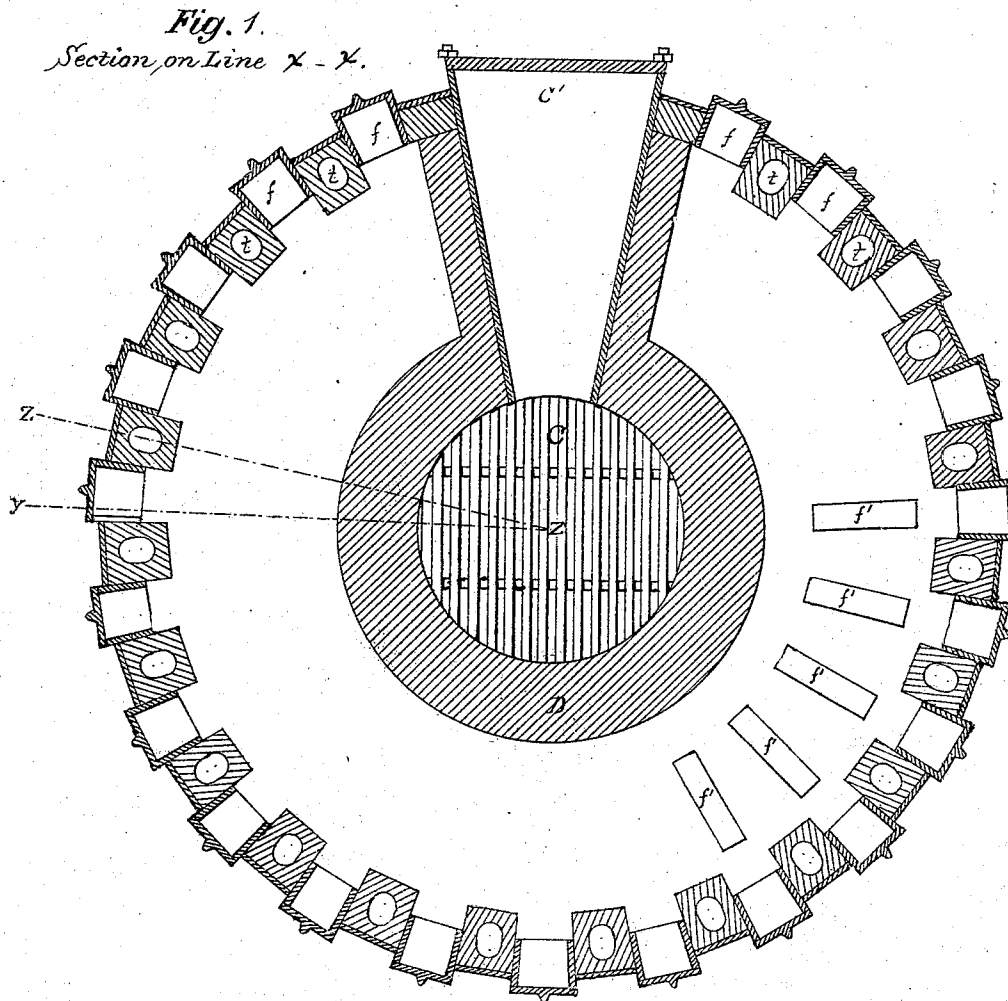


Henry Chess.
Furnace for Heating Metal Plates.

117382

PATENTED JUL 25 1871



Scale: 3/4 in. to One Foot.

Witnesses:
Fred. Artis.
Wm. Dora Peters

Inventor
Henry Chess
by his attorneys
A. H. & R. H. Evans.

