Sept. 9, 1924. 1,508,135

H. BLOUNT ET AL

TREATMENT OF BRIGHT SURFACED MATERIALS

Filed Sept. 24, 1921 2 Sheets-Sheet 1

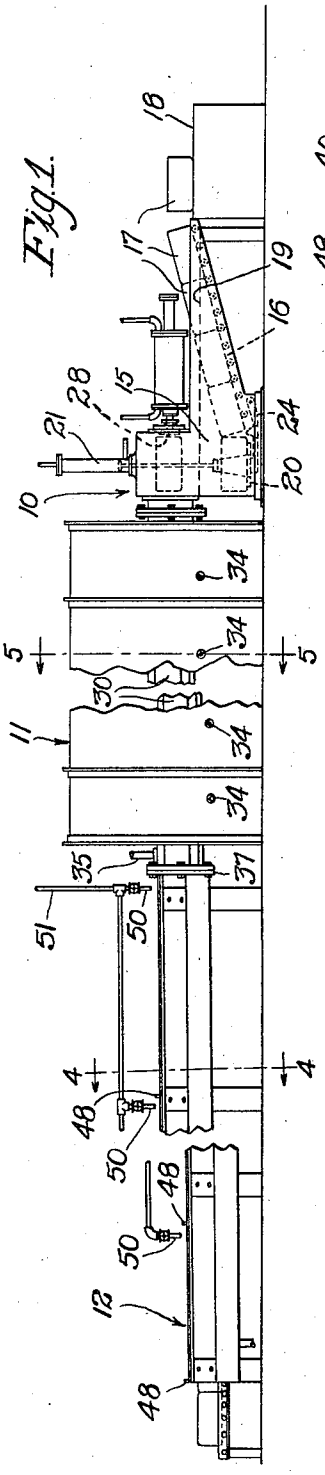


Fig. 1.

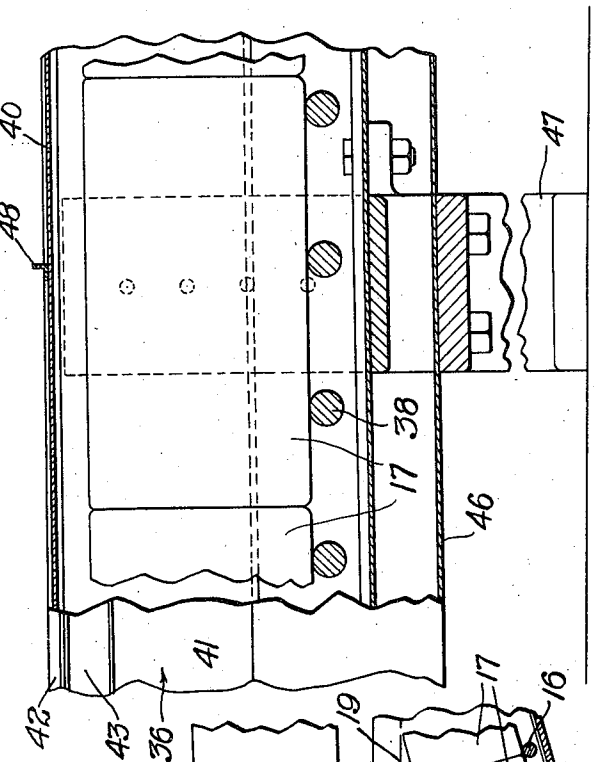


Fig. 3.

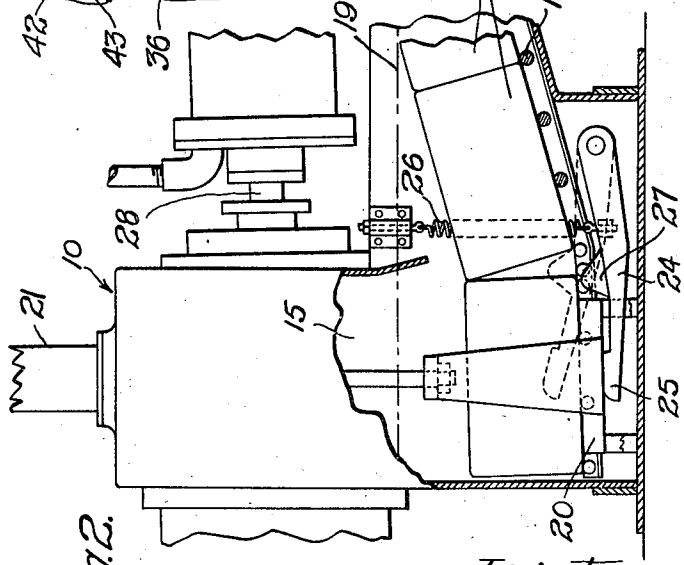


Fig. 2.

