July 8, 1930. P. W. McCOY ET AL 1,770,081

HEAT TREATING FURNACE

Filed Dec. 21, 1928

Fig. 1.

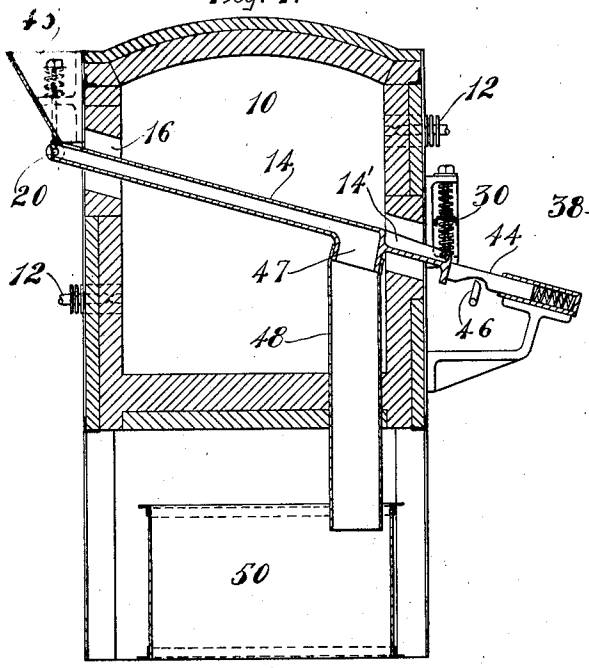


Fig. 2.

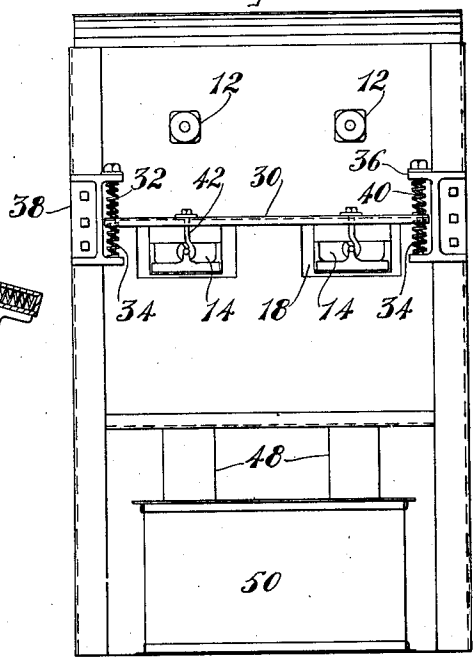


Fig. 3.

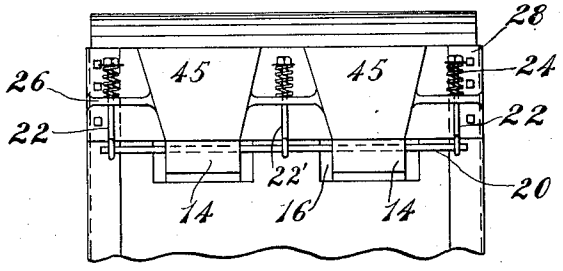


Fig. 4.



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HEAT-TREATING FURNACE

Application filed December 21, 1928. Serial No. 327,508.

This invention relates to improvements in heat-treating furnaces and more particularly to means for moving work through the furnace.

It is an object of the invention to provide a simple and practical means for moving relatively small work such as screws, nuts, bolts, rings and the like through the furnace.

In accordance with this invention there is provided a relatively stationary inclined chute which may be put into a state of vibration by being hammered by suitable hammering means, the objects resting on the chute moving down the incline when the chute is in a state of vibration but not otherwise.

For a more complete understanding of the invention reference is made to the detailed description taken in connection with the accompanying drawings forming part of this specification.

Referring to the drawings,

Fig. 1 is a vertical section through a heat-treating furnace containing the invention. Fig. 2 is a front elevation of the furnace viewed from the right of Fig. 1, the means for hammering the chute being omitted for simplicity of showing. Fig. 3 is a fragmentary rear end elevation showing how the upper end of the chute may be supported and also showing the hopper therefor. Fig. 4 is a cross section of a modified form of chute.

The furnace itself may be of any suitable form and construction. As shown it comprises a generally rectangular heating chamber 10 in the side wall of which are burners 12 for heating the chamber.

The chute extends across the heating chamber and may or may not be covered. In the drawings, two chutes are shown, numeral 14 indicating the same. As many chutes may be provided in one heating chamber as may be desired and they are conveniently arranged side by side in spaced relation.

The chute is made of relatively thin metal so as to enable it the more readily to be put into a state of vibration. It is mounted in a plane out of the horizontal but not sufficiently inclined to cause the flat or elongated objects to slide down the incline by gravity alone. The degree of inclination must be such as to cause the work or objects to be heat-treated to move slowly down the incline when the chute is vibrated by means hereinafter described.

