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W. A. BLOCKINGER

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METAL SHEET FURNACE

Filed April 6, 1929

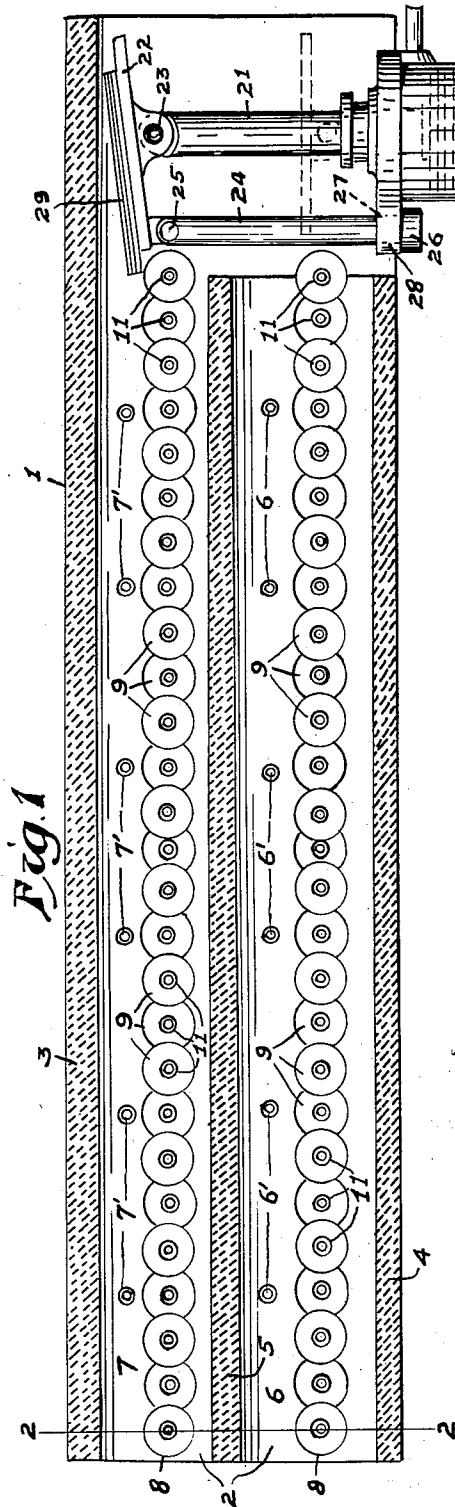


Fig. 3

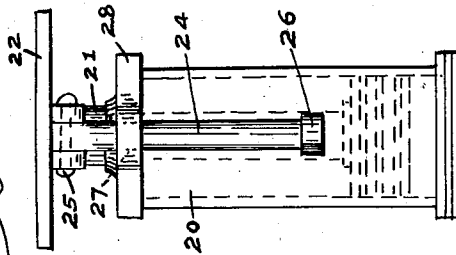
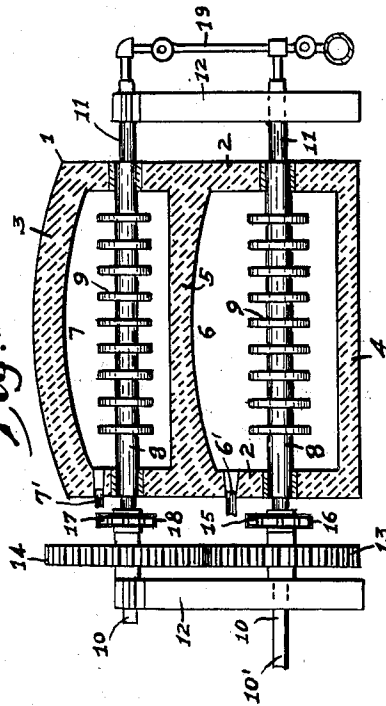


Fig. 2



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METAL-SHEET FURNACE

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My invention relates to certain new and useful improvements in sheet-furnaces of the type employed in rolling mills in the manufacture of tin plate and other sheet metal products.

