No. 768,054. PATENTED AUG. 23, 1904.

C. G. P. DE LAVAL.

ELECTRIC FURNACE.

APPLICATION FILED MAY 8, 1903.

NO MODEL.

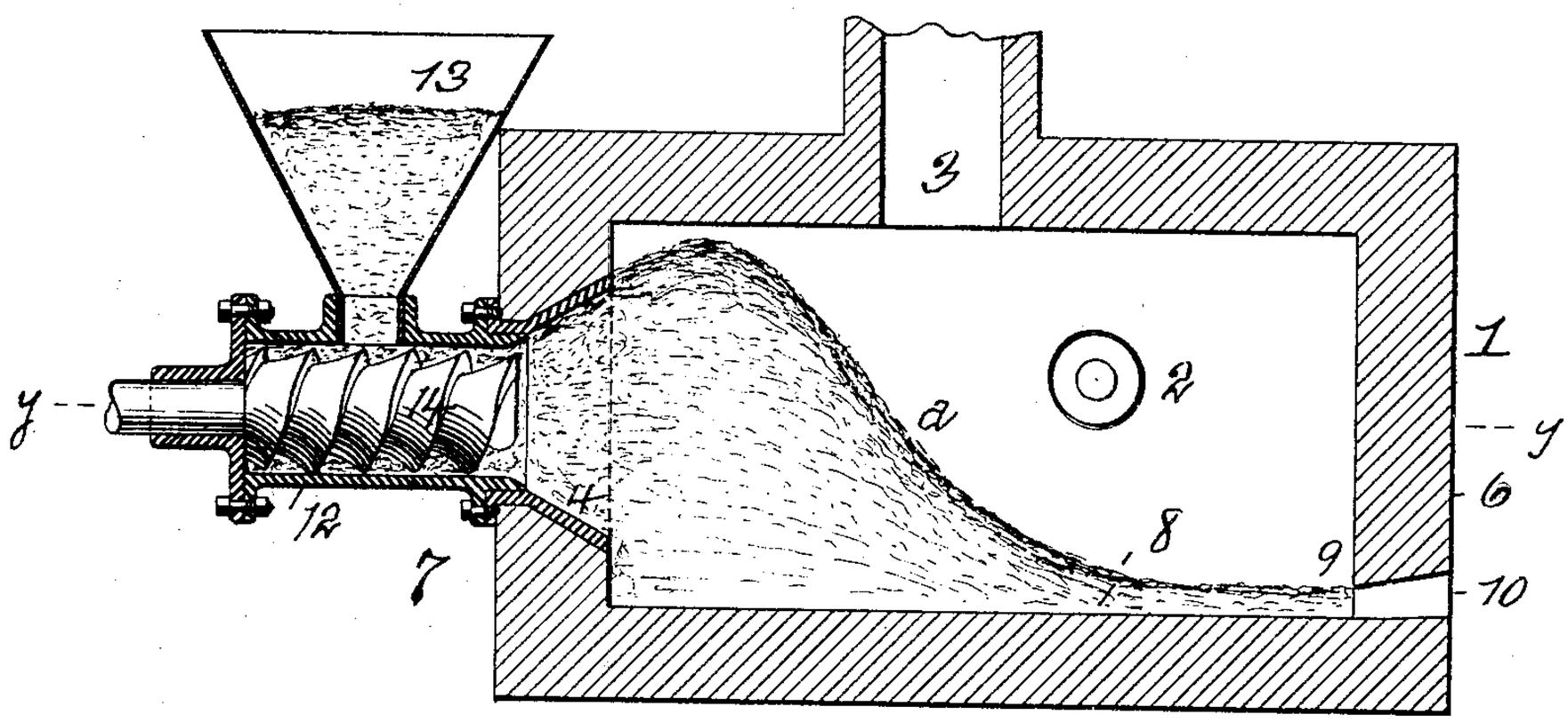

Fig. 1.

