

F. ERNST.

REVOLVING FURNACE FOR ROASTING ORES.

No. 81,762.

Patented Sept. 1, 1868.

Fig: 1.

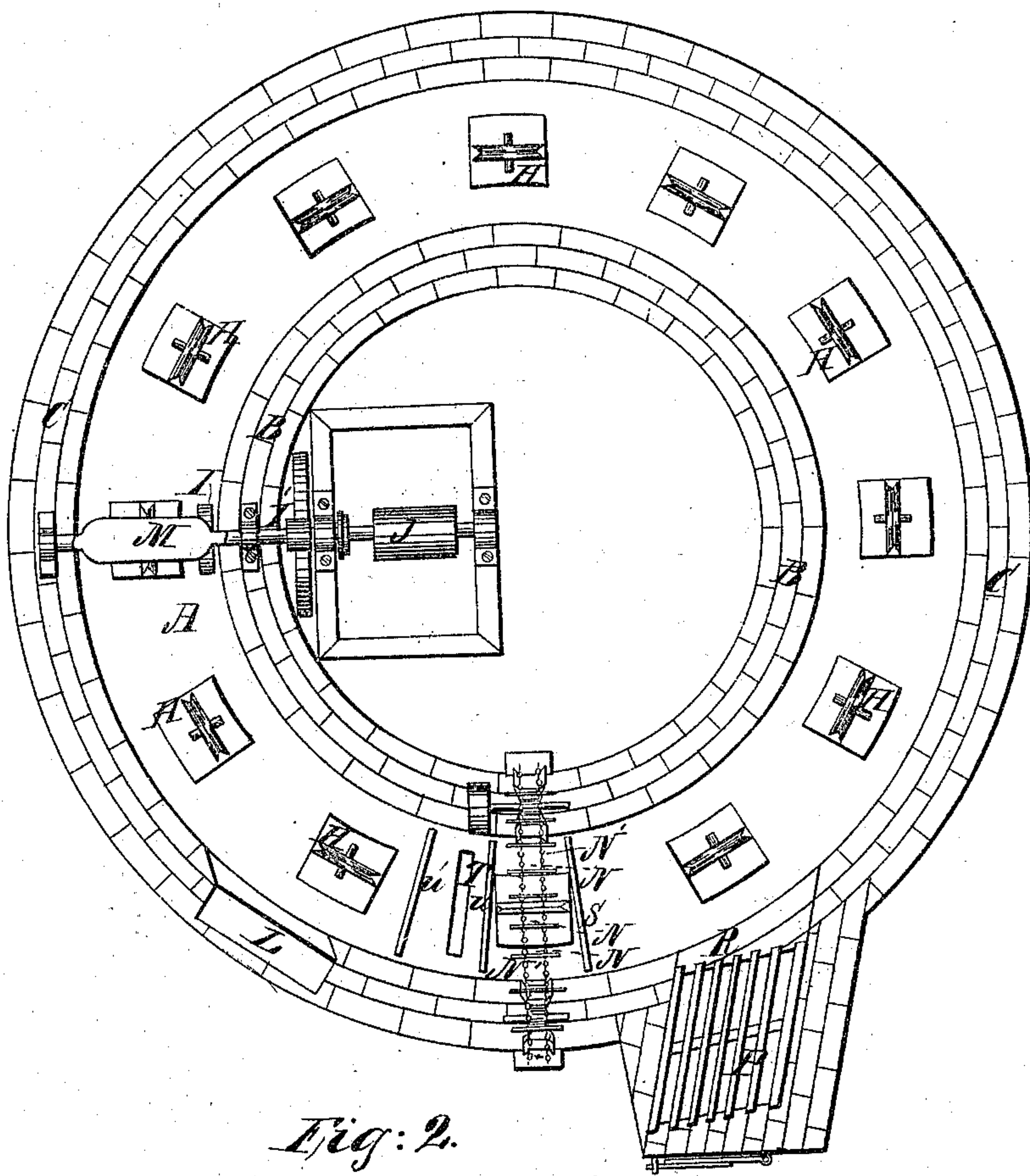
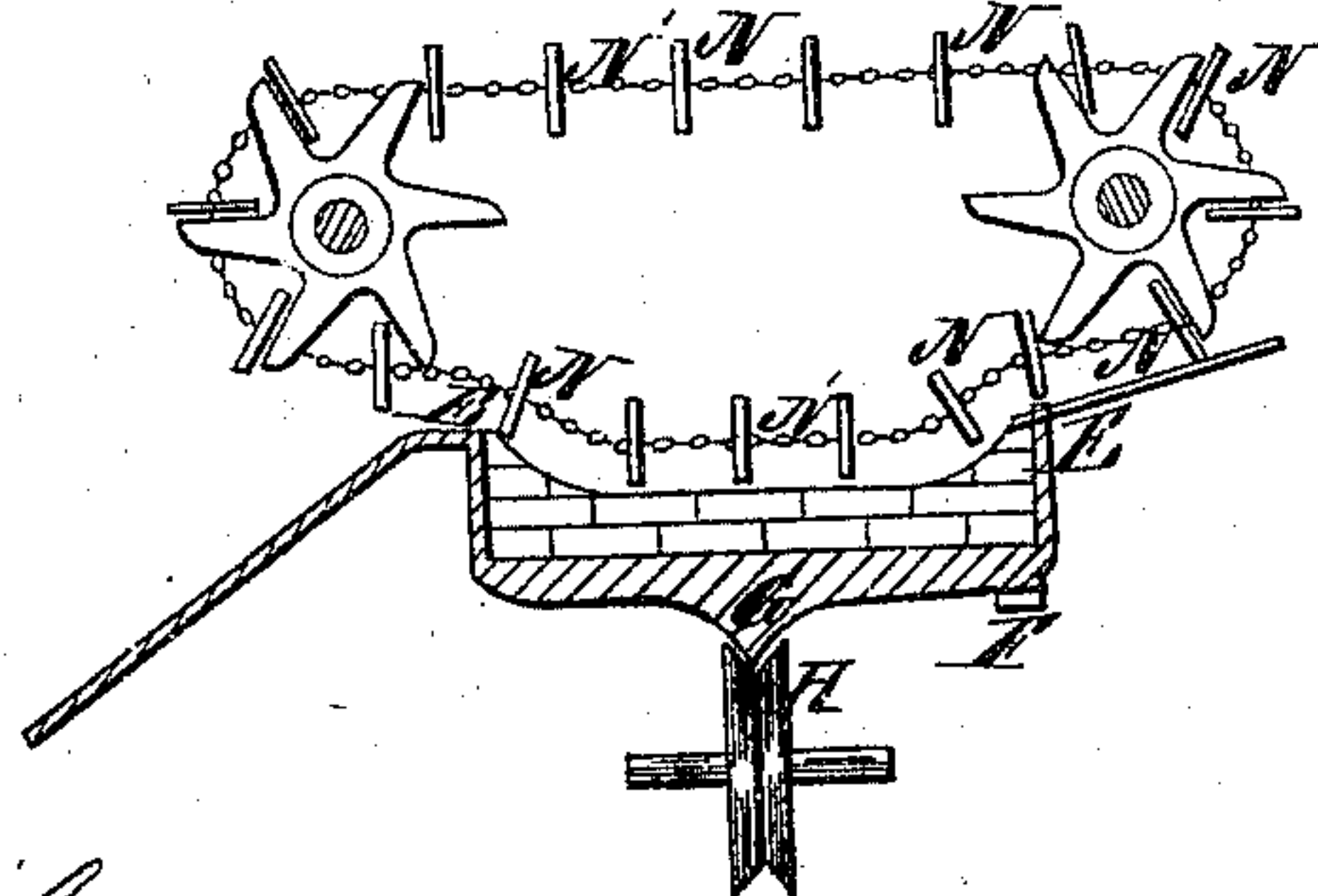


