Jan. 24, 1933. R. M. FENTON ET AL 1,895,072

CONTINUOUS FURNACE FOR METALLURGICAL PURPOSES

Original Filed Feb. 17, 1927 3 Sheets-Sheet 1

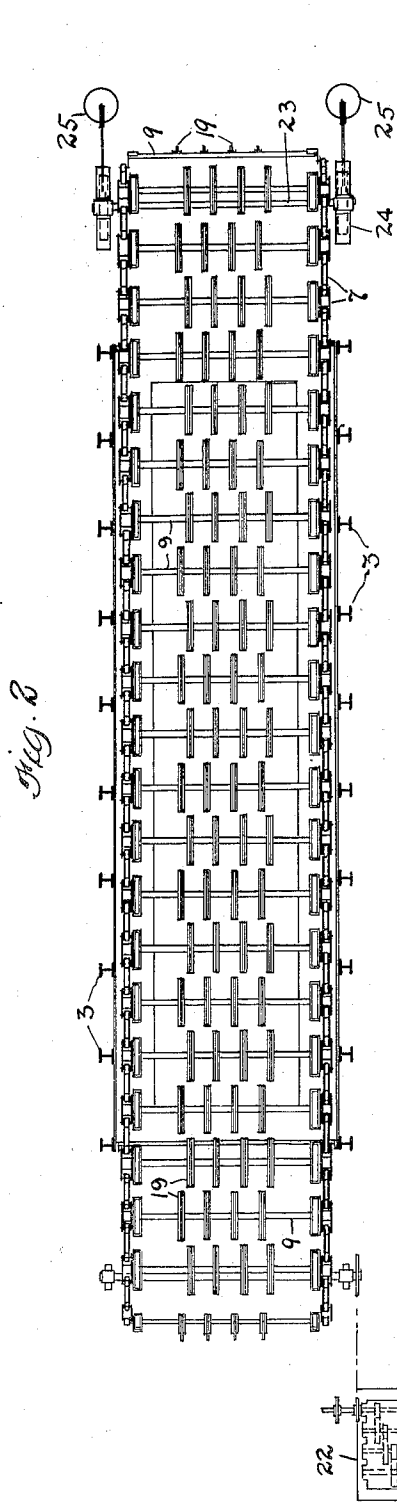

Fig. 2

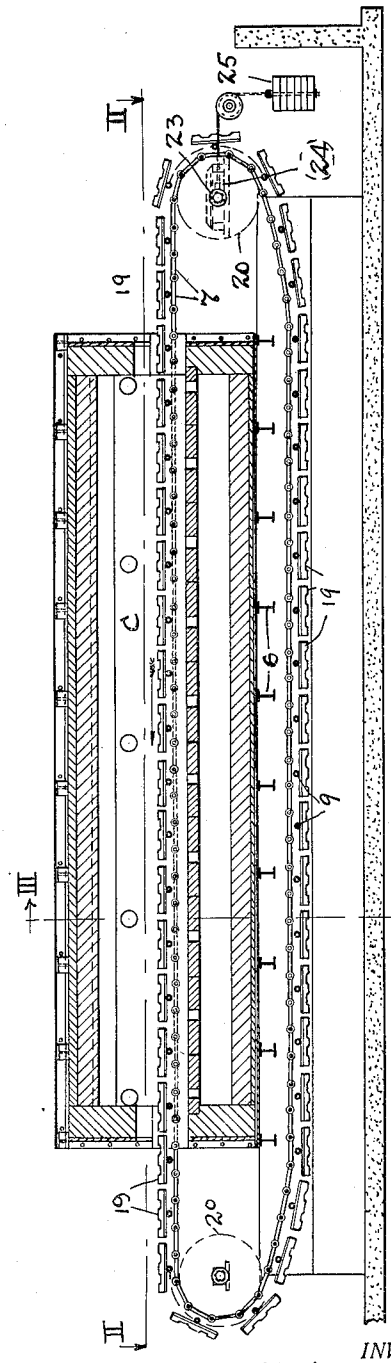

Fig. 1

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Original Filed Feb. 17, 1927 3 Sheets-Sheet 2