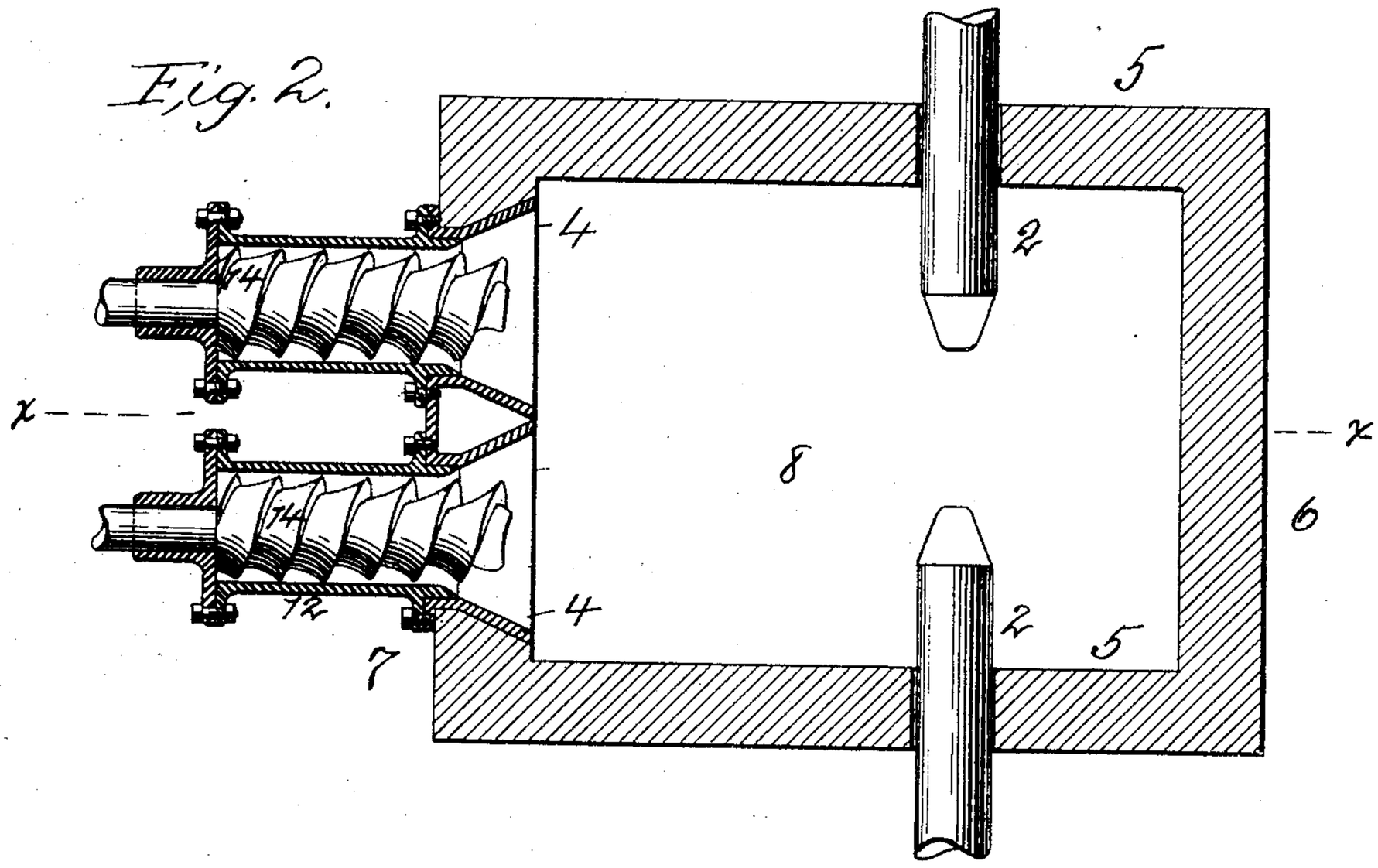

Fig. 2.

WITNESSES:

A. Henderson.

A. Hull.

INVENTOR

Carl G. P. de Laval

BY Louis Benjamin

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No. 768,054. Patented August 23, 1904.

UNITED STATES PATENT OFFICE.

CARL GUSTAF PATRIK DE LAVAL, OF STOCKHOLM, SWEDEN.

ELECTRIC FURNACE.

SPECIFICATION forming part of Letters Patent No. 768,054, dated August 23, 1904.

Application filed May 8, 1903. Serial No. 156,277. (No model.)

To all whom it may concern:

Be it known that I, CARL GUSTAF PATRIK DE LAVAL, a subject of the King of Sweden and Norway, and a resident of Stockholm, Sweden, have invented a new and useful Improvement in Electric Furnaces, of which the following is a specification.

