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V. R. TROGLIONE
HEAT TREATING FURNACE
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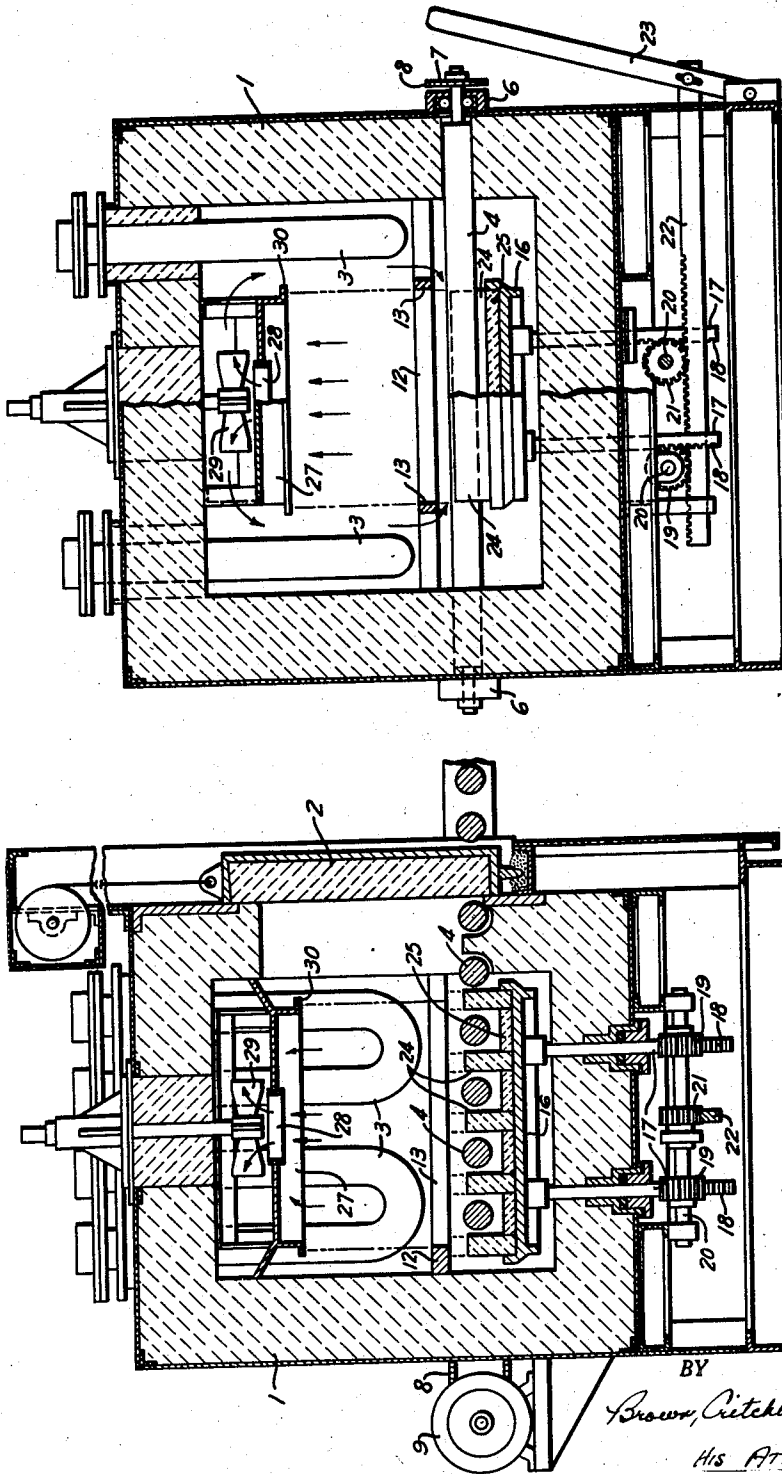


Fig. 2

Fig. 3

Fig. 1

INVENTOR.

VINCENT R. TROGLIONE

BY

Brown, Citchlow, Hick & Peckham

HIS ATTORNEYS

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HEAT TREATING FURNACE

Vincent Ralph Troglione, Pittsburgh, Pa., assignor to Ferguson Equipment Corporation, Pittsburgh, Pa., a corporation of Pennsylvania

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1 Claim. (Cl. 263—6)

This invention relates to heat treating furnaces, and more particularly to such a furnace provided with a roller conveyor.

When a heat treating furnace is provided with a roller conveyor for carrying the work into and out of the furnace, the rollers naturally become very hot. In fact, they become so hot that if they stand still during the heat treating period, especially with the weight of the work resting on them, they tend to sag. It is therefore desirable to rotate the rollers continuously, but this has obvious disadvantages when the work is resting on them in the furnace and cannot move. It is customary in a heat treating furnace to circulate the furnace atmosphere around the work. When the work is carried in a metal basket or container, the bottom and usually the sides are perforated to permit the furnace atmosphere to be drawn through the basket and the work in it. However, much of the atmosphere flows along the outside of the basket without entering it.

It is among the objects of this invention to provide a heat treating furnace, in which a roller conveyor can be driven continuously without engaging the work during the heat treating period, and in which substantially all of the furnace atmosphere will be circulated through the work.