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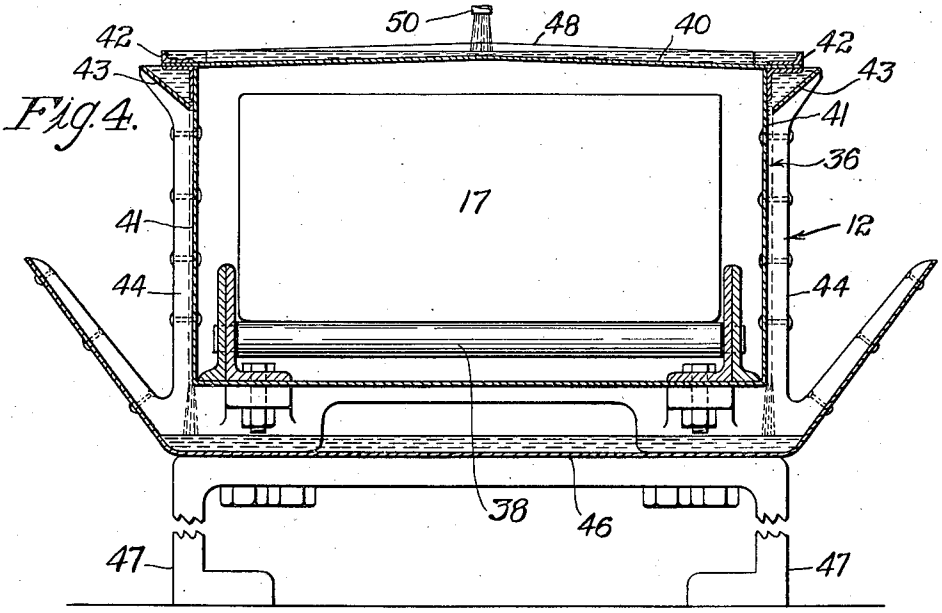
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Fig. 4.



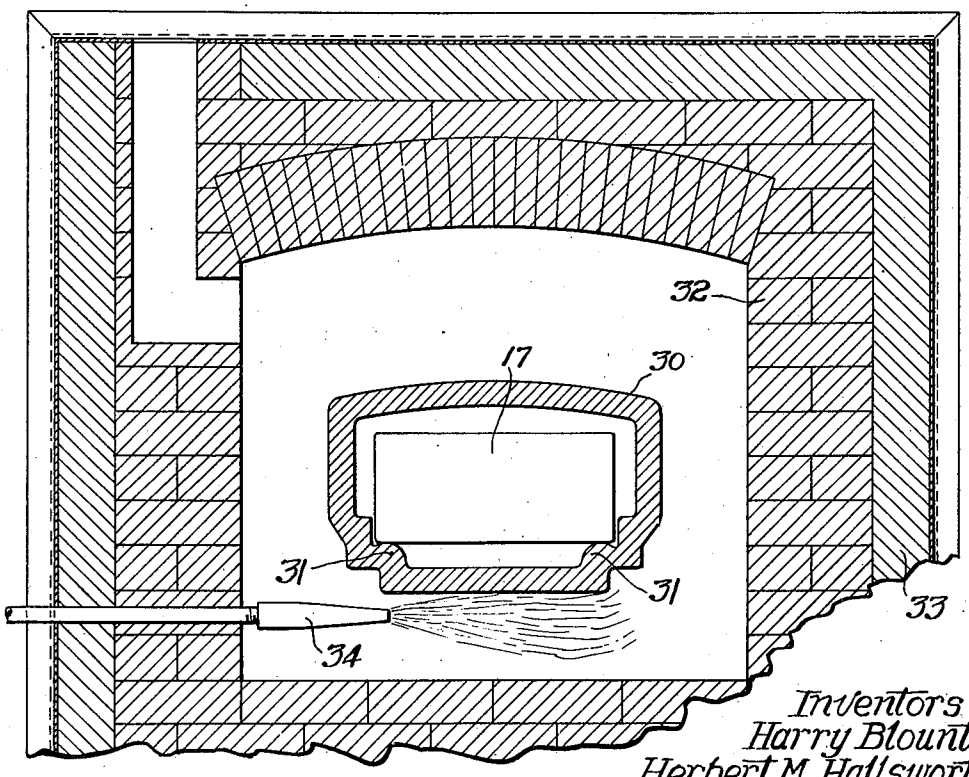


Fig. 5.

