April 15, 1930. A. N. OTIS 1,755,072

FURNACE

Filed Aug. 8, 1927

Fig. 1.

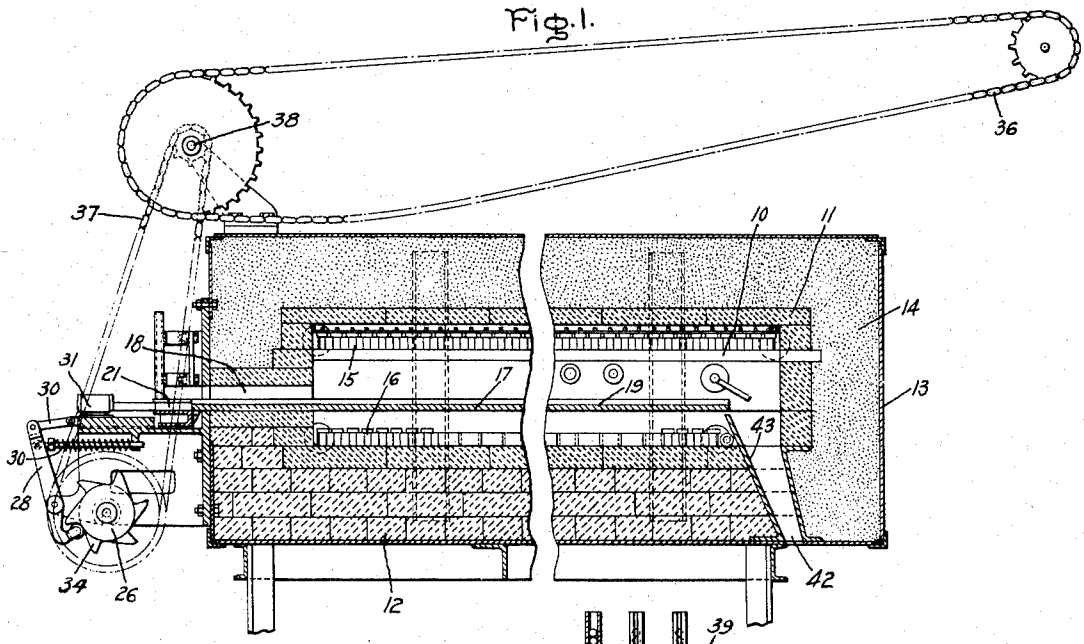


Fig. 4.

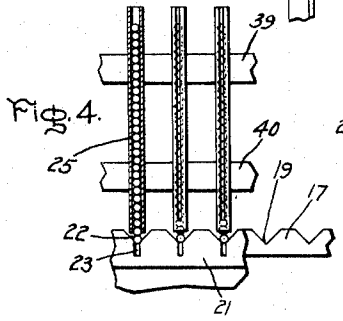


Fig. 3.

Fig. 2.

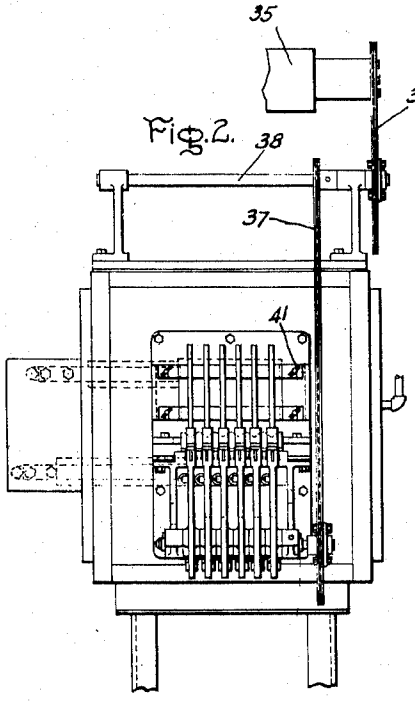
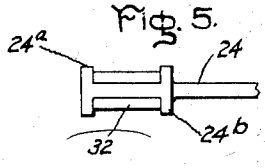


Fig. 5.



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UNITED STATES PATENT OFFICE

ALBERT N. OTIS, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK

FURNACE

Application filed August 8, 1927. Serial No. 211,272.

My invention relates to furnaces, more particularly to furnaces for heating small parts or articles, and has for its object the provision of simple and reliable mechanism for passing the parts to be heated through the furnace.

In carrying out my invention in one form I provide a channel in the wall of the furnace extending through the heating chamber, together with means for feeding the articles to be heated into the furnace and moving them along the channel through the heating chamber.

