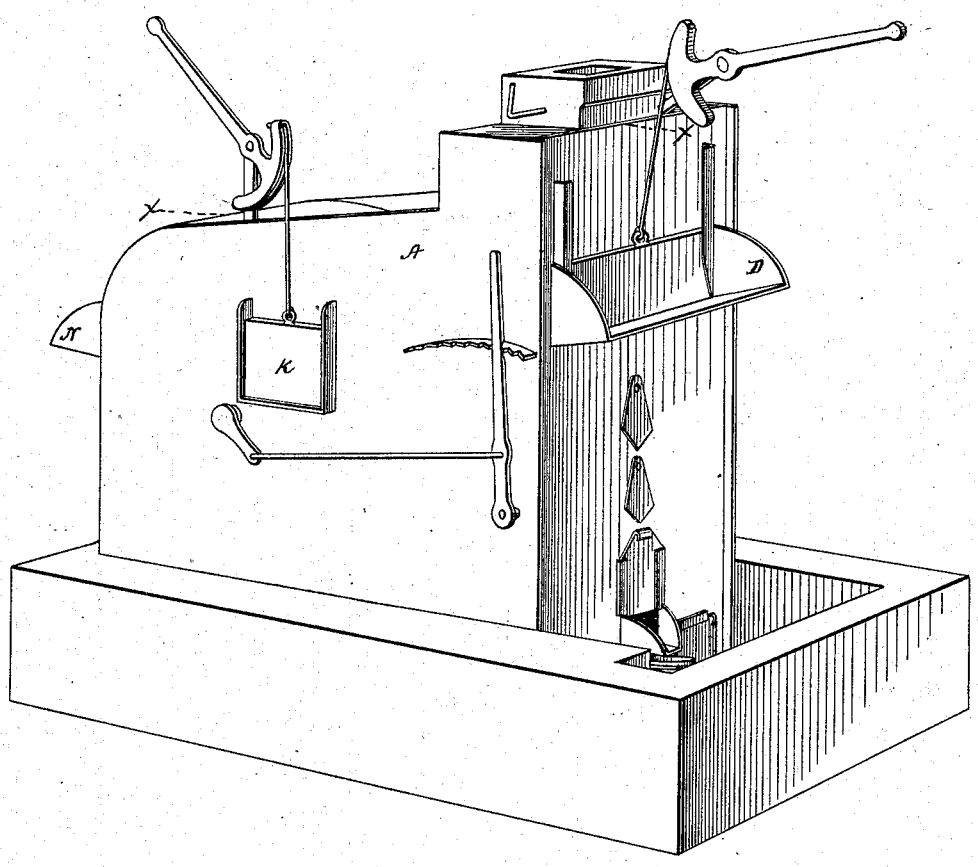
2 Sheets—Sheet 1.

H. B. CHESS.

ANNEALING FURNACE.

No. 186,404. Patented Jan. 16, 1877.

Fig. 1.



Witnesses:

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2 Sheets—Sheet 2.

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Fig. 2.

