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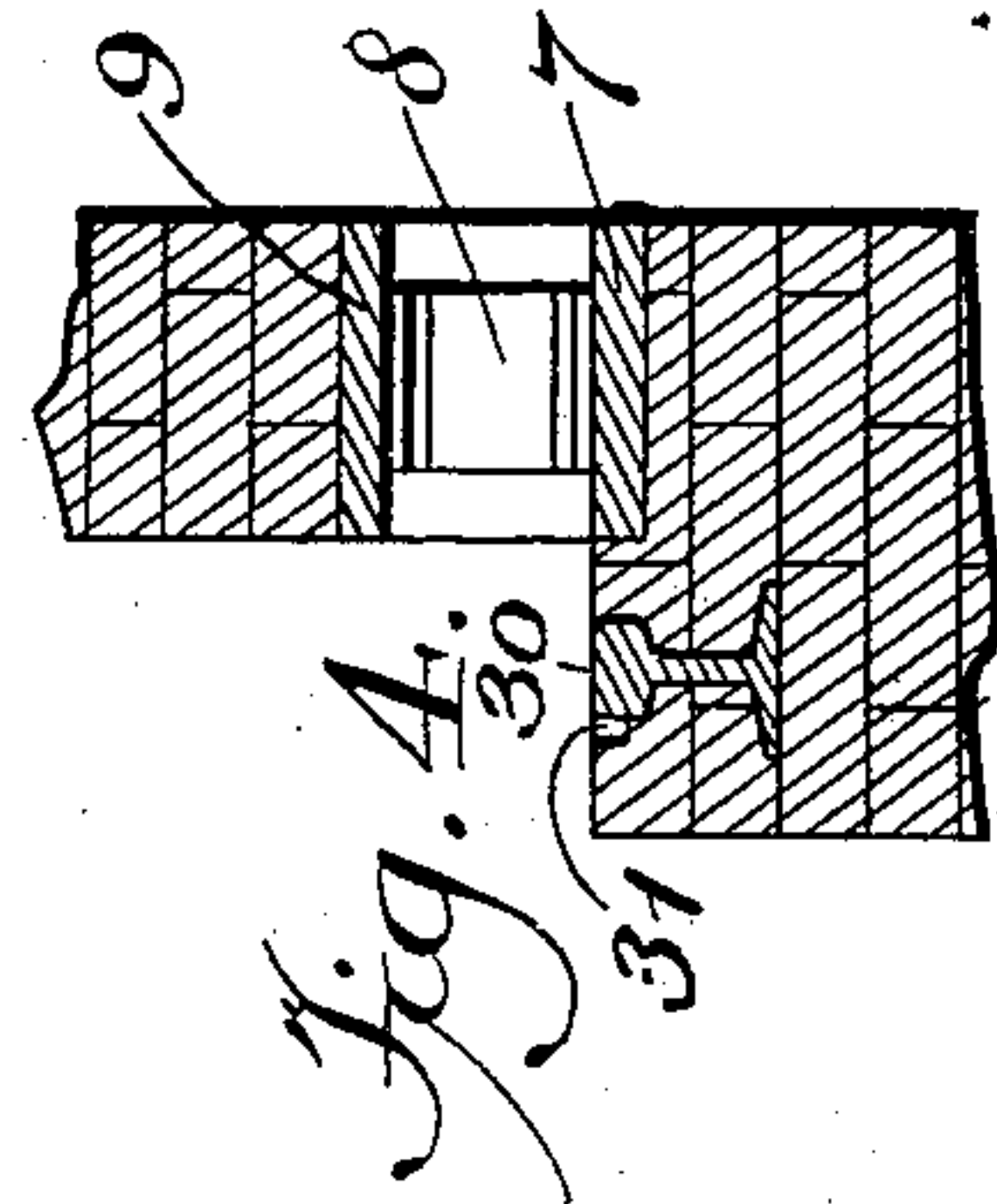
