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PATENTED SEPT. 8, 1908.

H. PAULING.

APPARATUS FOR PRODUCING VOLTAIC HIGH CURRENT ARCS.

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FIG. 1

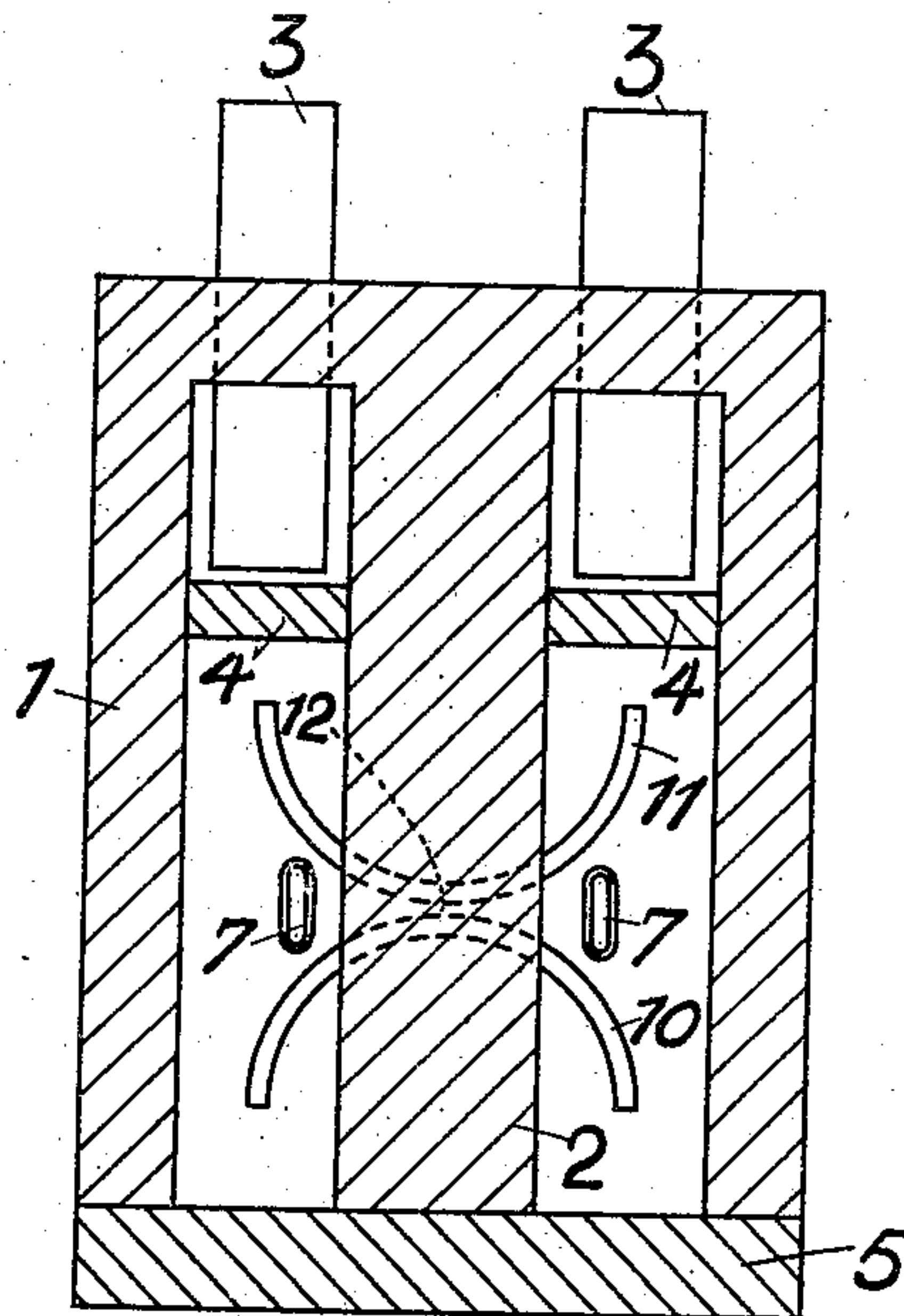
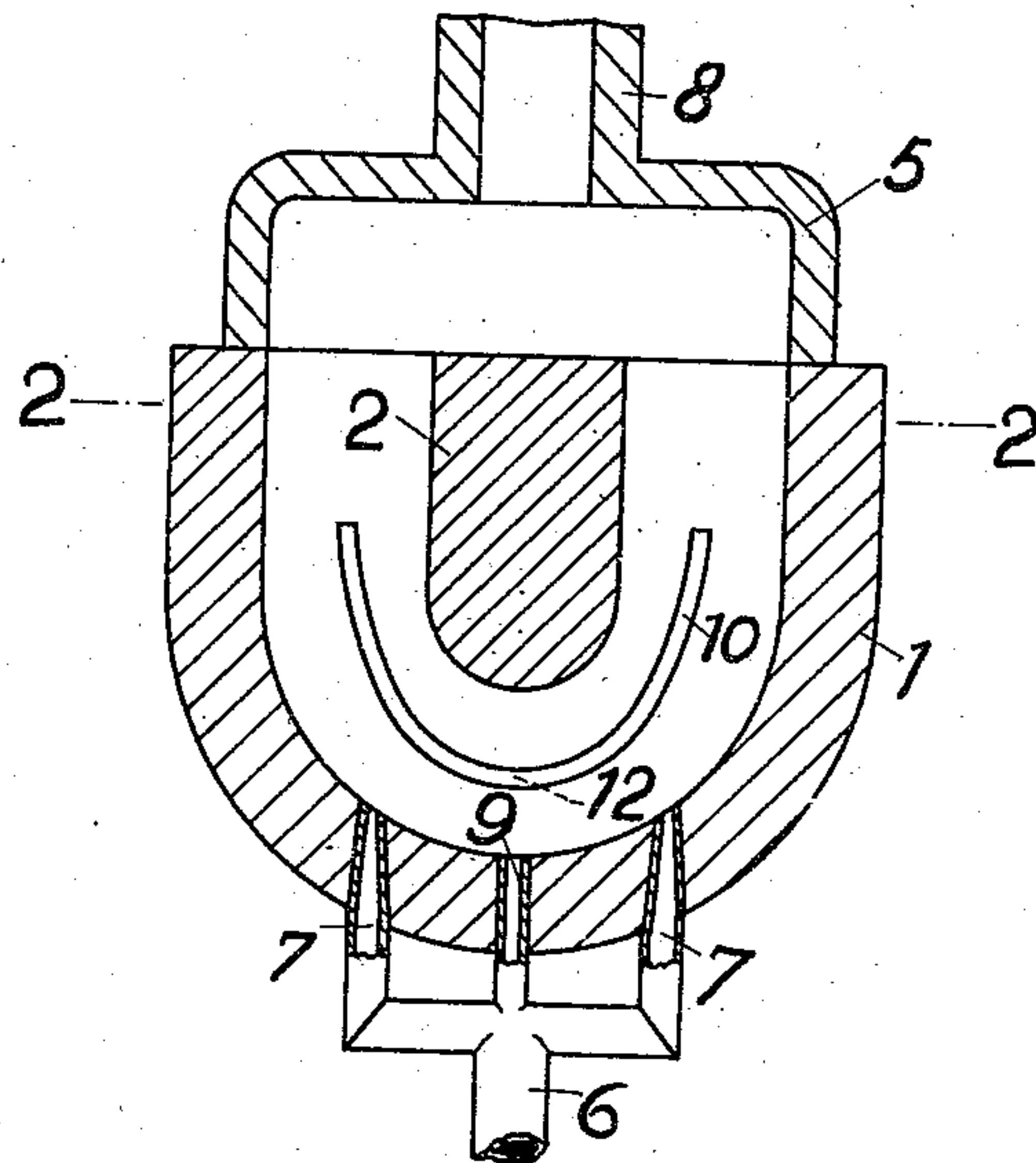