For a more complete understanding of my invention reference should be had to the accompanying drawing in which Fig. 1 is a sectional view of an electric furnace embodying my invention; Fig. 2 is an end elevation view of the furnace shown in Fig. 1, while Figs. 3, 4 and 5 are enlarged fragmentary views showing details of construction.

Referring to the drawing, I have shown my invention in one form as applied to an electrically heated furnace although it obviously has application to various other types of furnaces. The furnace comprises an elongated horizontally arranged heating chamber 10 surrounded by heat refractory bricks 11 which rest on suitable heat insulating bricks 12. This brick work is enclosed in a metallic casing 13 which is spaced at the top and sides from the bricks 11, this intervening space being filled with powdered heat insulating material 14. Suitable electric heating units 15 and 16 at the top and bottom of the heating chamber respectively are provided.

At the bottom of the heating chamber, and just above the bottom heating units 16, is a platform member 17 which, in fact, forms the bottom of the heating chamber. This member 17 is preferably made of a suitable heat resisting metal, such as an alloy of nickel and chromium. It extends throughout the charging opening 18 for the furnace and projects slightly therefrom as indicated in Fig. 1. On its upper side this member is provided with a plurality of V shaped grooves or channels 19 which extend in parallel relation lengthwise with the heating chamber. These grooves form guides for the parts to be heated, shown in the present instance as cylindrical slugs 20.

Adjacent the outer end of the supporting plate 17 is a member 21 having grooves 22 which are in alignment with and register with the grooves 19. At the bottom of each of these grooves 22, however, is a narrow vertical slot 23 which forms a guide for a pusher member 24 moving therein. These pusher members are slightly higher than the slots 23 so that they project upward into the grooves 22 for a distance somewhat less than the height of the slugs. Just above each of the grooves 22 is a vertical magazine 25, shown as having a rectangular cross section in which the slugs 20 form a loose fit when inserted sidewise as indicated in Figs. 3 and 4. As each pusher member 24 is moved forward it pushes a slug from the bottom of its magazine. As the pusher member is withdrawn to the position indicated in Fig. 3, the slugs 20 in the magazine drop down so that a new slug drops in position in groove 22 to be engaged by the pusher when it is again advanced. The slugs are thus pushed along the grooves 22 and 19 in end to end relation through the heating chamber.

The operating mechanism for the pushers 24 comprises a plurality of cam members 26 mounted on a shaft 27, each pusher being provided with an operating cam 26. Mounted opposite each cam is a lever 28 having on its lower end a roller 29 which is caused to bear on the cam by means of a helical compression spring 30 acting on the upper part of the lever 28. The upper end of the lever 28 is connected by a link 31 to a horizontal slider member 32 to which in turn the pusher 24 is connected. The slider members are mounted in undercut grooves in a supporting plate 33. Each cam 26 is provided with a cam projection 34, and it will be observed that as each projection moves under its roller 29, its lever 28 is moved in a clockwise direction to advance the pusher 24, and as the roller leaves the projection the pusher is withdrawn. It will be understood that the cam is rotated in a clockwise direction as viewed in Fig. 3. Suitable driving mechanism is provided for the shaft 27, such, for example, as an electric motor 35 which is

connected thereto through suitable chains 36 and 37 and a counter-shaft 38.

As shown in Fig. 5, the pusher members 24 are removably mounted on the slider members 32, the slider member being provided with a slot, into which the pusher member fits. Lugs 24ª and 24ᵇ are provided in the pusher member 24 on opposite ends of the slider member whereby displacement in a horizontal direction is prevented. The height of the pusher member will vary with the diameter of the slug, a higher pusher member being provided for the larger diameter slugs. Various lengths of pusher members may also be used to accommodate different lengths of slugs. In order that any desired size of slug may be heated, the magazines 25 are secured in place so that they may easily be removed and magazines of the required size put in place. As shown, the magazines are attached to crossbars 39 and 40, which are secured to the front of the furnace by means of bolts. As shown, the ends of the bars are provided with vertical slots to receive the bolts and are secured in place by wing nuts 41. In order to remove a set of magazines, it is necessary only to loosen the wing nuts after which the magazines may be lifted off.

A discharge opening 42 is provided in the bottom wall of the furnace at its inner end and a suitable chute 43 is provided whereby the slugs which are pushed from the plate 17 are carried out through the opening. It will be understood that under normal operating conditions each groove 19 will be filled throughout its full length with slugs situated in end to end relation so that as each cold slug is pushed in a heated slug is pushed off the plate 17 onto the chute. The furnace is particularly useful in heating copper slugs for forging or hot pressing into various articles, such as cable terminals. Presser mechanism can be conveniently arranged so that each heated slug is conveyed by the chute 43 directly to the presser die. The cam projections 34 are equally spaced angularly around the shaft 27, as shown in Fig. 3 in such manner that the slugs are ejected one at a time from the furnace. In the arrangement shown six grooves 19 with appropriate feeding and operating mechanism are provided and the pusher mechanism will be operated consecutively in such manner that the slugs will be ejected one at a time to the presser die. It is contemplated also that the presser mechanism will be driven with the feeding mechanism so that during the operation of ejecting a slug, the previously ejected slug will be pressed.

