R. C. STIEFEL.

ANNEALING AND OTHER FURNACE.

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1,414,489.

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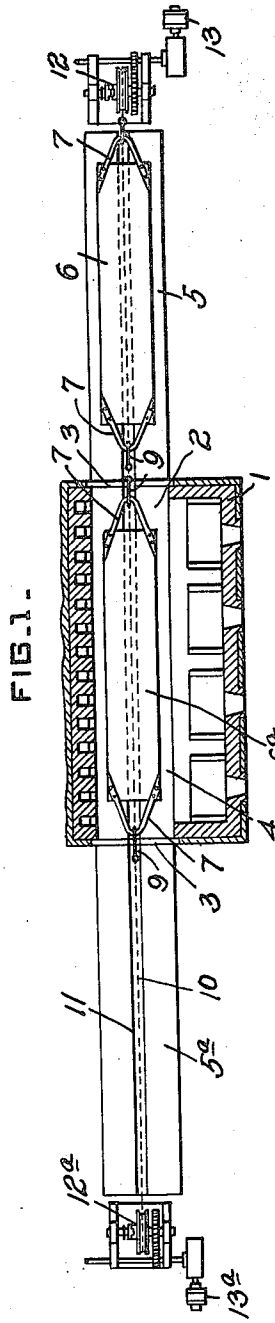


FIG. 1.

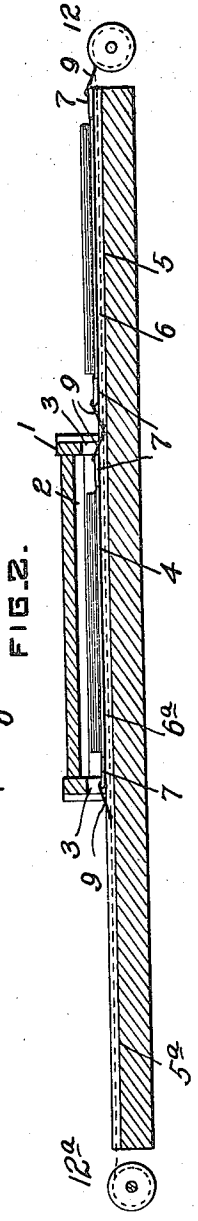


FIG. 2.

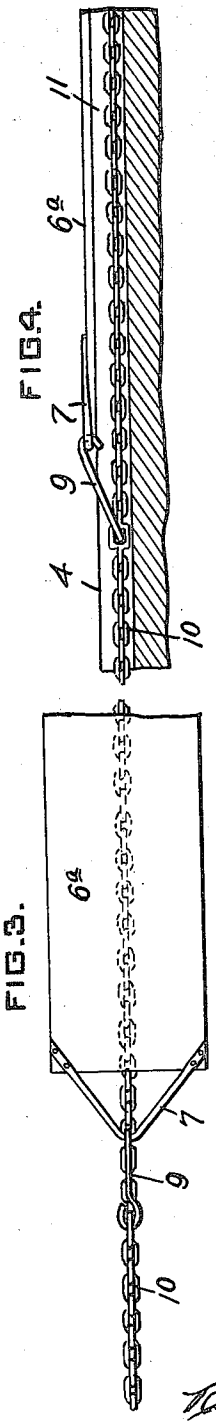


FIG. 4.

FIG. 3.

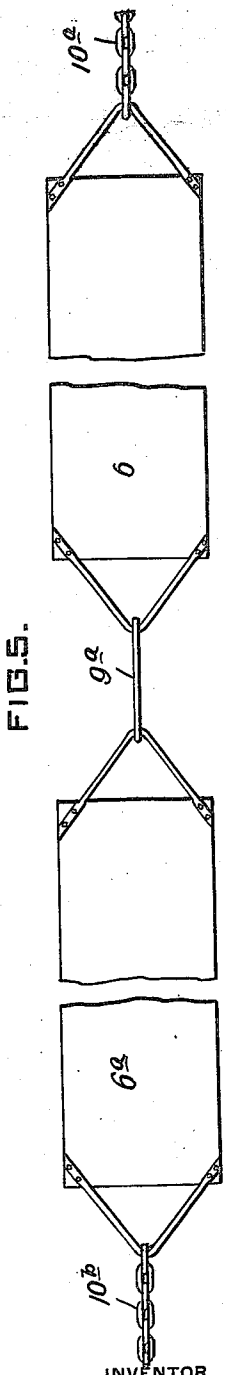


FIG. 5.