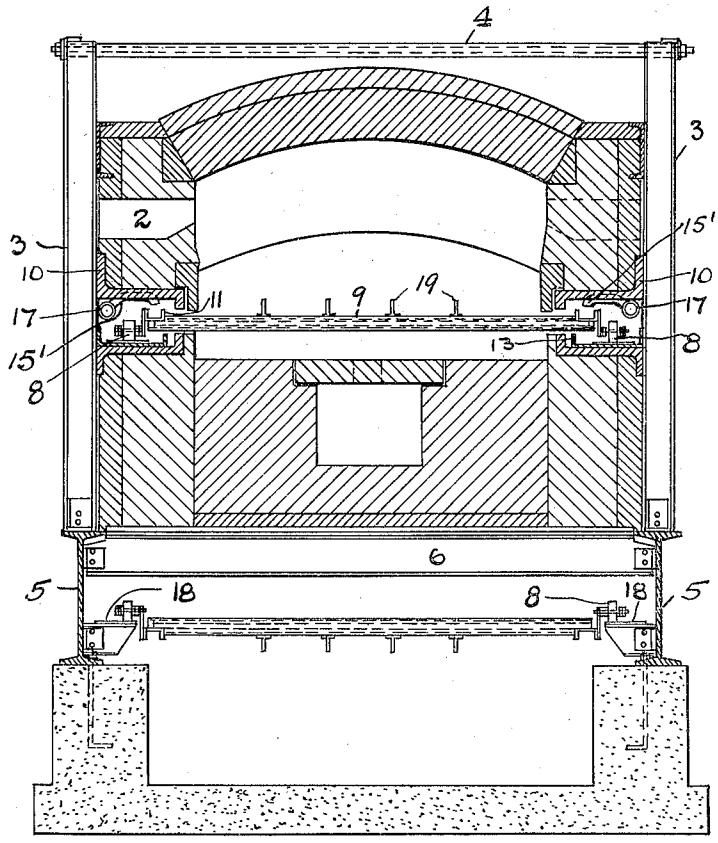

Fig. 3

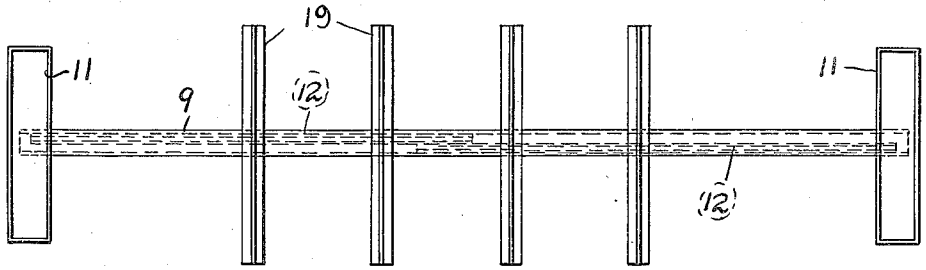

Fig. 4

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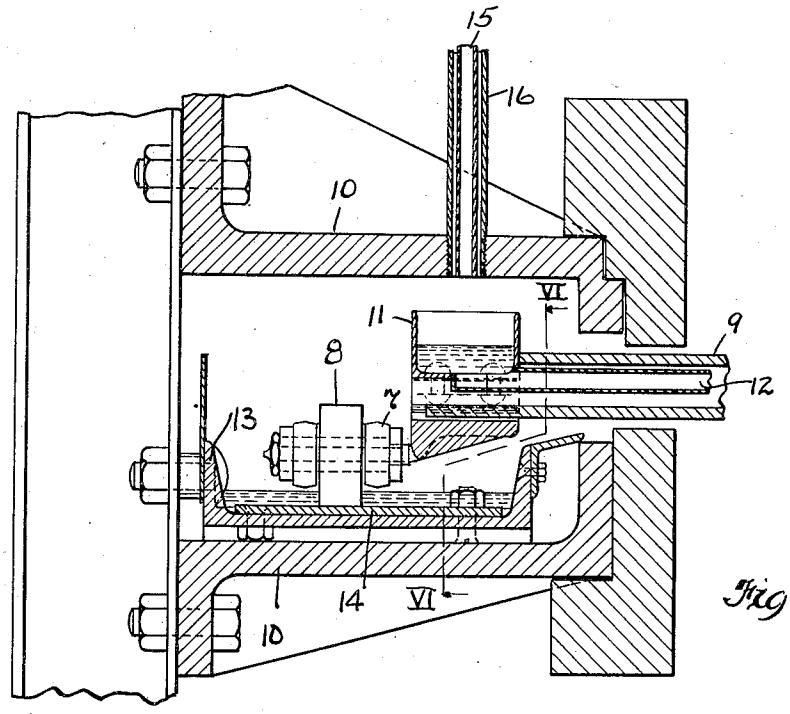