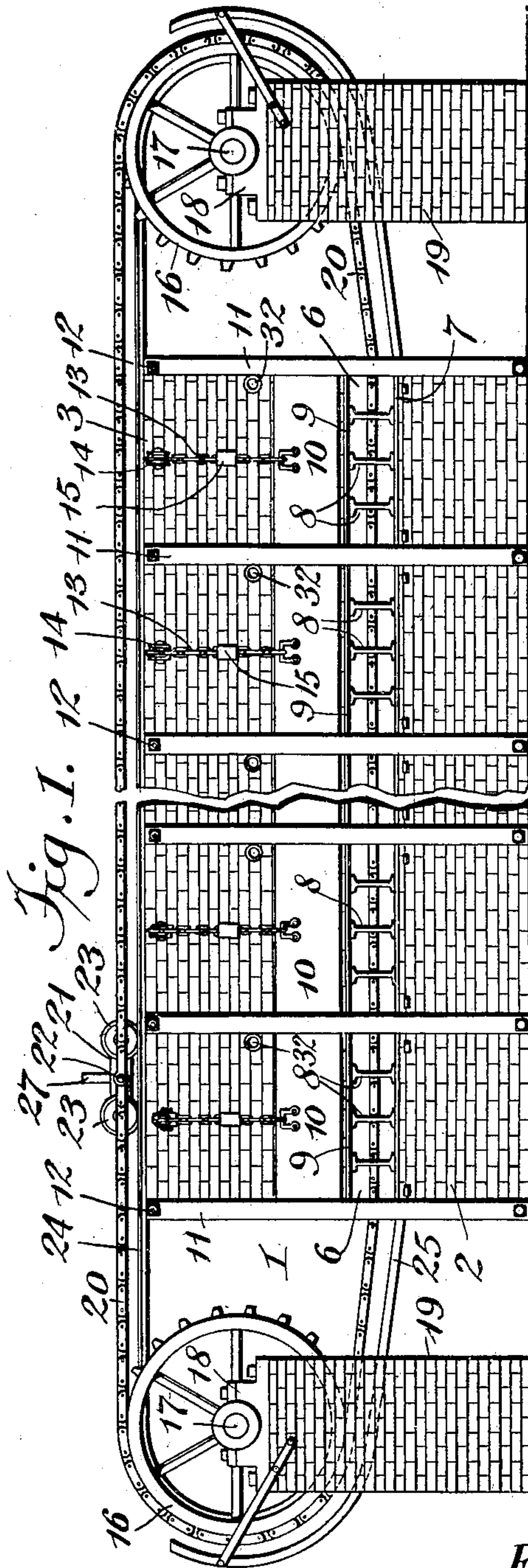
PATENTED JULY 21, 1903.