Fig: 2.



Witnesses:

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Fig. 3.

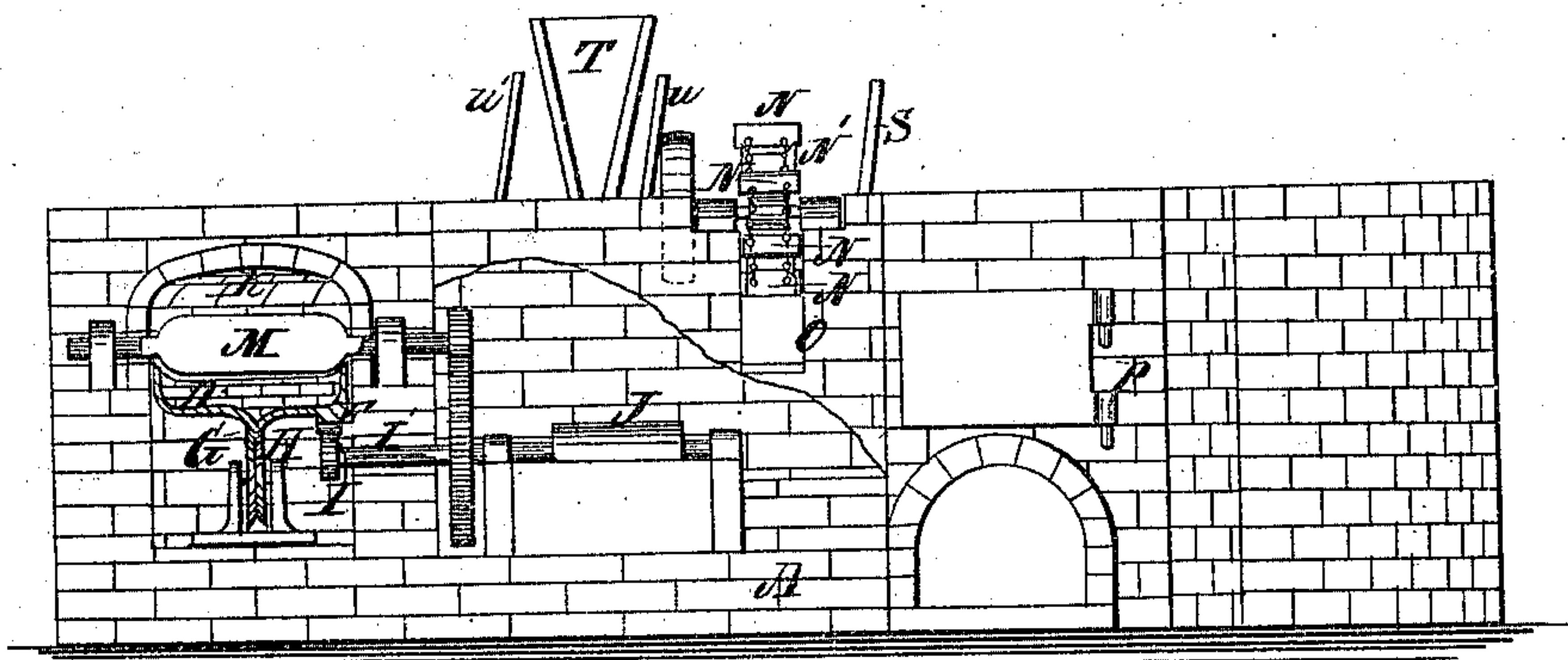
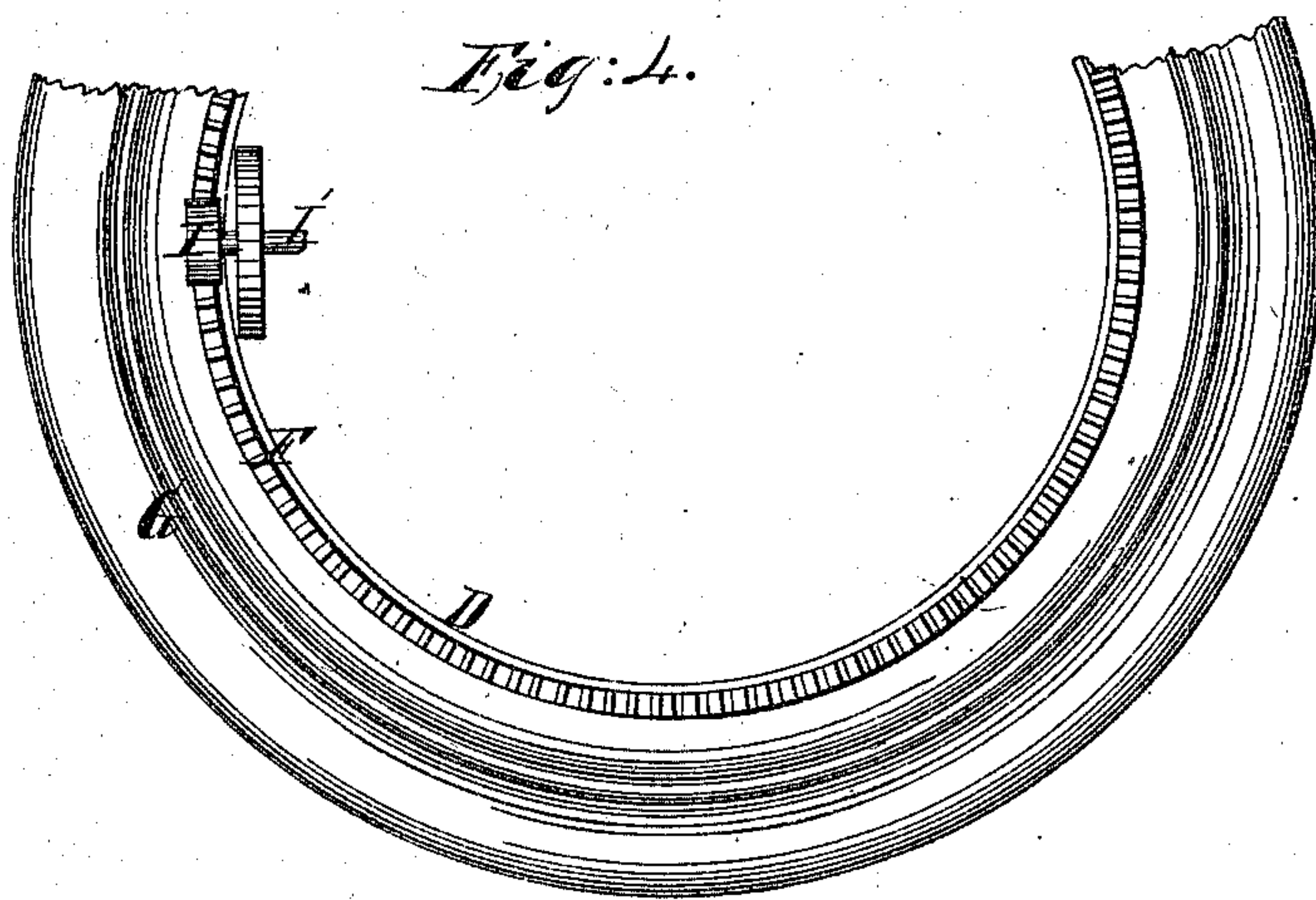