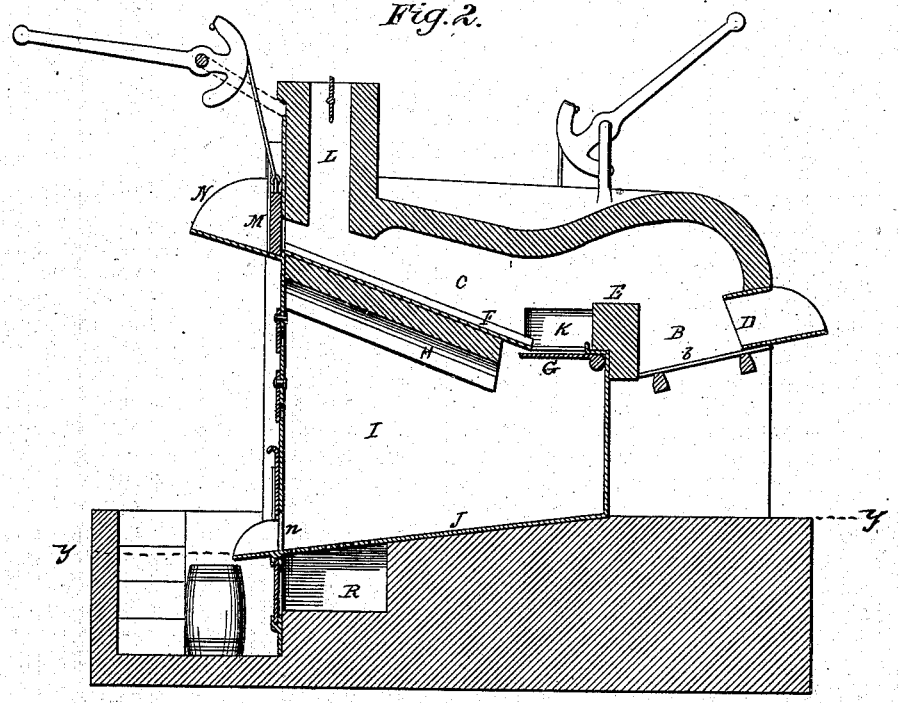
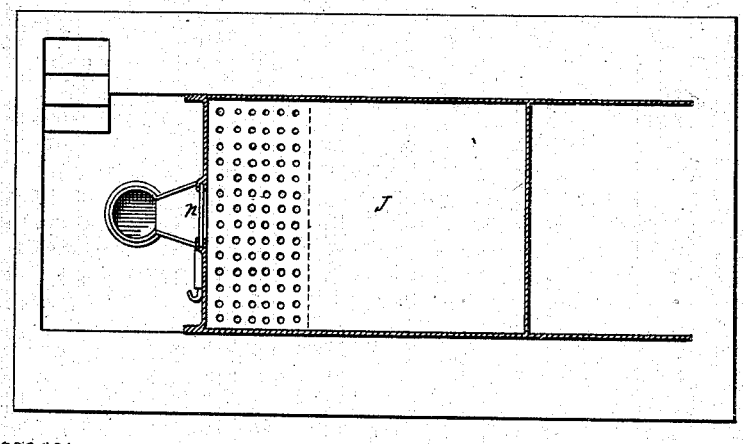


Fig. 3



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UNITED STATES PATENT OFFICE.

HARVEY B. CHESS, OF PITTSBURG, PENNSYLVANIA.

IMPROVEMENT IN ANNEALING-FURNACES.

Specification forming part of Letters Patent No. **186,404**, dated January 16, 1877; application filed December 8, 1876.

To all whom it may concern:

Be it known that I, HARVEY B. CHESS, of Pittsburg, Pennsylvania, have invented certain new and useful Improvements in Furnaces for annealing nails, rivets, spikes, and analogous articles, of which the following is a clear, full, and exact description, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a perspective view of an annealing-furnace with my improvements attached. Fig. 2 is a vertical longitudinal section through *x x*. Fig. 3 is a horizontal section through *y y*.

My invention relates to furnaces for annealing nails, rivets, spikes, and analogous articles; and it consists in the several combinations of devices hereinafter explained and claimed.

To enable others skilled in the art to make and use my invention, I will proceed to describe the exact manner in which I have carried it out.

In the drawings, A represents an annealing-furnace provided with fire-chamber B and combustion-chamber C. The bars *b* of the fire-chamber are arranged sloping downward from the stoke-hole D, which is placed in the rear of the furnace, or as far as possible from the bridge-wall E, for the purpose hereinafter explained. By thus sloping the grate-bars I facilitate the movement and distribution of the fuel, and aid in securing air-tightness at the bridge, where otherwise much free air might enter and go over unmixed. The stoke-hole is placed at the greatest distance from the bridge in order to prevent, as far as possible, unmixed air from passing over the bridge and coming in contact with the goods being annealed, and thus prevent scaling and discoloring the nails by oxidation.

