H. J. SCANLON AND M. B. KELLY.

ANNEALING FURNACE.

APPLICATION FILED APR. 19, 1921.

1,409,119.

Patented Mar. 7, 1922.

2 SHEETS—SHEET 1.

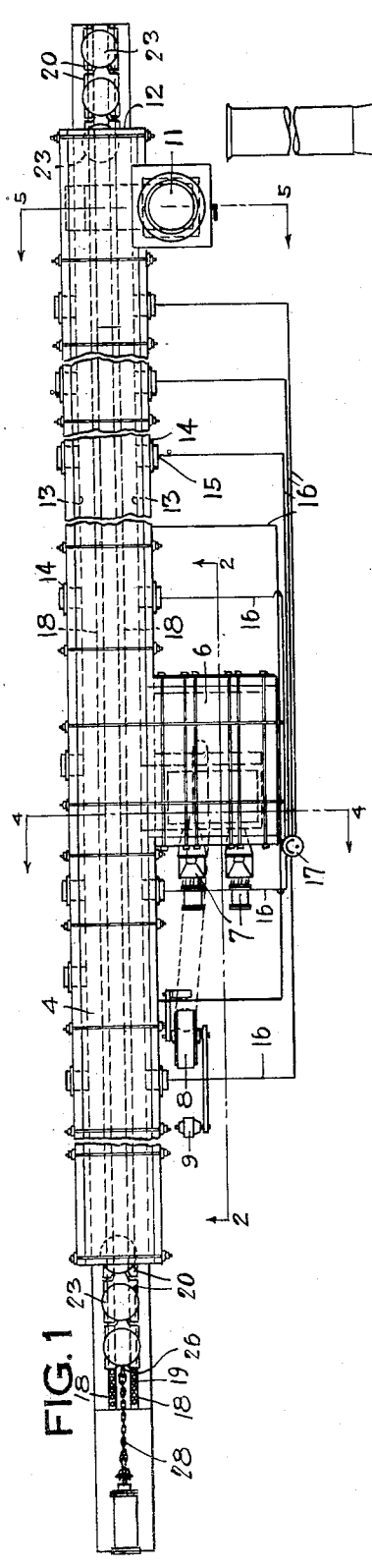


FIG. 1

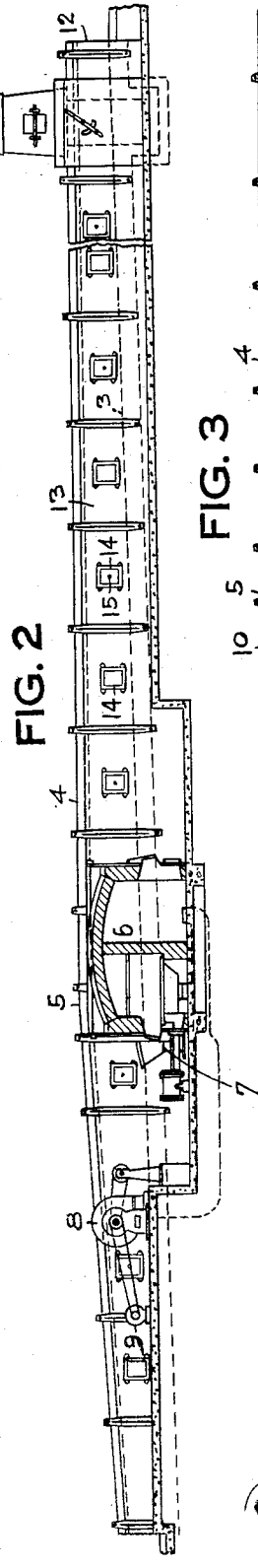


FIG. 2

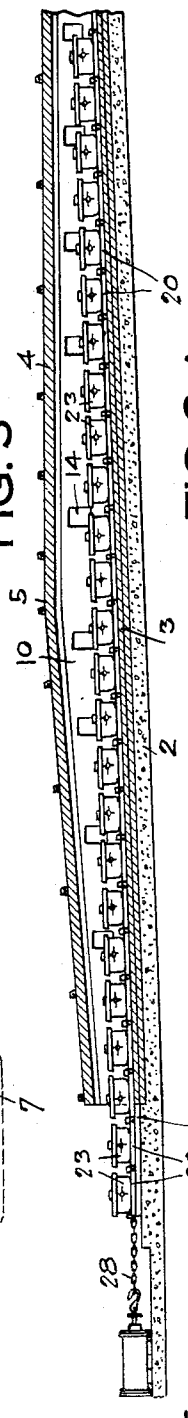


FIG. 3

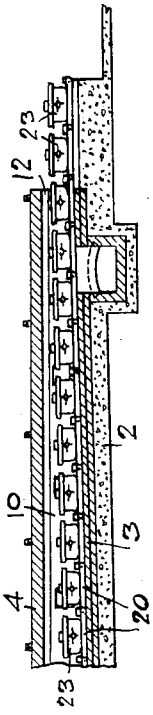


FIG. 3-A

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2 SHEETS—SHEET 2.