E. SWAIN & D. C. WOOD.
ORE ROASTING FURNACE.

APPLICATION FILED APR. 18, 1903.

NO MODEL.

3 SHEETS—SHEET 1.



Witnesses
E. H. Stewart
Dexter Morton

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D. C. Wood ^{Inventors,}
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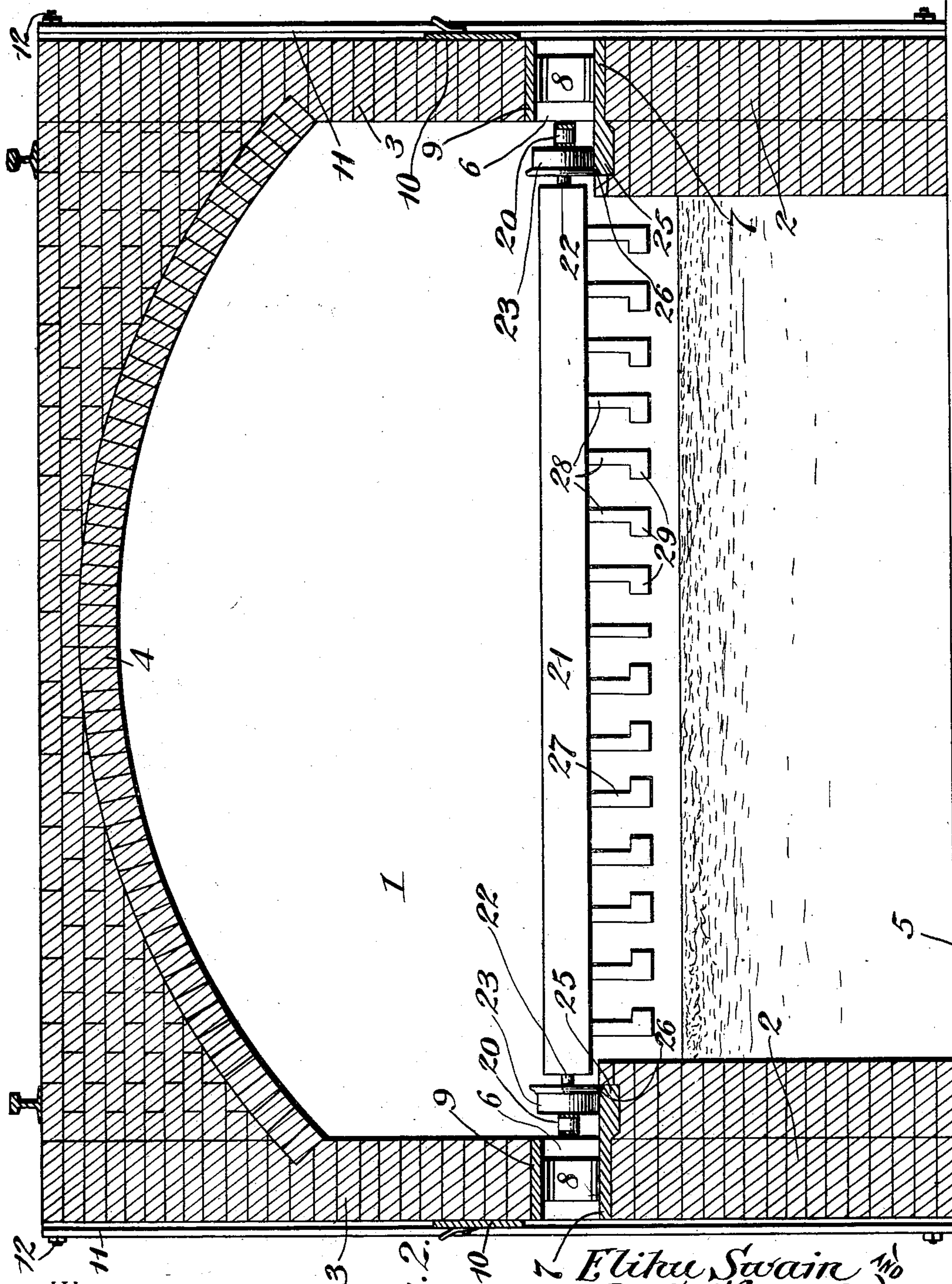
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Fig. 2.