In accordance with this invention, the conveyor rollers in the furnace are driven to carry work into and out of it. Between the rollers there are elevating members, which are normally located below the tops of the rollers. Provision is made for raising these members to lift the work from the rollers and support it above them during heat treatment so that they can be rotated continuously free of the load. The work preferably is carried in a container having an open top and a perforated bottom and solid sides. When such a container is raised above the conveyor in the furnace, the top of the container is brought into engagement with a hood located in the upper part of the furnace. This hood has an opening in its top, through which the furnace atmosphere is drawn. Because the container engages the hood, most of the atmosphere will be drawn up through the container instead of short circuiting around it.

The preferred embodiment of the invention is illustrated in the accompanying drawing, in which

Fig. 1 is a central vertical section through my furnace;

Fig. 2 is a transverse section, half of it taken through the front of the furnace chamber and the other half taken just in front of the third roller from the back; and

Fig. 3 is a perspective view of a work container showing its perforated bottom.

Referring to the drawings, the furnace 1 can be of any conventional design and may be provided with a vertically movable door 2. Inside of the furnace there are suitable heating members, radiant tubes 3 being shown for that purpose. In order to convey work into and out of the furnace, a conveyor is provided which includes parallel rollers 4, a number of which are inside of the

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furnace. These rollers extend through the side walls of the furnace and have their ends journaled in bearings 6 secured to the outside of the furnace. The rollers may be driven from one end by sprockets 7 and an endless chain 8 from a reversible electric motor 9. The rollers are driven in one direction to carry work into the furnace and are reversed to carry the work out again. When the work pieces are small, they are carried in a container 11, as shown in Fig. 3, which preferably is rectangular and as large as possible for the size of the furnace. The container also is indicated in dotted lines in the other two figures. When the container enters the furnace, it moves back until it strikes a suitable stop 12. The position of the container lengthwise of the rollers is controlled by side guides 13.

It is a feature of this invention that during the heat treating operation the work is lifted from the conveyor so that the rollers can be driven continuously without scraping against the work or its container. Accordingly, elevating means of suitable heat-resistant material and preferably having the form of a tray 16 is located below the conveyor inside the furnace. This tray is mounted on the upper ends of a post or posts 17, which are slidably mounted in the bottom of the furnace. They extend below the furnace and are provided with rack teeth 18, which engage pinions 19 on a pair of horizontal shafts 20 journaled below the furnace. Each shaft also carries a gear 21 that meshes with a horizontal rack bar 22, the outer end of which is connected to any suitable means for moving the bar lengthwise. For example, a hand operated lever 23 may be pivotally attached to the bar. When the bar is moved lengthwise, it will cause the gears 21 to rotate the two shafts, and they in turn will rotate the pinions on the same shafts and thus cause the posts to rise or descend. Mounted on the elevating tray are refractory or alloy blocks 24 on edge, which extend up between the conveyor rollers but normally do not project above them. The blocks are spaced apart by other horizontal blocks 25, so the top of the tray is protected to a large extent by refractory material.

As soon as a work container has come to rest against the stop at the back of the furnace, the elevator is raised to bring the upright blocks 24 into engagement with the bottom of the container and to then lift the container completely off the conveyor. The container is held in this elevated position throughout the heat treating operation. During this period, the conveyor rollers continue to rotate free of any load on them, and therefore there is no danger of their sagging in the intense heat.

Another feature of this invention is that a downwardly opening hood 27 is mounted in the upper part of the furnace chamber and is provided with a central opening 28 in its top. Above this opening there is a fan wheel or exhauster 29, which draws the furnace atmosphere up through the hood and then blows it out and down around the hood. The hood is of such size and shape that when the work container 11 is lifted from the conveyor, the upper edge of the container will engage the lower edge of the hood, which preferably has an outwardly extending flange 30. Consequently, practically all of the furnace atmosphere that is drawn up through the hood by the blower must flow up through the perforated bottom of the work container, the sides of which generally are solid. This greatly improves the heat treating operation and reduces the time needed for proper treatment. After heat treatment has been completed, the elevator is lowered to deposit the work container on the conveyor rollers, which have been reversed in the meantime. The furnace door then is opened and the conveyor carries the container out of the furnace.

According to the provisions of the patent statutes, I

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have explained the principle of my invention and have illustrated and described what I now consider to represent its best embodiment. However, I desire to have it understood that, within the scope of the appended claim, the invention may be practiced otherwise than as specifically illustrated and described.

I claim:

In a heat treating furnace having a stationary bottom wall, a plurality of spaced conveyor rollers journaled in fixed position above said wall, means for driving the rollers to carry an open-top and perforated bottom work container into and out of the furnace, elevating means in the furnace below the rollers and spaced therefrom, heat resistant members supported by said elevating means between the rollers and normally below their tops, a post slidably mounted in the bottom wall of the furnace and supporting said elevating means, a hood in the upper part of the furnace above the conveyor and having an opening in its top and a depending side wall provided with a bottom flange, means for drawing furnace at-

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mosphere up through said opening, and means below the furnace operatively connected with the lower end of the post for raising it to cause said members to lift a work container from the rollers and hold its top up against said hood flange, whereby the rollers will be relieved of the weight of the work during heat treatment and most of said atmosphere drawn through the hood will have to pass up through the container.

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