While I have described my invention as embodied in concrete form and as operating in a specific manner in accordance with the provisions of the patent statutes, it should be understood that I do not limit my invention thereto since various modifications will suggest themselves to those skilled in the art without departing from the spirit of my invention the scope of which is set forth in the annexed claims.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A conveying mechanism for moving small articles through a heating chamber provided with inlet and outlet openings comprising a member provided with a channel extending between said openings, a second member adjacent said inlet opening provided with a channel aligned with said first channel, said second channel having a slot in its bottom, means for feeding the articles to be heated into said second channel, a member mounted for reciprocatory motion within said slot so as to project into said second channel and means for reciprocating said member whereby said articles are moved along said channels through said heating chamber.

2. A conveying mechanism for moving small articles through a heating chamber provided with inlet and outlet openings, comprising a member provided with a channel extending between said openings, a second member adjacent said inlet opening provided with a channel aligned with said first channel, said second channel having a slot in its bottom, a magazine adjacent said inlet opening for feeding the articles one by one to said second channel, a pusher member mounted for reciprocatory motion in said slot so as to project into said second channel to engage the articles as they are fed to said channel and push them in end to end relation through said heating chamber, and operating means for said member comprising a cam, means for driving said cam, a lever cooperating at one end with said cam, and a link connecting the other end of said lever with said pusher member.

3. A conveying mechanism for moving small articles through a heating chamber provided with inlet and outlet openings, comprising a member provided with a channel extending between said openings, a second member adjacent said inlet opening provided with a channel aligned with said first channel, said second channel having a slot, means for feeding the articles to be heated to said second channel, a member slidably mounted adjacent the inlet end of said chamber, means for reciprocating said member, and a pusher member detachably secured to said slidable member and mounted for reciprocatory movement within said slot so as to project into said second channel and thereby cooperate with said articles and push them one by one along said first channel through said heating chamber.

4. A conveying mechanism for moving small articles through a heating chamber provided with inlet and outlet openings,

comprising a member in the bottom of said chamber extending between said openings provided with a plurality of channels extending through said chamber between said openings, a second member adjacent said inlet opening provided with a plurality of channels aligned with said first mentioned channels, each of said channels being provided with a slot, a plurality of magazines mounted adjacent said second channels arranged to feed the articles to be heated one by one to said channels, pushing members slidably mounted in said slots so as to project into said second channels and thereby engage said articles so as to push them along said channels through said heating chamber, and means for operating said pusher members in consecutive order so that the articles are ejected one by one from said outlet opening.

5. A conveying mechanism for moving small articles through a heating chamber provided with inlet and outlet openings, comprising a member provided with a channel extending between said openings, a member positioned adjacent the inlet opening of said channel, said member being provided with a channel aligned with said first channel, a magazine adjacent said inlet opening for feeding the articles one by one to said second channel, a pusher member mounted for reciprocatory motion in said second channel, said second channel being provided with a slot for receiving said pusher member so that said member extends into said channel to engage the articles as they are fed thereto and push them in end to end relation through said heating chamber, and means for reciprocating said pusher member whereby said articles are moved along said channel through the heating chamber.

6. A conveying mechanism for moving small articles through a heating chamber provided with inlet and outlet openings, comprising a member provided with a channel extending between said openings, a magazine adjacent said inlet opening for feeding the articles one by one to said channel, a pusher member mounted for reciprocatory motion in said channel to engage the articles as they are fed to said channel and push them in end to end relation through said heating chamber, and operating means for said member comprising a cam having a plurality of operating faces, a lever pivoted so as to cooperate at one end with said cam, means biasing said end into engagement with said cam operating faces, and a link connecting the other end of said lever with said pusher member.

7. A conveying mechanism for moving articles into a heating chamber which is provided with an inlet opening comprising a member positioned adjacent said inlet opening, said member being provided with a channel and a slot extending from said channel, means for feeding the articles one by one into said channel, a pusher member mounted for reciprocatory motion within said slot so as to project into said channel, and means for reciprocating said member so that said articles are moved along said channel and into said heating chamber.

In witness whereof, I have hereunto set my hand this 5th day of August, 1927.

ALBERT N. OTIS.