WITNESSES

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ANNEALING AND OTHER FURNACE.

1,414,489. Specification of Letters Patent. Patented May 2, 1922.

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To all whom it may concern:

Be it known that I, RALPH C. STIEFEL, a resident of Ellwood City, in the county of Lawrence and State of Pennsylvania, have invented a new and useful Improvement in Annealing and Other Furnaces, of which the following is a specification.

The invention relates to annealing and other heating furnaces, and more particularly to an arrangement for charging and discharging such furnaces. The object of the invention is to provide an arrangement whereby such furnaces can be charged and discharged in less time and with less labor than as heretofore constructed, thereby leading to economy both in the labor of charging and discharging, and also in the amount of fuel used, and also increasing the capacity of the furnace.

Since the invention can be conveniently explained in connection with an annealing furnace, it will be illustrated and described in connection with such furnaces, but it will be understood that it is applicable to various other kinds of furnaces.

In the accompanying drawings Fig. 1 is in part a plan view and in part a horizontal section of an arrangement of the invention applied to an annealing furnace; Fig. 2 is a longitudinal vertical section through the same; Fig. 3 is an enlarged plan view showing the end portion of one of the work carriers or pans and the pulling chain; Fig. 4 is an enlarged vertical sectional view showing the same parts and a portion of the furnace bottom; and Fig. 5 is a plan view illustrating a modification.

In the drawing 1 indicates the walls of an annealing furnace of approved type, having the longitudinal heating chamber 2 provided with end charging and discharging openings 3, the doors for closing said openings being omitted for the sake of clearness. The bottom 4 of the heating chamber is horizontal and flat from end to end and is arranged to support the articles to be heated in the furnace. At each end of this furnace, in line with its chamber and immediately adjacent the openings of the furnace is a table or platform, that at one end being marked 5 and that at the opposite end being marked 5^a, which are of substantially the same width as the bottom 4 of the furnace and of a length substantially equal of the length of the furnace bottom. 6 and 6^a indicate a pair of work carriers upon which the pieces to be heated are placed and upon which they are carried into and out of the furnace. These carriers may be of various constructions and are shown as plates, sheets or so-called pans. Each of these pans is shown of a length nearly equal to that of the heating chamber in the furnace, but obviously each work carrier can be composed of a plurality of sections. Each of these carriers whether a single carrier or composed of a plurality of sections, is provided at each of its ends with means for the convenient attachment of pulling mechanism thereto, the drawing showing loops 7, riveted, welded or otherwise suitably secured to the ends of the carriers, and forming convenient means for connecting thereto hooks 9 adapted for attachment to pull chains or cables 10.

The pulling means may be variously arranged. As shown in Figs. 1, 2, and 3, the pulling means comprises a pulling chain 10, furnace and in the tables 5 and 5^a, cenlying in a groove 11 in the bottom of the trally thereof, and sufficiently deep to prevent the chain or cable 10 from projecting above the surface of said bottom and tables. At the outer end of each table is a suitable pulling mechanism, shown as drums 12, 12^a driven by motors 13, 13^a. The ends of the continuous chain are wound upon these drums in opposite directions, so that when one drum is driven the chain is wound thereon and drawn in one direction, and when the opposite drum is driven the chain is drawn in the opposite direction.