FIG. 4

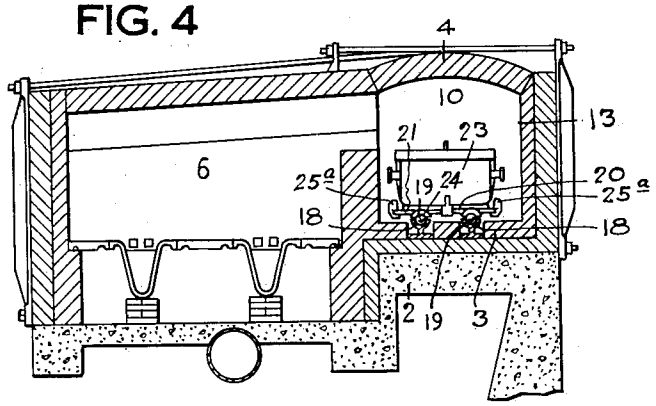


FIG. 5

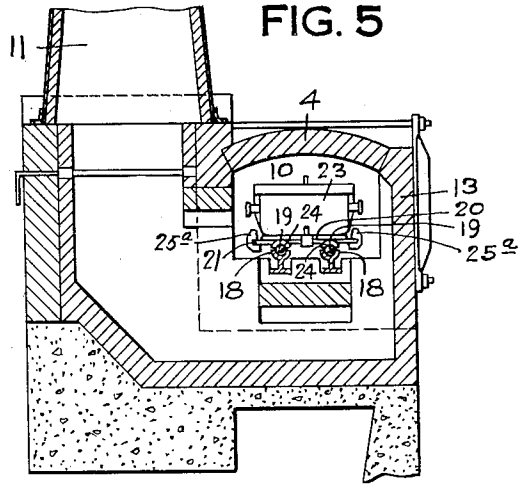
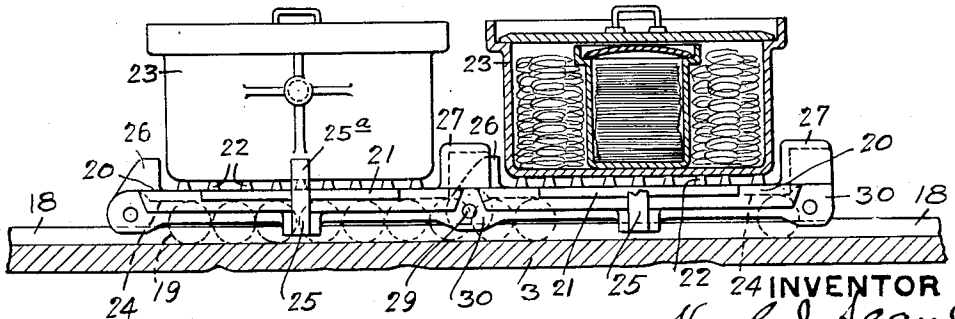


FIG. 6



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HUGH J. SCANLON, OF WAYNESBURG, AND MICHAEL B. KELLY, OF PITTSBURGH, PENNSYLVANIA, ASSIGNORS TO AMERICAN STEEL COMPANY, OF PITTSBURGH, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

ANNEALING FURNACE.

