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ANNEALING FURNACE

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My invention relates to annealing furnaces, more particularly to furnaces for continuous dry bright annealing of metals and has for its object the production of a furnace of improved construction providing for gradual and long time heating and cooling of the metal, thereby permitting operation at a lower temperature and consequently more uniform anneal. This is very important and valuable in the annealing of wire on spools or reels in that it avoids sudden expansion of the material thereby causing displacement of the wire, with consequent sticking on the spool.

A further object of my invention is to produce a furnace of large production capacity in comparatively small floor space.

So far as I am aware, all previous continuous dry bright annealing furnaces have either been of comparatively small capacity or have required excessive amount of floor space.

By my construction I secure gradual long time heating and cooling in non-oxidizing atmosphere, and am able to concentrate an apparatus capable of large production capacity in comparatively small floor space; and because of the tendency of the heated gas to rise, I insure a cold discharge, thereby preventing discoloration of the metal.

The foregoing and other features of my invention will now be described in connection with the accompanying drawings forming part of this specification in which I have represented my annealing furnace in its preferred form, after which I shall point out in the claims those features which I believe to be new and of my own invention.

In the drawings,

Figure 1 is a plan sectional view of my annealing furnace in part section.

Figure 2 is a vertical section of my furnace along the line 2—2—2, Figure 1.

Figure 3 is an elevation in part section along the line 3—3, Figure 1.

Figure 4 is a typical section of roller conveyor, showing relative location of rollers and the electrical heating element.

Figure 5 is a detail plan of means used for controlling the discharge of pans from the conveyor one at a time.

Figure 6 is an elevation of detail shown in Figure 5.

In the carrying out of my invention, I provide a continuous vertical spiral roller conveyor 10 enclosed in a gas tight annular space between an outer casing 11 and an inner casing 12.

In Figure 4 I have a typical section showing the vertical spiral conveyor with the rolls 13 mounted

in between rails 14, with the rails 15 acting as guiding rails for the circular pans 16 which I employ to transfer the articles to be annealed through the furnace.

The upper portion of annular space is insulated against heat transference by insulating material 17 and under the rollers 13 I provide heating elements 18 regulated by suitable pyrometer control 19 of the usual type and ensuring gradual heating and close control of temperature. There is also provided a horizontal insulated portion 20 between the upper and lower portions of the annular chamber to retard the transfer of heat from the upper or heating zone to the lower or cooling zone. In my preferred form of construction my annular chamber is gas tight and in order to ensure this I may provide water seals 21 at the bottom edges of the casings 11 and 12. However, I may dispense with this detail and use bolted joints well packed to prevent leaks.

At the top of the annular space I provide an inlet opening 22, and at the bottom of the annular space I provide an outlet opening 23. Both of these openings are sealed against ingress of air by gas locks 24 and 25. These locks being similar I will describe only one, but will number similar parts of both locks with like numbers. These locks consist in the design shown of simple vestibules provided with two gas tight doors 26 and 27 operated by any means 28 so that when one door 26 is closed, 27 is opened and vice versa. These doors may also be controlled so that when material is being discharged from the bottom through vestibule 25 material to be annealed is being charged through vestibule 24. These vestibules may be provided with expansion joints 29 to accommodate any misalignment due to expansion. For convenience in handling material, I may connect these gas locks with elevating and conveying machinery and in the preferred form shown I employ an elevator 30 and a roller conveyor 31. I may also employ a direct lift 32 to facilitate the loading and unloading of the material, to elevate the loading platform 37 to a convenient working height.

It will be readily understood that the detail of the gravity conveyor and the detail of the lift will of necessity be modified to suit local conditions and I may dispense with the lift 32 or place the conveyor 31 at a different elevation.

In the discharge opening 23, I provide pawls 40 operated by fluid operated pusher 41 or manually operated mechanical means so that when one pawl goes forward the other is withdrawn to control the discharge of the finished product and in-