by

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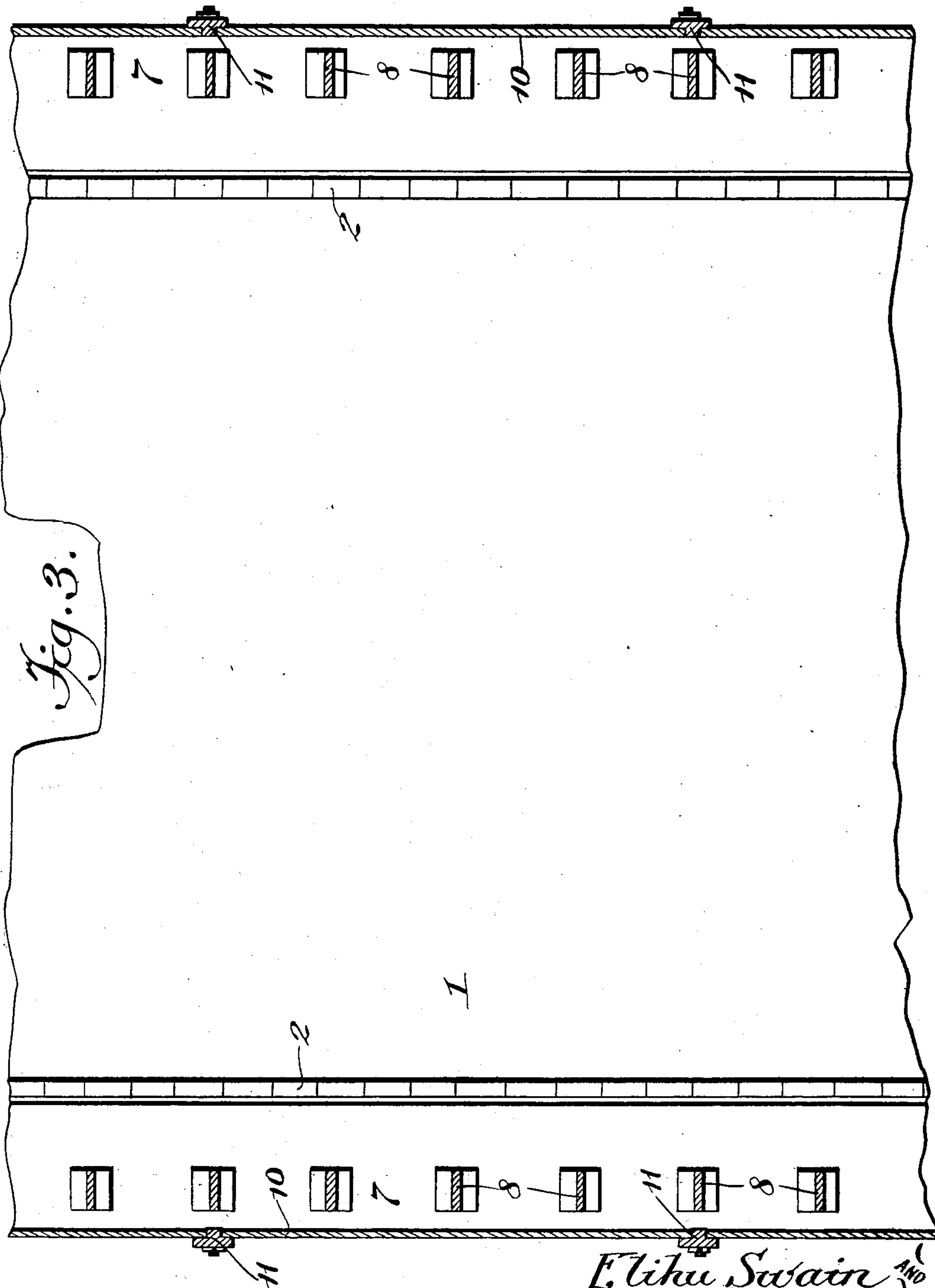
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

ELIHU SWAIN AND DOCTOR CLARK WOOD, OF IOLA, KANSAS.

ORE-ROASTING FURNACE.

SPECIFICATION forming part of Letters Patent No. 734,104, dated July 21, 1903.

Application filed April 18, 1903. Serial No. 153,276. (No model.)

To all whom it may concern:

Be it known that we, ELIHU SWAIN and DOCTOR CLARK WOOD, citizens of the United States, residing at Iola, in the county of Allen and State of Kansas, have invented a new and useful Ore-Roasting Furnace, of which the following is a specification.

This invention relates to ore-roasting furnaces, and more particularly to means for supplying air to such furnaces while in operation and to means for distributing the ore uniformly over the hearth of the furnace.

In ore-roasting furnaces as ordinarily constructed the hearth is of considerable length, and the ore, which is supplied to the furnace in any desired manner near one end, is generally distributed over the hearth by means of rakes carried by trucks connected by chains, so as to form an endless carrier, which travels over pulleys, sprocket-wheels, or other equivalent devices mounted at the ends of the furnace and on tracks provided within the furnace and on the top thereof. In some instances the furnaces are made in two sections placed one above the other, and the chain and rake supporting the trucks travel in one direction through one of the sections of the furnace and back in the opposite direction through the other section. In furnaces of either of the types mentioned the chains, rakes, and supporting trucks or cars frequently have to be replaced because they burn out. The chains especially, being the lightest structures, burn out most frequently, and consequently require more frequent renewal, which is a source of considerable expense. In such furnaces, also, the tracks within the furnace upon which the rake-supporting trucks travel are exposed to the temperature necessary in roasting the ores, and these, too, are subject to more or less rapid deterioration as the result of exposure to such high temperature.

One of the objects of the present invention is to provide means for preventing the burning out of the tracks for the rake-carrying trucks within the furnace and also to prevent the burning out of the chains connecting said trucks.