The chute is supported at its ends in such a manner as will permit it to vibrate without imparting destructive stresses to the walls of the heating chamber. The work receiving end of the chute extends through an opening 16 in the chamber wall and the lower end through an opening 18 in the opposite wall. Any suitable or preferred manner of supporting the chute may be employed. As shown in the drawings, the upper end of the chute is connected to a transversely extending rod 20 which at its ends is received in hangers 22 which in turn are supported by springs 24 resting on ledges 26 formed on a bracket 28 secured to the furnace wall, the hangers passing through the springs. The upper end of the chute is, therefore, resiliently supported. Where a plurality of chutes are employed, intermediate hangers 22′ may also be employed as will be readily understood.

The lower end of the chute is also resiliently supported in any suitable or preferred manner. As shown a cross bar 30 is supported at its ends between top and bottom springs 32 and 34 held in place between top and bottom ledges 36 formed on a bracket 38 secured to the furnace. An upright rod 40 between the ledges serves to confine the bar 30 to up and down movement as will be readily understood. Depending from the bar 30 is a hanger 42 to which extension 14′ of the chute is anchored for support.

As previously stated the chute is adapted to be put into a state of vibration for the purpose of causing the articles or work to be heat-treated to move down the incline. Vibration is imparted to the chute by hammer-like blows at any suitable point or points. For purpose of illustration, there is shown a simple hammering device comprising a spring pressed plunger 44 adapted to be set for release by a cam 46 which is rotated by any suitable motive means. As the hammer or plunger 44 strikes the adjacent end of the chute a succession of sharp blows, the shock

will set up vibrations in the chute and consequently any small object reposing on the chute will be momentarily and repeatedly dislodged from the chute and move down the incline as long as the vibrations persist. It will be readily appreciated that the incline of the chute must be less than the angle of repose otherwise the downward movement of the articles having been once initiated cannot be controlled. The less the degree of inclination the longer will it take the objects to move the length of the chute as will be readily understood. By raising or lowering the upper end of the chute the speed of downward movement of the objects down the chute can be controlled to a nicety.

It is to be understood that the hammering device shown is merely illustrative of any suitable means for imparting vibration to the chute, such for example as the well-known air and electrically operated hammers. It is also to be understood that the blows need not be localized at any particular place on the chute.

The force of the blows required to set up vibration in the chute will, of course, depend on the thickness of the chute and its general stiffness. The chute should, therefore, be made of relatively thin sheet metal and be of sufficient width and length to accomplish the end in view.

Where relatively long objects such as screws and pins are to be heat-treated it is desirable to make the bottom of the chute of longitudinally channelled form as indicated in Fig. 4 in order that they may dispose themselves with their long axis in parallelism with the length of the chute. Bunching of the articles is thereby prevented and a more or less uniform layer of the articles on the chute obtained.

The articles may be fed to the chute from a hopper 45 adjacent the upper end thereof. The articles may be discharged from the chute either within or without the furnace. As shown they are discharged through a bottom opening 47 in the chute from which they pass into a conduit 48 for passage to a quenching tank 50 below the flow of the furnace.

The invention provides a simple and practical means for effecting continuous heat-treatment of relatively small articles, and the absence of a moving conveyor reduces the cost of manufacture of the furnace as a whole to a minimum.

It will be readily appreciated that numerous changes in the form and location of the various parts may be made without departing from the spirit of the invention, which, as will now be understood, consists essentially of a chute or guide-way adapted to be put into a state of vibration to cause the objects to move down the incline assisted by gravity.

What is claimed is:

1. In combination, a heating chamber, an inclined relatively stationary chute within the heating chamber and adapted when hammered to vibrate with sufficient intensity to cause articles reposing thereon to be sufficiently agitated to move down the incline under the influence of gravity, and means for hammering the chute to set up said vibrations.

2. In combination, a heating chamber, an inclined relatively stationary chute within the heating chamber and adapted when hammered to vibrate with sufficient intensity to cause articles reposing thereon to be sufficiently agitated to move down the incline under the influence of gravity, cushioned means for supporting the chute, and means for hammering the chute to set up said vibrations.

3. In combination, a heating chamber, an inclined relatively stationary chute within the heating chamber and adapted when hammered to vibrate with sufficient intensity to cause articles reposing thereon to be sufficiently agitated to move down the incline under the influence of gravity, said chute having an anvil at one end, and means for hammering said anvil.

4. In combination, a heating chamber, an inclined relatively stationary chute within the heating chamber and adapted when hammered to vibrate with sufficient intensity to cause articles reposing thereon to be sufficiently agitated to move down the incline under the influence of gravity, said chute being longitudinally corrugated to form article-receiving paths, and means for hammering the chute to produce said vibrations.

5. In combination, a heating chamber, an inclined relatively stationary chute within the heating chamber and adapted when hammered to vibrate with sufficient intensity to cause articles reposing thereon to be sufficiently agitated to move down the incline under the influence of gravity, means at opposite ends of said chute for supporting it, a hopper at one end of said chute, and means at the other end of the chute for hammering it to set up said vibrations.

6. In combination, a heating chamber, a relatively stationary inclined chute, said chute having a bottom opening intermediate its ends for the discharge of material, an anvil at one end of said chute, and hammering means for setting up vibration in the chute.

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