1,409,119. Specification of Letters Patent. Patented Mar. 7, 1922.

Application filed April 19, 1921. Serial No. 462,525.

To all whom it may concern:

Be it known that we, HUGH J. SCANLON and MICHAEL B. KELLY, citizens of the United States, and residents of Waynesburg and Pittsburgh, respectively, in the counties of Greene and Allegheny, respectively, and State of Pennsylvania, have invented a new and useful Improvement in Annealing Furnaces; and we do hereby declare the following to be a full, clear, and exact description thereof.

Our invention relates to an annealing furnace more especially adapted for the annealing of wire.

One of the objects of our invention is to provide a furnace of this character which combines economy in installation, operation and upkeep.

Another object of our invention is to provide for the control of the temperature at different parts of the furnace, causing a more efficient application of heat to all parts of the annealing pot, and thus assuring a better quality of material annealed; and to provide for the gradual increase in temperature as the material moves from the entrance end of the furnace to a point therein and then gradually decreasing the temperature to the discharge outlet.

In the accompanying drawings, Fig. 1 is a plan view of our improved furnace; Fig. 2 is a side elevation with a part in section; Figs. 3 and 3ª are longitudinal sectional views taken through the annealing furnace proper for its entire length; Fig. 4 is an enlarged section on the line 4—4, Fig. 1; Fig. 5 is an enlarged section taken on the line 5—5, Fig. 1; and Fig. 6 is a detail of the conveying mechanism.

In the drawing the numeral 2 is the concrete foundation for our furnace upon which the floor 3 is laid, said floor inclining from the entrance to the discharge end for facilitating the passage of the pots through the furnace.

The roof 4 is inclined in opposite directions from a point 5 about where the furnace-chamber 6 is located. This furnace-chamber 6 may be of any suitable construction and is located to one side of the main structure, as clearly indicated in Fig. 1. This furnace-chamber 6 may be provided with any suitable form of stoking apparatus 7, and may be equipped with a suitable blower 8 driven by the motor 9 for obtaining a forced draft. The furnace 6 communicates with the annealing-chamber 10, and the draft is created by the stack 11 which communicates with the annealing-chamber 10, being located at one side thereof, as indicated in Fig. 1, adjacent to the entrance of said annealing-chamber.

Man-holes 14 are provided in the walls 13 at suitable intervals by which access may be had to the annealing chamber in case one of the pot-carriages becomes derailed or separated from the train, or for any other reason.

Located at intervals in the walls of the annealing chamber are the pyrometers 15 which are connected up by wires 16 to an indicator 17 where the temperatures of the annealing chamber at the points where the pyrometers are located are registered. In this manner active control of the heat at all points of the furnace may be had and greater efficiency is the result, as well as a more uniform quality of material.

For convenience these pyrometers are arranged in the man-hole covers or doors so that in case a pyrometer gets out of order by opening the door it is exposed both inside and outside.

Located within the annealing chamber 10 are the longitudinally extending troughs or grooves 18 containing balls 19. Resting on the balls 19 are the carriages 20 forming a train, each carriage comprising a platform 21 with the upwardly projecting ribs 22 formed thereon which form a rest or support for the annealing pot 23. The platform 21 is provided on its lower face with the grooves 24 registering with the troughs 18 containing the balls 19.