Fig. 5

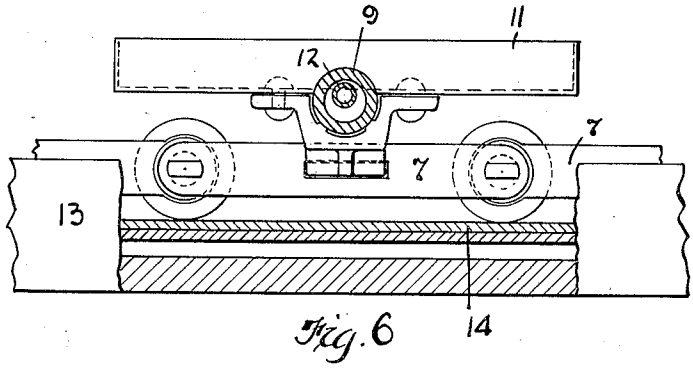

Fig. 6

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UNITED STATES PATENT OFFICE

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CONTINUOUS FURNACE FOR METALLURGICAL PURPOSES

Application filed February 17, 1927, Serial No. 168,924. Renewed December 3, 1931.

This invention relates to metallurgical furnaces, and more particularly furnaces of conveyor type; and it is among the objects of the invention to provide a construction promoting uniform treatment of material handled. Another object is the provision of a construction protective of the working parts of the apparatus. Other objects and advantages will appear as the description proceeds.

To the accomplishment of the foregoing and related ends, the invention, then, consists of the features hereinafter fully described, and particularly pointed out in the claims, the following description and the annexed drawings setting forth in detail certain mechanism embodying the invention, such mechanism constituting however but one of the various ways in which the principle of the invention may be employed.

In said annexed drawings:—

Fig. 1 is a longitudinal vertical sectional view of a construction embodying the invention; Fig. 2 is a plan view taken substantially as a section approximately on the line II—II, Fig. 1; Fig. 3 is a transverse vertical section taken on a plane indicated approximately by the line III—III, Fig. 1; Fig. 4 is a plan view of a detail; Fig. 5 is a detail sectional view; and Fig. 6 is a section taken on broken plane indicated approximately by line VI—VI, Fig. 5.

Referring more particularly to the drawings, the reference character C designates a furnace chamber, the precise detail of which may vary with particular requirements, but which ordinarily will comprise masonry construction with inlet ports 2 in the walls for the placement or burners where gas or oil firing is to be employed, and having I-beam framing 3 and ties 4, also reenforce binder channels and plates, as may be required.

By setting the structure on I-beam supports 5 with appropriate cross beams 6, a runway for the outside reach of the endless conveyor is conveniently had. The conveyor is made up preferably of connected links 7 with supporting rollers 8, and between corresponding links, hollow transverse members 9 extend, so that the rollers at the respective ends travel on trackways provided. The trackways are arranged to be shielded from the direct furnace heat, being in fact outside of the furnace chamber. For this, we enclose the trackways in the masonry or wall of the structure, and while in some instances with short members the trackways may be placed in the floor, ordinarily we prefer their location in the sides of the structure. Suitable plate beams 10 may be incorporated, to provide a passageway enclosed substantially against the furnace chamber, that is leaving sufficient clearance for the travelling conveyor members. The conveyor furthermore is provided with means whereby positive cooling also may be had. Preferably this embodies a water supply system, such that water may be furnished to hollow elements of the conveyor, and yet permit travel of the same. An advantageous construction for this purpose comprises tubular transverse members 9 having at the end a receiving cup 11. It is better to arrange an additional inside tube 12 which may be connected to the cup 11 to carry the water to a point of discharge in the hollow member 9, and thence drainage is had from the latter out the end thereof and into the trough 13. By providing cups 11 and inside tubes at both ends, the inside tubes extending slightly past the center, as shown more in detail in Fig. 4, a highly dependable cooling system is had. That is, the duplex feed, from both ends, instead of from one end only, offers additional safeguards as well as greater uniformity in cooling effect. While the trough 13 may be narrow such as to exclude the rollers 8, we prefer to make the trough of width sufficient to include the roller run also and thereby provide additional safety therefor. The rollers may thus travel with their treads upon a plate rail 14 in the trough. Water supply for the feed cups may be had by branch pipes 15 which may be spaced within shield tube 16, or feed main-pipes 17 may be carried along the outer side of the channelways, and have short branches 15′ over the cups. It will be seen that the cups 11 in end to end succession present a continuous receiver for the water as discharged from the feed pipes, each cup distributing to its own tube.