FIG. 2

Witnesses:

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APPARATUS FOR PRODUCING VOLTAIC HIGH-CURRENT ARCS.

No. 898,133.

Specification of Letters Patent.

Patented Sept. 8, 1908.

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To all whom it may concern:

Be it known that I, HARRY PAULING, a subject of the German Emperor, and resident of 84 Wilhelmstrasse, in Gelsenkirchen IV, in the Province of Westphalia, Kingdom of Prussia, Germany, have invented certain new and useful Improvements in Apparatus for Producing Voltaic High-Current Arcs, of which the following is a specification.

My invention relates to means for producing voltaic high-current arcs such as used for chemical and physical processes. Some of the latter will be more fully referred to after the description of my device.

In order to utilize the available energy for producing arcs of great lengths diverging electrodes are commonly used. To heighten the effect it has been proposed to subject the discharges, arising at the distance of greatest proximity of such electrodes, to the action of magnetical means arranged to cause the said discharges to run along the electrodes and in the direction of divergence thereof so as to form arcs of the desired great lengths. Another means proposed to such end consists in a current of gas blown through the space between the electrodes with sufficient force to act like the aforesaid magnetical means.

The present invention consists, broadly, in apparatus combining some or all of these features in a peculiar manner, as will be understood from the following description and be particularly pointed out in the appended claims, reference being had to the accompanying drawing which diagrammatically shows a form of construction embodying my improvements, Figure 1 being a vertical section, Fig. 2 a horizontal section on the line 2-2 of Fig. 1.