The platform 21 has the enlargements 25 with the upwardly projecting side lugs 25ª which act as retainers for the pot 23 to prevent its shifting laterally. These enlargements act as feet upon which the platforms may rest when disconnected and deposited on the floor at one side of the furnace for the removal of the pot therefrom. To prevent the undue longitudinal shifting of the pot the platform 21 is provided at one end with the upwardly projecting lug 26 and at the opposite end with the hood 27. The lug 26 forms a hook for connecting up with the drawing-chain 28, and when the sections 20 are connected together the hook-portion 26

extends within the hood 27, as indicated in dotted lines, Fig. 6, and a coupling pin 29 passes through the clevis-lug 30 and the lower portion of the hook-portion.

In this manner the carriage composing the train are connected up and traveling as they do down a slight incline and over the balls 19 the carriages move smoothly and evenly, and the power required to move same is greatly reduced. The construction of the carriages and method of connecting same form the subject of an application for Letters Patent, Serial No. 462,494.

When our improved annealing furnace is in use the carriages bearing the pots 23 are introduced at the entrance end 12 of the furnace and the front-carriage is connected up with the chain 28. The movement of the pots through the furnace is continuous, except when the carriages are coupled and uncoupled, and the heating up of the pots is gradual, the annealing chamber at, or near, the entrance end being heated up to about 500° F. From this point the heat gradually increases as the annealing pot approaches the furnace 6 where the temperature may reach approximately 1450°. This gradual increase of temperature applied to the wire in this manner assures the lessening of strain due to harsh and uneven heating, the increase continuing until the maximum heating point is reached. By having the top of the furnace sloping downwardly from about the furnace 6 to the entrance the hot gases are deflected, causing their more complete application to the body of the material to be heated and greater efficiency is obtained. The control of the heat may be provided for very accurately by the pyrometers which register at the registering device 17, and in this way the temperature can be very accurately controlled.

After the annealing pots pass the furnace 6 the temperature is gradually reduced below the critical point until at the discharge end it may be approximately 300°. In this manner after the material has been heated to the desired degree of temperature, the cooling operation is commenced and the gradual decline of temperature is so controlled as to eliminate any possibility of chilling strains being set up in the material. The temperatures given are, of course, only approximate and are not intended in any way to limit the scope of our invention.

It will thus be seen that we provide an annealing furnace in which the heated products of combustion which are developed intermediate the ends of the annealing chamber are carried by the draft to the entrance end where the annealing pots are admitted, and consequently the heat of the pots is gradually increased as the pots travel through the annealing chamber until they reach the maximum heat adjacent the furnace 6, whereupon, while still traveling in the same direction, the cooling of the pots gradually takes place as the pots continue to travel through the furnace beyond the furnace 6 until they pass out the discharge end of the chamber.

By sloping the annealing chamber roof in the manner illustrated the heat is conserved and a greater efficiency is obtained.

What we claim is:

1. In an annealing furnace, the combination of a straight-away annealing chamber having an inlet and an outlet, a heating furnace located on one side of the said annealing chamber and communicating therewith, said heating furnace being located at some distance from the ends of said annealing chamber, the top of said annealing chamber sloping in opposite directions from a point adjacent said heating furnace, and a stack at the inlet end of said annealing chamber, whereby the material on entering said annealing chamber is gradually heated, reaching the maximum temperature at, or about, said heating furnace and being gradually reduced in temperature beyond said heating furnace to the outlet.

2. In an annealing furnace, the combination of a straight-away annealing chamber having an inlet and outlet, a heating furnace located on one side of the said annealing chamber and communicating therewith, said heating furnace being located at some distance from the ends of said annealing chamber, the top of said annealing chamber sloping downwardly toward the inlet from a point adjacent said heating furnace, the bottom of said furnace sloping downwardly from the entrance end, and a stack at the inlet end of said annealing chamber.

In testimony whereof, we the said HUGH J. SCANLON and MICHAEL B. KELLY, have hereunto set our hands.

HUGH J. SCANLON.
MICHAEL B. KELLY.

Witnesses:
ROBT. D. TOTTEN,
JOHN F. WILL.