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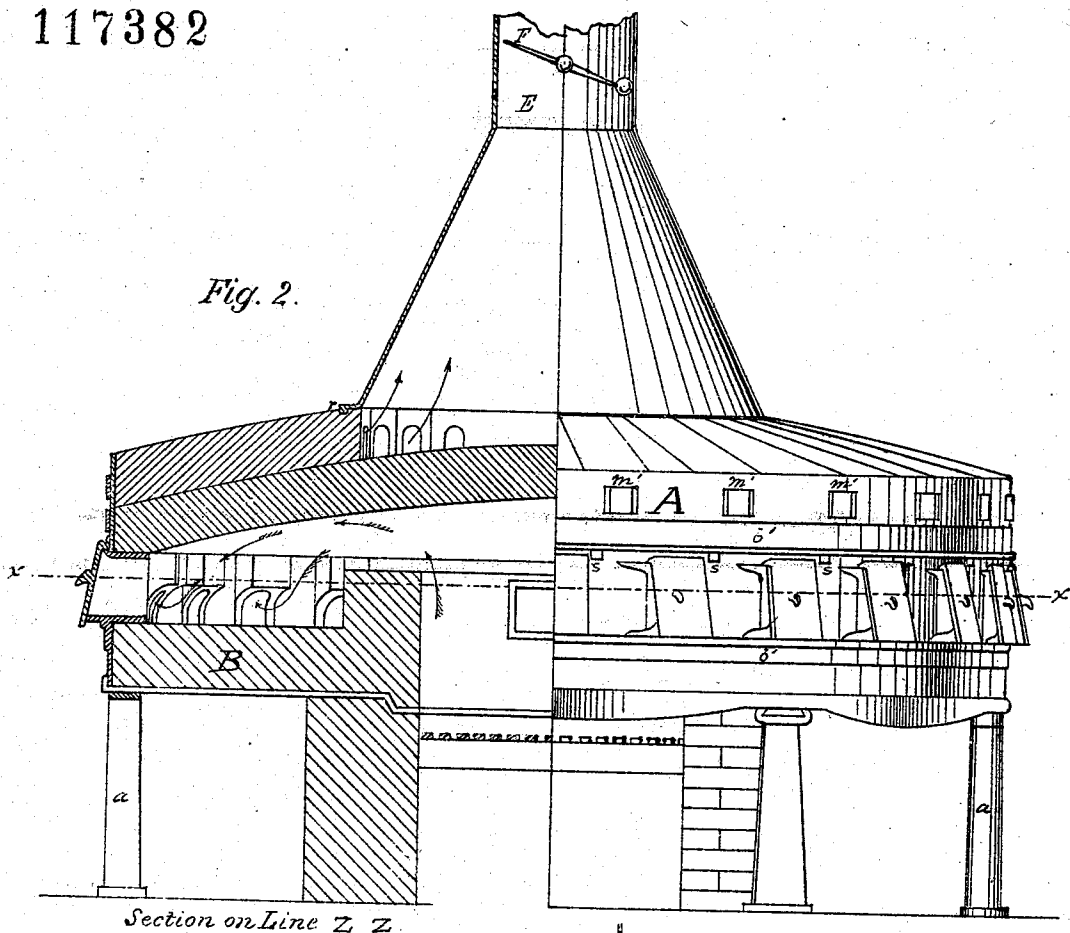
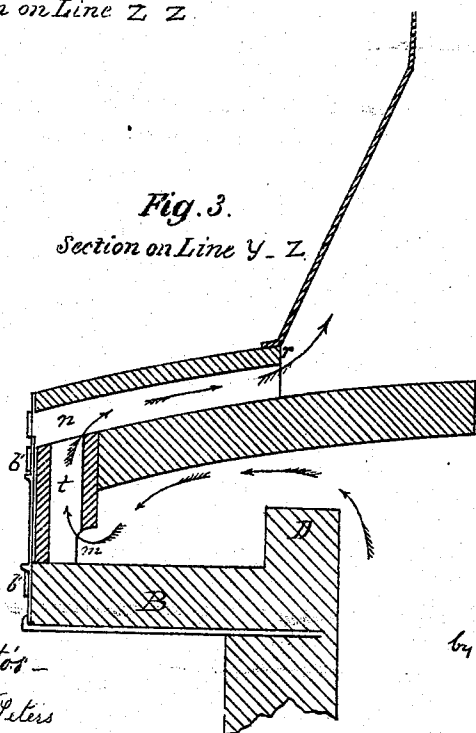


Fig. 3.
Section on Line Y. Z.



Witnesses:

Fred. Artor -
Miss Dora Peters

Inventor:

Henry Chess
by his Attorneys -
A. H. & R. K. Evans.

UNITED STATES PATENT OFFICE.

HENRY CHESS, OF PITTSBURG, PENNSYLVANIA.

IMPROVEMENT IN FURNACES FOR HEATING METAL PLATES, CALCINING ORES, AND FOR OTHER PURPOSES.

Specification forming part of Letters Patent No. 117,382, dated July 25, 1871.

To all whom it may concern:

Be it known that I, HENRY CHESS, of the city of Pittsburg and State of Pennsylvania, have invented an Improvement in Furnaces for Heating Metal Plates and Calcining of Ores, of which the following is a clear, full, and exact description, reference being had to the accompanying drawing, in which—

Figure 1 is a side elevation, partially broken in section, through the line *z z*, Fig. 2. Fig. 2 is a horizontal section through the line *x x*, Fig. 1. Fig. 3 is a vertical section through the line *y y*, Fig. 2.

My invention relates more particularly to that class of furnaces designed for heating metal strips preparatory to cutting them into nails; and it consists: 1st, in so constructing the furnace as to have all the piles equidistant from the fire, or nearly so. 2d, in having the flame to pass between the piles and not over them. 3d, in so arranging the doors with reference to the flues that the piles shall be protected from draughts of cold air when one of the doors is to be opened; and 4th, in so constructing the flues as to save fuel and utilize as far as possible the heat.

In order to enable others to understand and use my invention, I will proceed to describe the manner in which I have carried it out.

Nails, longer than two inches, are cut hot, the plates from which they are cut being first heated to a cherry-red heat, and being piled up on the top of each other in what is styled a "pile," of from five to seven inches high. These plates are taken to the nail-machine and cut at a black heat. The plates receive from the finishing-rolls a smooth polish, and it is important to keep this smooth surface on the nails. If the plates are heated too hot it scales the surface and injures the appearance of the nails. The furnaces at present in use scale from one to two per cent. of the iron. To obviate this scaling of the iron is one of the objects of my invention.