Fig. 4.



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FREDERICK ERNST, OF SAN FRANCISCO, CALIFORNIA.

Letters Patent No. 81,762, dated September 1, 1868.

IMPROVED REVOLVING FURNACE FOR ROASTING ORES.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, FREDERICK ERNST, of the city and county of San Francisco, State of California, have invented an Improved Revolving Furnace for Roasting Ores; and I do hereby declare the following description and accompanying drawings are sufficient to enable any person skilled in the art or science to which it most nearly appertains to make and use my said invention or improvements without further invention or experiment.

My invention consists in providing a mechanical furnace for roasting or treating ores, which does away with manual labor, with the exception of a fireman.

By the use of my furnace and apparatus, the ore is roasted, stirred, charged, and discharged, and in fact performs all the operations required in the oxidation or chlorination process of roasting gold or silver ores.

The ore is taken from the battery or stamps by means of an elevator, and discharged constantly and regularly into a hopper, from whence it falls upon the rotating hearth of the furnace.

The fire-grate is stationary, and the heat passes around in an opposite direction to the travel of the rotating hearth, and the ore, when sufficiently roasted, is discharged at one side of the fire-grate by revolving scrapers.

To more fully illustrate and describe my invention, reference is had to the accompanying drawings, and letters marked thereon, of which—

Figure 1 is a plan, with hearth removed.

Figure 2 is an enlarged view of the discharging-apparatus.

Figure 3 is a sectional elevation.

Figure 4 is a bottom view of the hearth.

Similar letters of reference in each of the figures indicate like parts.

The foundation, A, may be constructed of ordinary masonry, of the desired form. I prefer a circular shape, with a circular centre for the rotating apparatus, as shown in the drawings, with inner and outer walls, B C, affording sufficient space for the travel of the rotating hearth.

The hearth, D, consists of an annular or orbicular ring, paved with brick, or it may be constructed of iron plates in sections, surrounded with flanges or projections, E E.