Heretofore nails or other small articles have been placed in pans, canisters, or mufflers, open or closed, and these have been placed in the various kinds of furnaces, and then been withdrawn while heated to be cooled preparatory to being disposed of, or the whole furnace with its contents has been allowed to cool down for the convenient disposition of the goods; or the nails have been treated in a reverberatory furnace, being introduced at one side and withdrawn when heated by scraping them out at the opposite side. These several systems are objectionable, as they involve an intermission of the work of annealing, which is expensive. To overcome this objection, and others which are apparent to all skilled in the art of annealing, is the purpose of my invention.

The combustion-chamber C is provided with a sloping iron plate, F, at its bottom, sloping from the chimney toward the bridge-wall. At the foot of this sloping plate is a valve or door, G, swinging on or from the bridge, capable of being raised and supported snugly on a plane with the plate, or to be held partially or entirely open by means of any suitable device. The plate F is supported by an arch of non-conducting brick or other work, H, and below this arch I place the cooling-chamber I, provided with a plated floor, J, the forward portion of which is perforated, as shown in Fig. 3. Below the perforated portion of the floor J is placed a pit or receptacle, R, capable of being made air-tight or nearly so, which is the case with the cooling-chamber when the doors or openings into it are closed.

At the foot of the sloping plate F I place the door K for the removal of mufflers or pans from the furnace, should it at any time be desirable to use mufflers or pans, but ordinarily the door K is closed and luted. At the front of the combustion-chamber, and farthest from the bridge, rises the chimney L, and at its base, but outside of it, I place the door M, through which are introduced the goods to be annealed. At this point is secured the mouth or hopper N for convenience of receiving the nails. A corresponding door, *n*, with a chute, is attached to the floor J for the discharge of the nails from the furnace after being treated in the cooling-chamber I. Both these doors are kept closed except when actually in use.

The operation of my furnace is as follows: The furnace being heated, the nails or other articles are introduced through the door M and pushed well down the plate F. When those nearest the bridge-wall E are sufficiently heated the valve or door G is opened and the nails are gently pushed off the sloping plate F into the cooling-chamber. The valve G is

then again closed, the other nails are moved further down the slope, and fresh ones introduced at the mouth and through the door M. Thus the operation of annealing is continuous until the chamber I is well filled with the cooling nails.

It is evident that the sloping position of the plate F enables the operator to remove the heated nails into the cooling-chamber without bending or distorting them, as is apt to be the case when the heated nails are dragged or forced over a horizontal surface. As the nails are introduced at a point back of the chimney through the only opening in the furnace demanded for their management, it is evident that no free or oxidizing air can sweep over the heated nails to scale and discolor them.

This continuous operation of the furnace permits the use of just sufficient heat to do the work, and it follows that each individual nail traveling over equal ground will receive about an equal quantity of heat in an equal quantity of time. This secures a uniform effect, which can not be produced by the several systems now in use. When the nails have been gradually brought up to their proper heat they are at once withdrawn from the action of the fire and allowed to anneal in an approximately air-tight receptacle, and thus is avoided that discoloration which is always the result of open air or furnace cooling.

Room is made in the cooling-chamber for the falling nails by dragging those forward toward the door *n* which have fallen near the bridge and partially cooled. After a sufficient time has elapsed (several hours it may be) the nails are withdrawn through the door *n* and packed into kegs for market. They are also sufficiently cool to be available for other purposes or processes. The perforations in the floor of the cooling-chamber permit the dust or scale to sift through from the nails as they are being drawn out.

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

1. The combustion-chamber C, provided with a sloping bottom, and the valve G, in combination with the cooling-chamber I, substantially as and for the purpose set forth.

2. The cooling-chamber I, provided on its bottom with the perforated plate J, in combination with the combustion-chamber C, valve G, and a pit for receiving the dust and scales, substantially as and for the purpose set forth.

3. An annealing-furnace, provided with a sloping bottom, F, sloping from the charge opening downward toward the bridge-wall, the valve G, and the discharge opening K in the side of the furnace opposite the valve, substantially as and for the purpose set forth.

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Witnesses:
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