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Patented Sept. 9, 1924. 1,508,135

UNITED STATES PATENT OFFICE.

HARRY BLOUNT, OF OAK PARK, AND HERBERT MORTLOCK HALLSWORTH, OF LA GRANGE, ILLINOIS, ASSIGNORS TO WESTERN ELECTRIC COMPANY, INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

TREATMENT OF BRIGHT-SURFACED MATERIALS.

Application filed September 24, 1921. Serial No. 502,956.

To all whom it may concern:

Be it known that we, HARRY BLOUNT and HERBERT MORTLOCK HALLSWORTH, citizens of the United States, residing at Oak Park and La Grange, respectively, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in the Treatment of Bright-Surfaced Materials, of which the following is a full, clear, concise, and exact description.

This invention relates to the treatment of bright surfaced materials such as copper wire and the like, and more particularly to a furnace and apparatus for annealing such materials.

The object of the invention in general is to provide a furnace and associated apparatus by means of which the annealing of bright surfaced materials such as copper wire and the like, carried on spools, may be rapidly and efficiently carried on.

One of the features of this invention relates to the means provided for conveniently and rapidly handling the material to be annealed and consists in the use of containers for introducing the material into and conveying it through the various stages of the annealing operation.

Another feature of this invention relates to the means for introducing the containers into the annealing furnace and maintaining a substantially continuous movement thereof through the furnace whereby the annealing operation may be carried on without interruption. In accordance with this feature of the invention, the containers are introduced into the heating chamber of the furnace by means of reciprocally operating charging apparatus, which successively engages the containers to introduce them into the furnace and assist in their movement therethrough.

Another feature of this invention relates to the means for cooling the material after it has been raised to an annealing temperature and before it is exposed to an oxidizing atmosphere. The cooling of the material is brought about by the use of a chamber which is cooled by a uniform sheet of cold water constantly flowing over the top and sides of the chamber.

In the drawings:

Fig. 1 is a view in side elevation of an annealing furnace made in accordance with this invention, with the heating and cooling chambers partly broken away;

Fig. 2 is a fragmentary side view partly in section of the loading end thereof;

Fig. 3 is a fragmentary cross-sectional view of the cooling chamber;

Fig. 4 is a cross-section on the line 4—4 of Fig. 1, showing the path of the cooling water, and

Fig. 5 is a fragmentary cross section on the line 5—5 of Fig. 1.

As shown in the drawings, 10 designates the charging end of the furnace, 11 the heating chamber, and 12 the cooling chamber. The charging end, as clearly shown in Figs. 1 and 2, consists of a receiving chamber 15 equipped with a downwardly inclined roller runway 16, down which the cases 17—17 containing the material to be annealed are fed by gravity from the platform 18. The chamber 15 is water sealed from the ingress of air, as indicated by the dotted line 19. At the bottom of the roller runway 16 is an elevator 20 upon which one case 17 at a time rolls from the runway 16. The elevator 20 is elevated and lowered by a suitable hydraulic apparatus 21, and in moving up carries the case 17 up to the level of the entrance to the heating chamber 11 which is indicated by the dotted outline of the case 17 at the center of the heating chamber. Positioned below the elevator 20 is a suitably pivoted latch 24 with its free end 25 held in contact with the bottom of the elevator 20 by a suitably mounted spring 26. Intermediate the free end and the pivoted point of the latch and secured thereto is an upwardly projecting lug 27. When the elevator ascends with the case 17 the latch 24 turns about its pivot under the action of the spring 26 with the lug 27 coming into contact with the forward lower edge of the next case on the runway and holds the train of cases from moving down. This position of the latch is clearly shown in dotted outline on Fig. 2. The case 17 which is in line with the entrance to the heating chamber is pushed from the elevator at a suitable speed by a suitably controlled hydraulic ram 28 and into the heating chamber, and upon the return of the ram 28 the elevator is lowered. As the elevator moves down, it comes into contact