The inner circumference of the bottom of the hearth is provided with a circular-toothed rack, F, and a circular flange, G, is made in the centre, which operates in a series of grooved friction-rollers, H H, on the roadway beneath.

The hearth is made to revolve by the pinion I engaging the teeth on the circular rack.

The shaft I' of the pinion passes through the inner wall of the furnace, and is provided with a pulley, J, which may be a change-pulley for a belt-connection with the engine or power for driving the apparatus, and increasing or diminishing the speed of the hearth, as desired.

The top of the furnace, when constructed, forms a continuous arch, K, fig. 3, sheet 2, and is provided with a flue, L, near the feed-hopper, and suitable openings for the draught-regulators or stirrers, and discharging-apparatus.

The stirrers, M, one or more, are placed across the hearth, so as to nearly touch the circular pathway, and turn the ore, having bearings on the walls B C, and are operated by a wheel on the shaft I, and pinion at the end of the stirrer, and as the hearth is revolved, the ore is carried upon the stirring-plates and falls back upon the hearth on the other side. These plates may be replaced, as fast as they become worthless by the action of the sulphur upon the iron.

The discharging-apparatus is placed transversely across the hearth, and consists of iron scrapers, N N, connected to endless chains, N', passing over arms or wheels, having bearings on the top of the furnace. This apparatus may be arranged so as to be elevated or lowered, or its operation stopped entirely, as in case the ore is not sufficiently roasted by one revolution of the hearth, or it may be elevated so as to discharge the top portion of the ore at the opening O that has been subjected to the direct action of the heat from the fire-grate, and allow the under layer to pass on to perform another revolution.

The fire-grate P is built out at the side of the furnace having a flue, R, leading through the outer wall into the arch above the revolving hearth.

Between the fire-flue and the discharging-apparatus is placed a damper or sliding plate, S, which passes through the top of the wall, at a slight incline with the direction of travel of the hearth, and may serve the double purpose of checking the draught and stirring the ore, it being regulated by raising or lowering the slide.

The feed-hopper T is placed at the top of the wall, between the chimney-flue and the discharging-apparatus, and at each side of it are placed slides or dampers, U U'.

The slide represented at U' may serve to prevent the fine particles of ore-dust from entering the chimney-flue as the ore falls upon the hearth, and U for the purpose of preventing the dust from passing out through the opening in which the discharging-apparatus works.

To keep a constant circulation of air through the furnace, the arch over the hearth decreases slightly from the fire-bridge towards the flues, and it is intended that sufficient air shall be admitted between the revolving hearth and the walls of the furnace, as well as openings made for the operation of the discharging-apparatus to oxidize the ore, and consume the sulphur and other gases.

By this mode of constructing furnaces great advantages are obtained, among which may be enumerated, first, doing away with the costly and imperfect hand-labor, where it is almost an impossibility to roast a charge of ore well; and, second, the large saving of fuel, not alone by means of the great length of hearth, but that all the gases which are lost by other furnaces are utilized and consumed with the oxygen contained in the atmosphere, which is constantly being supplied through the spaces between the hearth and walls, and that, without cooling the ore; consequently the ore is much sooner oxidized; third, if the ore is once desulphurized, it will not be liable to absorb again the sulphurous gases which emanate, as they are carried behind by the current as the hearth is advancing; fourth, the loss of silver in sublimation in the present furnaces is avoided in this, as the silver condenses before reaching the flues, the distance being great, and the heat diminishing.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The hearth D, revolving between the inner and outer walls B C of the furnace, with the circular rack F and flange G, operating in the grooves of the rollers H H, substantially as described.
2. The discharging-apparatus, operating transversely across the furnace, above the rotating hearth, and consisting of the scrapers N N, attached to the endless chain N', operated by the wheels, substantially as described.
3. The construction of the hearth D, with the circular flange E E, so as to retain the ore upon the surface of the hearth, and the stirrer M, or its equivalent, to turn the ore as the hearth revolves, the whole constructed and operated substantially as described.
4. The dampers U U', and sliding plate S, arranged to be operated substantially as and for the purposes described.
5. In revolving furnaces, carrying the ore in one direction on the hearth, while the heat, flame, and gases pass in an opposite direction, substantially as described.

In witness whereof, I have hereunto set my hand and seal.

F. ERNST. [L. S.]

Witnesses:

C. W. M. SMITH,
J. L. BOONE.