The use of the arrangement described is as follows: The pieces to be heated are indicated at 15, supported upon the work carriers. We will assume that the carrier 6^a, with its charge of pieces is in the furnace, and is ready to be withdrawn. A fresh charge is placed, by means of an overhead crane or the like, upon the carrier 6 supported on table 5. When the charge in the furnace is ready to be drawn out, the left hand end of both carriers are hooked to the chain 10, and the drum 12^a is set into operation, thus drawing chain 10 toward the left, drawing carrier 6^a out onto the table 5^a and drawing carrier 6 from the table 5 into the furnace. The doors of the furnace are now closed and the parts remain in this position until the pieces on the table 5^a have cooled sufficiently to be handled. They are then removed and a fresh charge placed upon the

carrier 6ª. When the charge on carrier 6 is in condition for withdrawal from the furnace, the doors of the furnace are opened, the right hand end of each carrier is hooked to the chain 10, and the drum 12 is set into rotation, thus winding the chain 10 thereon and drawing both carriers toward the right, drawing the carrier 6 out of the furnace and onto the table 5, and the carrier 6ª from the table 5ª into the furnace. The doors of the furnace are then closed, and the devices left in this position until the pieces on the table 5 have cooled sufficiently for handling, when they are removed and a fresh charge placed on the carrier thereon, and as soon as the charge now in the furnace is ready to be withdrawn, the foregoing operations are repeated, both carriers being again drawn toward the left.

With this arrangement there is provided a reciprocatory movement of the two carriers alternately in opposite directions from and back onto the tables at the ends of the furnace, into the furnace in one direction and out of the furnace in the opposite direction. In this way no time is lost in charging and discharging the furnace, and it is possible to maintain a charge in the furnace substantially all of the time. Furthermore it is never necessary to move a work carrier from one end of the furnace around to the other, but the two carriers are merely reciprocated back and forth. Consequently the interval of time between successive charges is greatly reduced, thus resulting in economy in fuel, and the labor in charging and discharging is reduced to a minimum and the maximum capacity of the furnace is utilized.

Fig. 5 shows a modification adapted to a construction in which the groove 11 in the bottom of the furnace and in the tables 5 and 5ª is omitted, and the pulling member, instead of being a continuous chain passing from drum 12 to drum 12ª is in two sections, marked 10ª and 10ᵇ, said sections being arranged to be wound on the drums, 12, 12ª, respectively, and both sections being provided at their free ends with hooks for attachment to the end loops of the carriers. In this case the adjacent ends of the two carriers must be connected together, such as by a hook or link 9ª, so that when one of said carriers is moved it will draw with it the other carrier, as will be understood. This modification attains exactly the same alternate reciprocatory movement of the work carriers as in the form first described, the principal difference being that because of the sectional form of the pulling chain or cable, it is necessary to hitch the two carriers together.

I claim:

1. In combination with a heating furnace provided with openings in opposite ends thereof, of a table immediately adjacent each end of the furnace on a level with the bottom thereof, a pair of connected work carriers movable on said tables and on the furnace bottom, and mechanism for drawing said work carriers simultaneously and alternately in opposite directions, said work carriers being spaced apart, and each having a total length less than the length of the furnace whereby when either thereof is in the furnace the other one is entirely outside the furnace on one of the tables for loading and unloading.

2. In combination with a heating furnace provided with openings in opposite ends thereof, of a table immediately adjacent each end of the furnace on a level with the bottom thereof normally connected, a pair of work carriers movable on said tables and on the furnace bottom, a pulling mechanism arranged to pull said work carriers in either direction, and means for connecting both of said carriers simultaneously, and alternately at opposite ends of said carriers, to said pulling mechanism, said carriers being separate and spaced apart, and each carrier having a total length less than the length of the furnace whereby when either of said carriers is in the furnace the other one is entirely outside the furnace on a table for loading and unloading.

3. In combination with a heating furnace provided with openings in opposite ends thereof of a table immediately adjacent each end of the furnace on a level with the bottom thereof, a pair of connected work carriers movable on said tables and on the furnace bottom, a pulling chain extending completely through and projecting from both ends of the furnace, means connecting the opposite ends of the work carriers to said chain so as to cause the carriers to move in unison therewith in both directions, mechanism for moving the chain and attached work carriers in either direction, said work carriers being spaced apart whereby when either thereof is in the furnace, the other one is entirely outside the furnace on one of the tables for loading and unloading.

In testimony whereof, I have hereunto set my hand.

RALPH C. STIEFEL.

Witness:
ALICE A. TRILL.