with the free end of the latch and swings it down against the action of the spring 26, thereby moving the lug 27 from the next case on the runway and allowing it to roll onto the elevator which thereafter is moved upward and the ram 28 is then operated to push the case into the heating chamber and against the case which was previously entered therein, thus causing it to be moved further in its course through the furnace with each successive case charged into the heating chamber progressively moving the train of cases through the furnace until they finally emerge from the cooling chamber 12. The heating chamber 11 comprises a suitable inner chamber 30 with a track 31 formed therein for guiding the cases 17—17 therethrough. Surrounding the chamber 30 and spaced therefrom is a wall 32 of fire clay, which wall is also surrounded by a wall 33 of heat resistng material, such as that known in the trade as Sil-O-Cel. Positioned between chambers 30 and 32 are a plurality of gas burners 34—34 by means of which the interior of the inner chamber 30 may be raised to a temperature sufficient to anneal the material passing through it.

At the outlet end of the heating chamber 11 is a steam inlet 35 for removing the moisture from the material in the cases which they contain after leaving the water seal at the receiving chamber.

The heating and cooling chambers slope downward toward their outlet ends at such an angle as to serve to reduce the power required by the ram 28 to push the cases 17—17 therethrough. The sloping of the cooling chamber also serves to form a steam pocket in the cooling chamber, the steam for which is supplied by the inlet 35. This steam pocket serves to exclude air from entering at the outlet end of the cooling chamber, thereby preventing the discoloring of the material within the cases 17—17 by reason of the fact that the material is absolutely prevented from contact with the atmosphere until it has been cooled below a temperature at which it would ordinarily oxidize or discolor.

The cooling chamber 12 consists of a tube 36 of a sufficient length equipped with a suitable flange 37 at its inlet end which is sealed to the flanged end of the inner chamber 30 of the heating chamber 11. A suitable roller track 38 is laid on the floor of the tube 36, upon which the cases 17—17 move. The roof 40 of the tube 36 along its entire length has a slight crown to it and also projects a slight distance outward from side walls 41 thereof. Upon the roof 40 and along its side edges are upturned flanges 42 which serve to keep the cooling water constantly upon the crowned roof 40 at a certain depth. Suitably positioned immediately below the projecting edges of the roof 40 and at an angle to the side walls 41 with their lower ends spaced a slight distance therefrom are deflector plates 43 which serve to deflect the constant overflow of water from the roof to the side walls in the form of a thin sheet which rapidly absorbs the heat therein. The deflector plates are secured to supporting castings 44 suitably spaced along the length of the cooling chamber. Secured to the lower surface of the supports 44—44 is a pan or trough 46 which extends the full length of the cooling chamber and serves to draw off the water falling from the sides of the cooling chamber. Standards 47—47 are positioned below each support 44—44 with the pan 46 in between. As clearly shown in Figs. 1 and 4, the roof of the cooling chamber is divided into a plurality of sections by the laterally extending baffle members 48—48 and positioned above the highest point of each section is a water header 50, which is suitably connected to a main water supply line 51. The dividing of the roof 40 into sections with a water supply to each section insures a substantially uniform quantity of water flowing over the entire roof and sides of the cooling chamber.

In the operation of the annealing furnace of this invention the cases 17—17, which may contain spools of bright copper wire or other material to be annealed, are fed by gravity into the receiving chamber 15, down the roller runway 16 and into the water seal provided at the receiving chamber. A case moves onto the elevator 20 and is moved upward by the hydraulic apparatus 21 and into position to be charged into the heating chamber 11 by the ram 28. The balance of the cases 17—17 on the roller runway are automatically held in position by the latch 24, thereby keeping them from moving down into the position occupied by the elevator and upon the lowering of the elevator the latch is automatically operated to allow another case to move from the runway and onto the elevator. Upon the elevator coming to a stop in line with the heating chamber, the ram 28 is operated to push the case from the elevator and into the heating chamber. By the successive charging of the cases into the heating chamber, one case in contact with the one just previously entered, they are progressively moved through the heating and cooling chambers.

The advantages of this method of charging the furnace and moving the material therethrough are that it can be operated with an expenditure of less heat units than the type of furnace which uses a chain conveyor or similar mechanism, which in moving the material through the heating chamber absorbs a great amount of heat therefrom, is then cooled, enters the atmosphere, may or may not enter a water seal, and then enters the heating chamber again

where it absorbs more heat which is again wasted.

The cooling chamber construction and method of cooling it provides for a maximum absorption of the heat liberated from the material passing through it caused by the uniform sheet of water constantly flowing over the roof and sides thereof.

