of chilling the hot reaction gases. This is illustrated in connection with the slots 24 to 27 in Fig. 4.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:

1. In an electric furnace for treating gases, a furnace wall having its surface next the electric flame subdivided into a plurality of separate elements by a network of connected passages extending to a depth in said wall at which the latter does not become heated sufficiently to be electrically conductive.

2. In an electric furnace for treating gases, a furnace wall having its surface next the electric flame subdivided along the line of fall of the potential into a plurality of separate elements by a network of connected passages extending to a depth in said wall at which the latter does not become heated sufficiently to be electrically conductive.

3. In an electric furnace for treating gases, the combination of a continuous outer furnace wall, and an inner furnace wall composed of a plurality of wall elements arranged with air passages between one another and said outer furnace wall, each of said wall elements having a depth reckoned from its surface next the electric flame at which the material of said wall element does not become heated sufficiently to be electrically conductive.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

HARRY PAULING.

Witnesses:

R. J. Boylan,

L. A. Hammersley.