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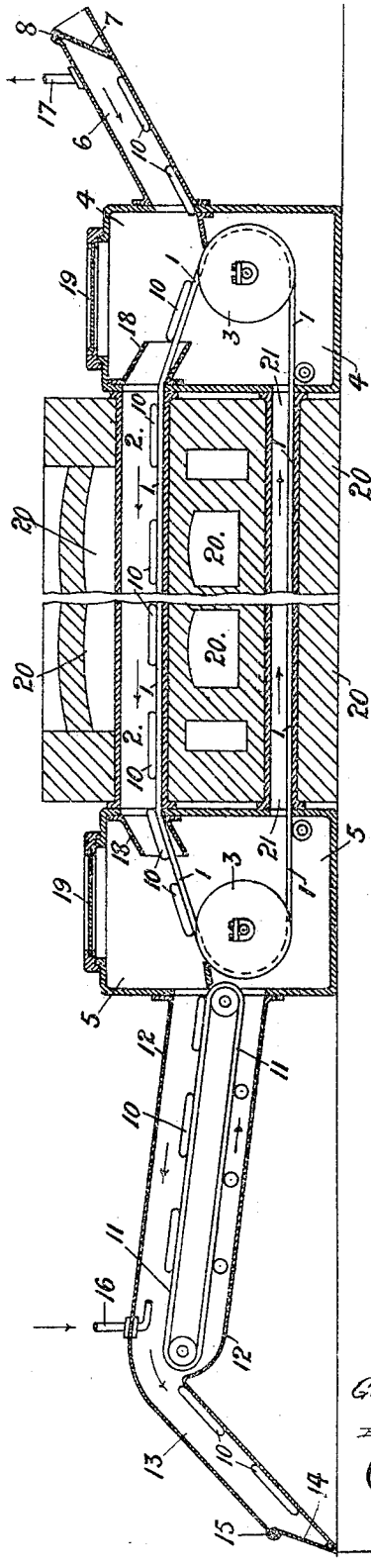
D. BATES & G. W. PEARD.

METAL ANNEALING FURNACE.

APPLICATION FILED APR. 29, 1904.



WITNESSES

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UNITED STATES PATENT OFFICE.

DARWIN BATES AND GEORGE WORDSWORTH PEARD, OF HUYTON, ENGLAND.

METAL-ANNEALING FURNACE.

SPECIFICATION forming part of Letters Patent No. 793,268, dated June 27, 1905.

Application filed April 29, 1904. Serial No. 205,561.

To all whom it may concern:

Be it known that we, DARWIN BATES and GEORGE WORDSWORTH PEARD, subjects of the King of England, and residents of Huyton, in the county of Lancaster, England, have invented certain new and useful Improvements in and Connected with Metal-Annealing Furnaces, of which the following is a specification.

This invention has reference to that kind or type of the annealing process for the annealing of wire, rods, strips, sheets, or other forms of iron, steel, copper, and other metals, by which their surfaces when burnished or bright do not become oxidized, discolored, or detrimentally affected, but are brought out of or discharged from the annealing furnace or apparatus still bright and have a good appearance and at the same time soft. In annealing processes of the kind referred to the object has generally been proposed to be effected by employing within the annealing-chamber a non-oxidizing atmosphere, sometimes by the artificial introduction of a non-oxidizing gas, such as carbonic acid or steam, especially where the continuous conveyers have been used for moving the material through the furnace or chamber, and the retention of this non-oxidizing atmosphere has been effected by trapping or sealing the inlet and outlet ends, which has generally been done by using a liquid as a trapping medium.

This invention has for its object to provide annealing apparatus for carrying out the bright annealing process above referred to where it is desired that the annealing operation should be carried out without the metal to be annealed coming in contact with a liquid. This is effected according to the present invention by a closed system comprising an inlet-conduit, annealing-chamber, and an outlet or outlet-conduit, and the employment in this system of a suitable non-oxidizing gas or vapor and mechanical gas locks or closures at the inlet and discharge end in the form of hinged or sliding doors or revolving or reciprocating chambered locks or the like, by which the material may be introduced into the inlet-conduit and discharged from the outlet-conduit without the entrance of any detrimental quantity of air or escape of gas. Any suitable gas may be employed—such as illuminating-gas, carbonic acid, or any gas equivalent for the purpose—and in cases of the gas used being a waste or cheap gas a small escape is of little moment.

The invention will be further described with the aid of the accompanying drawing, which shows it in sectional elevation.