The outside run of the conveyor travels on trackways 18 secured to the foundation beams or support. Air cooling is thus had externally as well as water cooling inside the furnace. Warpage and misalignment and premature destruction of running parts is thus safeguarded against.

On the conveyor, article-supports are carried, these supports being of relatively thin section, and presenting a minimum of contact with the articles carried. Preferably these supports may be in the form of thin plates 19, best of heat resistant alloy, and notched or shaped to present multipoint contact, and desirably extending longitudinally of the path of travel of the conveyor. The supports may be secured directly to the transverse members 9, sufficient clearance being afforded at the ends to allow of such movement relative to each other as may be incurred in the travel. The conveyor as a whole runs over the sprockets 20 located at the ends outside the furnace. One of these may be driven as by motor 21 with a reduction gear 22, variable or not as preferred. The sprockets at the other end may be mounted on a floating or adjustable mounting including the shaft 23, slide boxes 24 and a weight take-up 25.

Other modes of applying the principle of the invention may be employed, change being made as regards the details disclosed, provided the means stated in any of the following claims, or the equivalent of such, be employed.

We therefore particularly point out and distinctly claim as our invention:—

1. In apparatus of the character described, the combination of a furnace chamber, a travelling conveyor therein having hollow transverse members, receiving cups at the end of said members, and means for feeding water to said cups.

2. In apparatus of the character described, the combination of a furnace chamber, a travelling conveyor therein having hollow transverse members, receiving cups at the ends of said members, an inner tube extending from each cup into the corresponding hollow transverse member, and a drain trough for receiving the discharge from the transverse members.

3. In apparatus of the character described, the combination of a furnace chamber, a travelling conveyor therein having rollers and hollow transverse members, receiving cups at the end of said members, a drain trough for receiving the discharge from the transverse members, and a plate-rail in said trough for the rollers.

4. In apparatus of the character described, the combination of a furnace chamber, a travelling conveyor therein having rollers and hollow transverse members, receiving cups at the end of said members, an inner tube extending from each cup into the corresponding hollow transverse member, a drain trough for receiving the discharge from the transverse members, and a plate-rail in said trough for said rollers.

5. In apparatus of the character described, the combination of a furnace chamber, a travelling conveyor including links and rollers, hollow transverse members between corresponding links, receiving cups at the end of said members, a drain trough for receiving the discharge from the transverse members, and a plate-rail in said trough for the said rollers.

6. In apparatus of the character described, the combination of a furnace chamber, a travelling conveyor including links and rollers, hollow transverse members between corresponding links, receiving cups at the end of said members, an inner tube extending from each cup into the corresponding hollow transverse member, a drain trough for receiving the discharge from the transverse members, and a plate-rail in said trough for the said rollers.

7. The combination with a furnace; of a conveyor adapted to travel through said furnace, said conveyor comprising a plurality of travelling members extending transversely of said furnace; and means for cooling said members internally, and individually, said means being operable at any point during said travel.

8. The combination with a furnace; of a conveyor adapted to travel through said furnace, said conveyor comprising a plurality of travelling members extending transversely of said furnace; and means extending internally for cooling said members individually, said means being operable at any point during said travel.

9. The combination with a furnace; of a conveyor adapted to travel through said furnace, said conveyor comprising a plurality of travelling members extending transversely of said furnace; and means for circulating a cooling medium through said members individually while in motion, said means being operable at any point during said travel.

10. The combination with a furnace; of a conveyor adapted to travel through said furnace, said conveyor comprising a plurality of hollow travelling members extending transversely of said furnace; and means for circulating a cooling fluid through said members individually while in motion, said means being operable at any point during said travel.

11. The combination with a furnace; of a conveyor adapted to travel longitudinally of said furnace, said conveyor comprising a plurality of hollow members adapted to move longitudinally of said furnace, and means for introducing a cooling fluid into said members while individually in motion, in said furnace,

said means being operable at any point during said travel.

12. The combination with a furnace, of a conveyor comprising spaced means on opposite sides of said furnace for moving hollow conveyor members therethrough, and means for introducing a cooling fluid into said members individually while in motion, said means being operable at any point during said travel.

13. The combination with a furnace, of endless conveyor chains on opposite sides of said furnace, hollow conveyor members extending transversely of said chains and connected thereto, and means for circulating a cooling fluid through said hollow members while in motion, said means being operable at any point during said travel.

Signed by us this 14th day of February, 1927.

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