In furnaces as at present constructed the fire-place is at one end, and the chimney at the opposite end. The draught carries a powerful stream of flame over and across a series of piles introduced through side openings into the body of the furnace. To heat the piles furthest from the fire there is great danger of burning or scalding the piles nearest the fire. By my improvement this danger is entirely obviated, as the piles are ar-

ranged in a circle around a central fire, and each pile subjected to the same degree of heat, being equidistant, or nearly so, from the fire.

It is also true that in furnaces as at present constructed the stream of flame passes over the several piles, and consequently heats the plates in the piles unevenly, the upper plates frequently becoming scorched before the bottom ones are sufficiently heated. My improvement readily obviates this serious difficulty by passing the flame between and not over the piles, as will hereinafter be fully explained.

Another difficulty with furnaces as at present constructed is in removing a pile which has been sufficiently heated without damage to the other piles. When the pile nearest to the fire is to be removed it becomes necessary to open the small door opposite the pile. Immediately a stream of cold air rushes into the furnace and sweeps its whole length across and over all the other piles, cutting off the draught from the fire and chilling the metal. To avoid this difficulty is another object of my invention, and the manner in which it is accomplished will be hereinafter fully explained. In the old furnaces it can only be overcome by the use of a larger amount of fuel—say from twenty-eight to thirty-five bushels of bituminous coal per day—while my improved furnace will accomplish the same work with a daily consumption of from eight to twelve bushels of bituminous coal.

Its construction in a circular or octagonal form saves much valuable room in a factory. A furnace of this construction is admirably adapted to calcining ores.

In the drawing, A represents my improved furnace, standing on its legs *a a*, and the sides of the ash-pit. The bottom B of the furnace may be made of cast-iron plates, or of any other suitable material. I construct my furnace round, where it can be conveniently done, as it is the best form; but it may be constructed elliptical or polygonal without departing from the principle of my invention. The sides of the furnace may be made of cast-iron plates, perforated with as many holes *f f f* as may be desired, say twenty-four in an ordinary furnace, each containing a cast-iron liner projecting a short distance into the furnace. Between each of the liners I place an upright flue, *t*, (see Fig. 3,) with the side fronting the center of the furnace cut away at the bottom, as at *m*, Fig. 3, to make an opening into the furnace, or an out-

let for the heat or draught. Fuel is introduced at the stoke-hole C' into the circular fire-place C. The flame and heat pass over the bridge-wall D, (see Fig. 3,) and to escape have to come down to *m*, nearly at the bottom of the furnace, and hence are forced to pass between the piles *f'*. In addition to this direct action of the flame passing between the piles I utilize the heat given off by the red-hot bridge, and that from the crown or roof of the furnace, which, for the purpose of assisting in heating the metal, is brought down as low as possible at its outer edge. The flame or draught having reached the base of the upright flues at *m* (see Fig. 3) it passes into and up said flues, and goes into the inclined flues *n* lying on the top of the crown and converging toward the center. The cone-shaped base of the chimney E is made of sheet-iron, and rests upon the inner ends *r* of the converging flues. At the top of the cone is the damper F, of the "butterfly" or other desirable pattern. There is not much heat or flame which reaches this point, as it is absorbed by the fire-brick of the furnace, to be again thrown upon the metal to be heated. The straight chimney rising above the damper I make about fifteen inches in diameter, and of sheet-iron, and in this I find a great saving as compared with furnaces as at present constructed, which require stacks almost equal to boiling-furnaces.

From the description thus far given of the doors and upright flues in my improved furnace it is evident that when one of the doors *fff* is opened to remove or put in a pile the cold air does not travel over any of the other piles, but makes a short cut for the opening *m* in the nearest upright flue, and consequently it cannot chill the furnace to any extent, or oxidize the surface of the red-hot iron, as in furnaces now in use.

The small openings or doors *m' m' m'* at the upper edge of the outer wall open into the inclined

converging flues for the purpose of allowing these flues to be cleaned; or they may be opened for the purpose of cutting off the draught from that particular portion of the furnace. The openings through which the piles are introduced are closed by doors inclined as shown in Fig. 1. These doors slide upon brackets which are formed on the liner, and they are stopped at a proper distance by the studs *s s s* cast upon the main plate. To secure the whole structure the upright plates, which are segmental, are bound by the iron bands *b' b'*, as shown in Fig. 1, the upper one resisting the outward pressure of the crown, and the lower one resisting the expansion of the bottom.

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

1. A furnace for heating metal plates and calcining ores, constructed and arranged substantially as herein described.

2. The central fire-place C and bridge-wall D, in combination with the vertical flues *t* and the inclined converging flues *n*, when constructed with reference to a furnace for heating metal plates and calcining ores, substantially as described.

3. The doors or openings *fff* of a furnace for heating metal plates, arranged in a circular, elliptical, or polygonal form, in combination with a central fire-place, C, substantially as and for the purpose set forth.

4. The openings or doors *fff*, in combination with the upright flues *t*, inclined converging flues *n*, and the central fire-place C, constructed and arranged substantially as and for the purpose set forth.

HENRY CHESSE.

Witnesses:

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HARVEY B. CHESSE.