The invention relates to an electric furnace for the treatment of comminuted materials, such as pulverized ore, from which the metal is to be extracted.

The invention consists in the construction of the furnace, as hereinafter more particularly pointed out and claimed.

In the accompanying drawings, Figure 1 is a vertical longitudinal section through the furnace on the line *x x* of Fig. 2. Fig. 2 is a horizontal section of the same on the line *y y* of Fig. 1.

Similar characters of reference indicate like parts.

The furnace-chamber is shown at 1. At 2 are the electrodes. between which is produced the electric arc, which is the heat focus. 3 is the outlet for gases or metal vapors, and at 4 are inlets for the comminuted material to be treated. The electrodes 2 pass through opposite side walls 5 of the furnace and are located above the hearth 8. The furnace bottom or hearth 8 extends from the end wall 7 to the opposite wall 6, in which is provided the opening 10, through which the molten material is drawn off. A plurality of inlet-openings 4 may be employed, as shown, each having its inner end flared or enlarged. Communicating with said openings are cylinders 12, provided with hoppers 13, and internal transport-screws. The crushed material to be treated is placed in the hoppers 13, whence it descends into the cylinders 12. The screws 14 in said cylinders are then rotated by any suitable means to force said material through the openings 4, and so into the furnace 1. By reason of this construction the material will be fed into the furnace so that it will assume as a resultant of the impelling force and gravity the form of a pile or heap, which will lie between the electrodes and the inlet-openings. This pile will also have a sloping or inclined face *a* toward the heat focus and will diminish in thickness measured vertically from the hearth until it becomes thinnest at the edge of the hearth and below the electrodes. By reason also of the flared inlet the pile will rise somewhat above said inlet, as shown in Fig. 1, so that as a consequence there will be an interposed mass of material between the heat focus and the upper edge of said inlet. The material is to be fed through the openings 4 at such a rate as will maintain the slope *a* at such a distance from the heat focus as that no sudden development of gases will occur sufficient to materially disturb or displace the material at said surface by causing it to fly about, and, further, as that a layer of half-molten material will be produced on said slope-surface which will slowly flow down the same, while the volatile ingredients which are liberated will escape at the outlet 3. The effect of forcing in the new material at the back of the pile or heap, as shown, is constantly to push the pile forward or toward the electric focus, and therefore it will be understood that this pushing forward is to be so timed and regulated to maintain the slope *a* at proper distances from said focus, as already described. The outlet-opening 3 is preferably placed, as shown, in such a position in relation to the electric arc that the volatile ingredients escape directly from the slope-surface *a* through said outlet without passing through the electric focus, which would raise their temperature. Where zinc ore, for example, is the material treated, the metal-vapors mixed with gases pass off at the outlet 3, and the crude ore and slag, encountering the most intense heat of the arc while in their thinnest layer on the hearth, melt and run to the bottom of the furnace at 9, whence they are withdrawn through the opening 10. Inasmuch as the distillation of the zinc and the smelting of the residues take place in the same furnace, the whole operation is continuous when the charge is continuously fed and the slag, &c., continuously removed.

I claim—

1. An electric-furnace chamber having a horizontal feed-opening, an escape-opening and a focus of electric heat within said chamber and opposite said feed-opening; the said escape-opening being located above said feed-

opening and between said feed-opening and said focus.

2. An electric-furnace chamber having a horizontal feed-opening and a focus of electric heat within said chamber opposite said feed-opening and an escape-opening in the roof of said chamber and between said feed-opening and said focus.

3. An electric-furnace chamber having a horizontal inwardly-extending feed-opening, a focus of electric heat within said chamber and opposite said feed-opening and an escape-opening in the roof of said chamber and between said feed-opening and said focus.

4. An electric-furnace chamber having a feed-opening in its wall, electrodes extending through opposite walls of said furnace and terminating in front of said feed-opening, and an escape-opening in the roof of said chamber and between said feed-opening and said electrodes.

5. An electric-furnace chamber of cubical form having a flat hearth, a feed-opening in one wall, a focus of electric heat within said chamber opposite said feed-opening, and an escape-opening in the roof of said chamber and between said feed-opening and said focus.

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

CARL GUSTAF PATRIK DE LAVAL.

Witnesses:

WALDEMAR BOMAN,

A. HENDERSON.