The ends of the conveyer 1, which carries the metal articles or parcels to be annealed through the annealing-chamber 2, and the drum or wheels 3, over which the ends of the conveyer run, are disposed within closed boxes or chambers 4 and 5, of iron or other suitable material, one at each end, which are in free communication with the interior of the chamber 2, and on the inlet-chamber 4 there is an inclined chute or mouth 6, down which the metal to be annealed slides when introduced, this mouth or chute having at its upper end an inclined door or flap 7, hinged at its upper end at 8, which is moved up about its hinge when introducing the metal—say bundles of wires—and then falls automatically and closes the chute when the metal passes it. The metal, which may, for example, be wire coils, (marked 10,) slide down onto the conveyer 1 in the box 4 and are carried by it into and through the chamber 2. On the end of the other or outlet box 5 there is another conveyer 11, adapted to receive the articles 10 as they are delivered from off the end of the conveyer 1. This conveyer 11 works in the casing 12, connected with and in free communication with the box 5, and in passing through it the metal becomes cooled. The surface of this case 12 may be cooled in any suitable manner. The articles are discharged from the conveyer 11 down the discharge-chute 13, the lower end of which is provided with a flap or door 14, hinged at its upper end 15, and which will be opened by the articles as they fall down it. It closes afterward automatically by its own weight.

A constant non-oxidizing atmosphere is retained within the chamber 2, boxes 4 and 5, inlet-chute 6, casing 12, and outlet-chute 13

by introducing gas under a slight pressure above that of the atmosphere, such as coal-gas, through the inlet-pipe 16 and having a small constant escape through the pipe 17. If a slight pressure above the outside atmosphere be maintained in the apparatus, the outside air cannot ~~get in when~~ the doors 7 and 14 are open and only a slight escape of gas takes place, and of course, as regards the kind of gas used, any other suitable form of gas or vapor may be employed which will serve the purpose—such as illuminating, carbonic-acid, or the like—the particular gas or vapor depending upon the nature of the metal being annealed, and as regards the inlet and outlet doors of the spouts 6 and 13 any known kind of rotary or mechanical closing device which will admit the article without letting out the gas may be employed instead of the hinged doors 7 and 14.

If desired for the final cooling of the articles after leaving the discharge-chute 13 they may fall into water, oil, or other suitable liquid for absolute cooling.

Over the ends of the chamber 2 there are provided downwardly-inclined screens 18, which prevent the heat of the chamber 2 being radiated directly onto the boxes 4 and 5, and on the top of these boxes there are covers 19, made in the form of a window or having a window in them, so as to enable the operation of the process to be seen and the condition of the articles observed.

The chamber 2 is set in the usual brickwork-furnace 20, with a tube 21 in its lower part to allow the return of the conveyer 1.

Having now particularly described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In apparatus for annealing bright metals without oxidizing or deteriorating the surface of same, the combination of an annealing-chamber 2; a conveyer 1 passing through same; a chamber 4 on the inlet end of the annealing-chamber 2; a chamber 5 on the outlet end of the annealing-chamber 2; rollers for the conveyer in said end chambers an upwardly-extending inlet-conduit 6 on the chamber 4; a downwardly-extending discharge-conduit 13 on the chamber 5; an inlet-trap 7 on the conduit 6, and an outlet-trap 14 on the conduit 13; substantially as set forth.

2. In apparatus for annealing bright metals without oxidizing or deteriorating the surface of same, the combination of an annealing-chamber 2; a conveyer 1 passing through same, a chamber 4 on the inlet end of the annealing-chamber 2 a feed-chute connected thereto; a chamber 5 on the outlet end of the annealing-chamber 2; rollers for the conveyer in said end chambers a conduit 12 on the chamber 5; a conveyer 11 within the conduit 12 adapted to receive the material from the first conveyer; and a trapped discharge-conduit 13 on the conduit 12; substantially as set forth.

3. In apparatus for annealing metals, the combination of an annealing-chamber, chambers 4 and 5 on each end thereof and in communication therewith, rollers in said end chambers, a conveyer carried on said rollers and passing through the annealing-chamber, an upwardly-extending inlet-chute connected to one of said end chambers, a cooling-chamber 12 connected to the other end chamber, a conveyer in said cooling-chamber, below the plane of the first conveyer, a downwardly-extending outlet-chute connected to said cooling-chamber, traps in the inlet and outlet chutes and means for passing gas through the annealing-chamber.

4. In apparatus for annealing metals, the combination of an annealing-chamber, closed chambers 4 and 5 on each end thereof and in communication therewith, a continuous annealing-conveyer, the ends of which are disposed in said chambers 4 and 5, and passing through the annealing-chamber, an inlet-chute on the chamber 4, a trap on said inlet, an outlet-chute on the chamber 5, a trap on said outlet-chute, and means for passing gas through the several chambers and chutes beginning with the outlet-chute and ending with the inlet-chute, substantially as set forth.

In witness whereof we have hereunto set our hands in presence of two witnesses.

DARWIN BATES.
GEORGE WORDSWORTH PEARD.

Witnesses:
S. GOODALL,
F. H. JENNINGS.