What is claimed is:

1. Annealing apparatus comprising in combination containers for the articles to be annealed, an annealing tube sealed against ingress of an oxidizing atmosphere and comprising a heating chamber and a substantially dry cooling chamber co-extensive with each other, the heating chamber being provided with guides for the containers and the cooling chamber being sloped downwardly from the heating chamber to the discharge end, anti-friction rollers in said cooling chamber for the containers, and means adjacent the open end of the heating chamber for feeding said containers into and through the annealing tube.

2. Annealing apparatus comprising in combination containers for the articles to be annealed, an annealing tube comprising a heating chamber and a cooling chamber co-extensive with each other, a water sealed chamber at the input end of the annealing tube adapted to receive the loaded containers and seal said end against ingress of air, an intermittently operating lifting and feeding mechanism for introducing the containers from the receiving chamber into and moving them through the annealing tube, a steam seal for preventing the admission of oxidizing atmosphere into the cooling chamber, and means for cooling the cooling chamber.

3. An annealing apparatus comprising in combination an annealing tube sealed against ingress of an oxidizing atmosphere and comprising a heating chamber and a substantially dry cooling chamber opening into each other, the cooling chamber being sloped downwardly from the heating chamber to its discharge end, a receiving chamber located below the input end of the annealing tube and filled with water, and reciprocally operated mechanism for lifting the articles to be annealed to the level of the annealing tube and moving them through the tube.

4. Annealing apparatus comprising in combination containers for the articles to be annealed, an annealing tube comprising a heating chamber and a cooling chamber co-extensive with each other, a receiving chamber located below the input end of the annealing tube and filled with water, means for introducing the loaded containers into said water-filled chamber, reciprocally operated mechanism for lifting the loaded containers to the level of the inlet to the tube and moving them through the tube, and a steam seal for the cooling chamber to seal it against oxidizing atmosphere.

5. Annealing apparatus comprising in combination an annealing tube sealed against ingress of an oxidizing atmosphere and comprising a heating chamber and a substantially dry cooling chamber opening into each other, the cooling chamber being sloped downwardly from the heating chamber to its discharge end, a receiving chamber located below the input end of the annealing tube and filled with water, reciprocally operated mechanism for lifting the articles to be annealed to the level of the annealing tube and moving them through the tube, and a steam seal for the cooling chamber to seal it against oxidizing atmosphere.

6. In an annealing furnace, an annealing tube comprising a heating chamber and a cooling chamber opening into each other and sealed against ingress of air, a crown for said cooling chamber having oppositely sloping surfaces, and a plurality of nozzles for discharging water on top of said cooling chamber.

7. In an annealing furnace, an annealing tube comprising a heating chamber and a cooling chamber co-extensive with each other and sealed against ingress of air, a crown for said cooling chamber having oppositely sloping surfaces, a plurality of nozzles for discharging water on top of said cooling chamber, and means for causing said water to flow down the sides of said cooling chamber.

8. In an annealing furnace, an annealing tube comprising a heating chamber and a cooling chamber co-extensive with each other and sealed against ingress of air, a crown for said cooling chamber having oppositely sloping surfaces, means for supplying a continuous stream of water to said crown, and baffle plates located adjacent the crown upon opposite side walls of the cooling chamber to cause the water from said supply to spread over said crown and flow over said side walls in a thin sheet.

9. In an annealing furnace, an annealing tube comprising a heating chamber and a cooling chamber co-extensive with each other and sealed against ingress of air, said cooling chamber having a crown top surface and being divided into a plurality of sections, means for supplying each section with a constantly flowing stream of cooling water, and means for causing the water in each section to flow over the top and sides of the cooling chamber in a thin sheet.

10. An annealing apparatus comprising in combination an annealing tube consisting of a heating chamber and a substantially dry cooling chamber communicating with each other, the cooling chamber being sloped

downwardly from the heating chamber to its discharge end, and reciprocally operating means adjacent the open end of the heating chamber for feeding the articles to be annealed through the annealing tube.

11. An annealing apparatus comprising in combination an annealing tube consisting of a heating chamber and a substantially dry cooling chamber communicating with each other, the cooling chamber being sloped downwardly from the heating chamber to its discharge end, reciprocally operating means adjacent the open end of the heating chamber for feeding the articles to be annealed through the annealing tube, and a steam seal for preventing the admission of oxidizing atmosphere into the cooling chamber.

In witness whereof, we hereunto subscribe our names this 15th day of September, A. D. 1921.

HARRY BLOUNT.
HERBERT MORTLOCK HALLSWORTH.