Another object contemplated in the present invention is to provide an adequate air-supply for the roasting process throughout the

entire length of the furnace and to utilize said supply of air in reducing the temperature of the tracks and chains above mentioned, so as to minimize the effect thereon of the heat from the furnace necessary in roasting the ore.

With the above and other objects in view, which will appear as the invention is more fully disclosed, the same consists in the construction and novel combination and arrangements of parts shown in the accompanying drawings, described in the following specification, and having the novel features thereof pointed out in the appended claims.

In the drawings, Figure 1 is a view in side elevation of the furnace, the structure being shown as broken through the center in order to represent both ends of the structure on the same sheet of drawings. Fig. 2 is a view in transverse vertical section through the furnace, the means for supporting the doors for closing the air-inlets being omitted to save space. Fig. 3 is a view in transverse horizontal section through a portion of the furnace, showing the arrangement of the preferred form of track within the furnace in relation to the air-inlet openings. Fig. 4 is a detail view in section, showing a modified form of track.

In all the figures of the drawings corresponding parts are designated by the same characters of reference.

Referring to the drawings in detail, 1 designates an ore-roasting furnace having side walls composed of lower sections 2 and upper sections 3 and an arched top 4.

5 designates the hearth, which lies at the bottom of the furnace throughout its entire length and supports the ore which is roasted in the furnace. The lower sections 2 and upper sections 3 of the side walls of the furnace are separated, as shown, by a horizontal space on either side of the furnace, which forms a suitable passage for the entry of air. In order to leave the space 6 between the two sections of each side wall, we provide at the top of the lower sections a plate of iron 7, upon which are placed at suitable intervals blocks or pillars 8, and resting upon the tops of the blocks or pillars 8 is another iron plate or series of plates 9, which forms the base upon which the upper section 3 of each side wall is supported.

The blocks or pillars 8 are formed, preferably, of iron and have the tops and bottoms thereof wider than the body portions between said tops and bottoms, as shown, so as to oppose as little obstruction as possible to the inlet of air through the space 6.

In order to control the admission of air to the furnace and adapt it to the needs thereof, we provide a plurality of sliding doors 10, which normally close the opening 6 and shut off communication through said opening between the interior of the furnace and the outside air. The doors 10 are mounted in guide-ways formed between buckstays 11, which extend vertically upward along the outer surface of each of the side walls of the furnace, as shown, the tops of said buckstays being connected through the top of the furnace by tie-rods 12. The doors 10 are preferably supported by means of chains 13, which pass over pulleys 14, supported on the side walls, near the top thereof, as shown, and have counterweights 15, attached thereto, as shown, to balance the weight of the doors.

At either end of the furnace is provided a pair of large sprocket-wheels 16, each pair having a shaft 17, rotatably mounted in bearings 18, supported on pillars 19, located adjacent to the ends of the furnace, as shown. Passing over the sprocket-wheels 16 are a pair of endless chains 20, spaced apart and carrying cars or trucks 21, which may be of any ordinary type and which have extended through the sides of each a rod or bar 22, the ends of which are adapted to engage with links on the sprocket-chains 20. The cars 21 are provided with wheels 23 of the usual type, having their rims provided with flanges at the inner margins thereof and adapted to travel on tracks 24 on top of the furnace and on tracks 25 within the furnace. The tracks 24 on top of the furnace extend beyond the ends thereof and are downwardly curved, as shown, in such position that the rods 22, carried by the cars, may engage with the notches on the sprocket-wheels 16 as the cars pass over said sprocket-wheels on the tracks. The tracks 25 in the furnace extend outward from each end thereof and curve upward around the sprocket-wheels 16, being spaced farther from the centers of the wheels than the ends of tracks 24, which said tracks 25 overlap. The terminals of the two pairs of tracks therefore form ways from which it is practically impossible for the cars or trucks 21 to become disengaged as they pass around the sprocket-wheels 16.