Like numerals of reference indicate like parts.

1 and 2 are the two poles of a magnet. The pole 1 forms a sort of receptacle which is open at one end, in the case represented the upper end, while the pole 2 is arranged within the former so that there is a clear space between the two. Located within this space are a pair of curved electrodes 10, 11 so that the pole 2 is embraced by either of them. These electrodes diverge towards the open end of the pole 1, so that the distance of their greatest proximity is at the place marked 12. Opposite the open end of the pole 1 is a pipe or the like 6 leading into the interspace be-

tween the poles, preferably through the medium of two lateral nose pipes 7 arranged to blow through the space between the electrodes 10, 11. Besides the pipes 7 there may also be a pipe 9 lying between the former and like these connecting the pipe 6 with the said interspace.

In the case of electromagnets being employed the coils 3 thereof must be protected from the radiating heat of the discharges between the electrodes 10, 11, by masonry or the like 4.

5 indicates fire-proof masonry or equivalent material, and 8 is an outlet for the treated gases.

The device described acts as follows: The discharges which take place at 12 are caused to propagate along the diverging electrodes 10, 11 by the action of a suitable current of gas arriving from the nose pipes 7, and by the influence of the magnet 1, 2, which acts in the same direction as the said current of gas, or nearly so. In this way the two means serving to obtain the object in view, namely the current of gas and the magnetic effect, assist each other so as to enable arcs of great lengths to be produced in a very reliable and perfect manner. The increasing length of such arcs is a consequence of the diverging position of the electrodes, as is well known; after having attained a definite length the arcs break and extinguish in the well-known manner. The arc started at 12 may be caused to go along the electrodes either in one or the other direction, that is to say, it may propagate either along those portions of the electrodes which extend to the right or those extending to the left. This depends on the direction the alternating current, with which the electrodes are supplied, has in each special case, a fact that results from permanent magnetic effect—or electromagnets fed with continuous currents—cooperating with the said alternating current. Thus the discharges arising at 12 will propagate in one direction or the other alternately. The air or other gas leaving the pipe 9 mainly serves for cooling the device.

I will now proceed to state some of the processes before mentioned to which my apparatus may be useful.

In the first place the device is intended for effecting gas reactions which require the high temperatures of high-tension discharges, such,

for example, as the reaction accomplished in manufacturing nitric acid from air or the like. But the device may also be employed for treating powdery ores by reductive or oxidizing gas mixtures. Thus sulfur ores may be roasted or calcined by means of a current of atmospheric air, heavy particles of the ore, or portions thereof not roasted falling back into the oven after leaving the arcs, and being blown back into the arcs by the current of air. The same mode of working may be employed for metallizing ore oxides by the aid of the gases of a blast furnace which are subjected to the requisite pressure to such end. The apparatus may further be used for the treatment of ores in pieces, and for melting down metal blocks or waste pieces. To such end gases, air, or mixtures of gases, are heated by means of the described arrangements to the desired temperature, whereupon they are brought to act on the material to be heated or chemically influenced, as the case may be. Similarly the device may be employed for thickening solutions, for drying and calcining salts, etc. These processes may be effected in conjunction with preliminary or subsequent gas reactions of the nature before mentioned.

Changes in the form, proportion, size, and the minor details may be resorted to without departing from the idea or sacrificing any of the advantages of this invention.

What I claim is:

1. In an apparatus for producing voltaic high-current arcs, in combination, a magnet one pole of which forms a receptacle open at one end, such receptacle inclosing the other pole of the said magnet with a clear space be-

tween them, and a pair of curved electrodes arranged within this space so that the second said pole is embraced by both of them, such electrodes diverging towards the open end of the first said pole, substantially as set forth.

2. In an apparatus for producing voltaic high-current arcs, in combination, a magnet one pole of which forms a receptacle open at one end, such receptacle inclosing the other pole of the said magnet with a clear space between them, and a pair of curved electrodes arranged within this space so that the second said pole is embraced by both of them, such electrodes diverging towards the open end of the first said pole, and means for blowing a current of gas through the space between the electrodes and in the direction of divergence thereof, substantially as specified.

3. In an apparatus for producing voltaic high-current arcs, in combination, a magnet one pole of which forms a receptacle open at one end, such receptacle inclosing the other pole of the said magnet with a clear space between them, and a pair of curved electrodes arranged within this space so that the second said pole is embraced by both of them, such electrodes diverging towards the open end of the first said pole, and a pair of nose pipes extending through the closed end of the first said pole and lying on opposite sides of the second said pole, substantially as described.

In witness whereof I have hereunto signed my name this 22 day of June 1907, in the presence of two subscribing witnesses.

HARRY PAULING.

Witnesses:

CARL HEINRICH,
RICHARD MERKEL.