The tracks 25 within the furnace are supported upon the tops of the lower sections 2 of the side walls, as best seen in Fig. 2. The said lower sections are made wider than the upper sections 3 in order to furnish a support for the tracks 25, and the tracks 25 are located in the manner shown in order that the tracks may be as near as possible to the cool air which enters the furnace from the outside through the openings 6 between the

upper and lower wall-sections. The preferred form of construction for the tracks 25 is that shown in Fig. 2, in which the tracks are formed integral with the plates 7, which lie on the top of the lower wall-section 2. The plates 7 when used in this way are made thicker at their inner margins than at the outer ones to give them sufficient strength for the purpose to which they are put, and the inner edges of the plates extend inward farther than the inner surface of the upper wall-sections, but not entirely across the upper surface of the lower wall-sections. Adjacent to the inner edges of the plates 7, which form the tracks 25, are provided longitudinal grooves 26, extending throughout the length of the furnace to permit the passage of the flanges on the wheels 23 of the trucks or cars.

Each truck or car 21 has rigidly attached thereto a rake comprising a plurality of heavy metal teeth or spreaders 27, which are bolted or otherwise securely fastened to the transverse bar 22, provided on each truck or car 21. These teeth or spreaders 27 each consist of a relatively narrow shank 28 and a broad end 29 and are so disposed with reference to each car that when the car passes through the furnace the spreaders are disposed downward and come almost into contact with the roasting-hearth of the furnace, as best seen in Fig. 2. When the cars are passing along the top of the furnace, the spreaders are of course directed upward.

Instead of extending the plates 7 inward and providing the thickened margins which serve as tracks for the cars we sometimes employ side rails 30, which are embedded in the brick forming the lower wall-sections 2, as seen in Fig. 4, leaving the upper surface of the rails flush with the top of the inner portion of each of said lower wall-sections and providing a groove 31 along the inner side of each rail similar to the groove provided adjacent to the edges of plates 7, as above described, and serving the same purpose. When the rails 30 are used, the plates 7 are made similar to the plates 9 and are of the same thickness at both edges.

Heat is supplied to the furnace in any desired manner, preferably by means of gas or oil burners, (not shown,) which are attached to the inner ends of pipes 32, which extend through the side walls of the furnace in the manner indicated in the drawings. The ore may be supplied to the furnace in any desired manner, either by automatic mechanism (not shown) or by manual labor. As the means for supplying the ore to the furnace forms no part of our invention, we have not shown or described any mechanism therefor.

When the furnace is in operation, the chains 20 are continuously driven, and the ore, which is supplied to the furnace in any desired manner, as above explained, is carried slowly through the same by means of the rakes carried by the cars 21, which traverse

the furnace constantly in the direction indicated. Air is supplied to the furnace through the openings 6 between the upper and lower sections of the side walls, the amount of air admitted being controlled by the degree of opening of the sliding doors 10, by means of which the openings 6 are opened or closed, as desired.

It will be observed that as the tracks 25, upon which the cars or trucks 21 travel through the furnace, are located closely adjacent to the openings 6 at either side of the furnace the current of air entering through said openings necessarily serves in a considerable measure to reduce the temperature of the chains connecting the trucks, the trucks themselves, and the rails upon which said trucks travel, thus effectively diminishing the destructive action of the heat of the furnace upon the above-mentioned structures.

It will be noted that the furnace, as above described and illustrated, is of extremely simple construction, and the parts are so arranged that the damaging effect upon the rakes and carriers caused by the heat of the furnace, as well as upon the rails, is reduced to a minimum.

Having thus described the construction and operation of our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. The combination in an ore-roasting fur-

nace of side walls formed with upper and lower spaced sections having an air-inlet opening between said sections, tracks within said furnace on said lower wall-sections, said tracks having their upper surfaces flush with the top of said lower wall-sections and having a groove formed in said lower wall-sections adjacent to one side of each of said tracks, and rake-carriers having wheels provided with flanges adapted to traverse said tracks and move in said grooves.

2. The combination in an ore-roasting furnace of side walls, comprising lower sections provided at the top with cap-plates extending longitudinally thereof and covering the outer portion of the top of each of said lower wall-sections, said cap-plates being thickened at their inner edges to form tracks and grooves being provided in said lower wall-sections adjacent to the inner edges of said plates, and upper wall-sections spaced from said lower wall-sections to form substantially continuous longitudinal air-inlet openings.

In testimony that we claim the foregoing as our own we have hereto affixed our signatures in the presence of two witnesses.

ELIHU SWAIN.

DOCTOR CLARK WOOD.

Witnesses:

J. H. HENDERSON,

CHAS. H. MCNAUGHTON.