Important objects of the invention are to provide a sheet furnace of the character described in the manner hereinafter referred to, which embodies a pair of furnace chambers in a unitary furnace structure, which is continuous and automatic in its operation, which conserves space and facilitates and expedites the manufacture of metal sheets, and which diminishes the labor ordinarily concomitant with the sheet manufacture.

Further objects of the invention are to provide a device of the class stated which is simple in its construction and arrangement, durable and efficient in its use, compact, and economical in its construction, installation and operation.

To the accomplishment of these and such other objects as may hereinafter appear, the invention consists of the novel construction, combination and arrangement of parts herein specifically described and illustrated in the accompanying drawing, but it is to be understood that the latter is merely illustrative of an embodiment of the invention, and that various changes in the form, proportions and details of construction may be resorted to which come within the scope of the claim hereunto appended.

In the drawing wherein like numerals of reference designate corresponding parts throughout the several views:—

Figure 1 is a longitudinally vertical, cross sectional view of a continuous sheet furnace, constructed in accordance with the invention.

Figure 2 is a sectional view on line 2—2, Figure 1.

Figure 3 is a side view of the sheet elevating element in its lowered position.

Referring in detail to the drawing 1 denotes an elongated furnace structure, which is constructed from refractory material of the kind usually employed in the art in analogous structures.

The furnace structure 1 comprises a pair

of side walls 2, a top 3, a base or bottom 4 and a partition 5. The partition 5 is disposed horizontally and divides the interior of the furnace structure 1 into a lower heating chamber 6 and an upper heating chamber 7, the latter being disposed directly over the former. The partition 5 constitutes a top or ceiling for the lower heating chamber 6 and a floor or bottom for the upper heating chamber 7. The lower heating chamber 6 and the upper heating chamber 7 are similar to each other and extend in parallel relation throughout the length of the furnace structure 1. The lower and upper chambers 6 and 7 are heated in the usual manner, by a plurality of burner elements, respectively indicated at 6' and 7'.

Sheet conveying apparatus 8, is mounted in the lower heating chamber 6 and in the upper heating chamber 7. Each conveying apparatus 8 comprises a plurality of horizontally disposed closely positioned, conveyor members 9 of the type now in common use.

The conveyor members 9 extend transversely through respective lower and upper heating chambers 6 and 7. Each conveying member 9 is provided with a pair of bearing shafts, respectively indicated at 10 and 11, which project through respective side walls 2 and are suitably journaled for rotation in the bearing supports 12. The latter are fixed in proper position along respective sides of the furnace structure 1.

The bearing shaft 10, preferably of the most forwardly disposed conveyor member 9 in the lower heating chamber 6, is formed with an extension 10', which is adapted for connection with any suitable drive mechanism for simultaneously operating the whole conveying apparatus 8, in the manner to be described.

The bearing shafts 10, of the most forwardly disposed conveyor members 9 in the lower and upper heating chambers 6 and 7, are provided with fixed, meshing transmission gears, respectively indicated at 13 and 14, the gear 13 driving the other gear 14.

The bearing shafts 10, of the conveyor members 9 mounted in the lower heating chamber 6, carry similar fixed sprocket wheels 15, which are all longitudinally aligned and en-

gaged by a continuous driving chain 16 for imparting simultaneous rotation, in the same direction, to all of the conveyor members 9 in the lower heating chamber 6. In like manner, the bearing shaft 10, of the conveyor members 9 mounted in the upper chamber 7, carry similar, fixed sprocket wheels 17, which are all longitudinally aligned and engaged by a continuous driving chain 18 for imparting simultaneous rotation, in the same direction, to all of the conveyor members 9 in the upper heating chamber 7.

The conveying apparatus 8, mounted in the lower heating chamber 6, is operated in the direction to convey the sheets thereon from the front to the rear of the latter. As the transmission gear 13 meshes directly with and drives the other transmission gear 14, the conveying apparatus 8, associated with the latter and mounted in the upper heating chamber 7, is operated in the other direction to convey the sheets thereon from the rear to the front of said upper heating chamber 7.

Each of the conveyor members 9 is formed with a suitable passage cavity and connects with a water supply system, as indicated at 19, for maintaining the said conveyor members 9 properly cooled during the sheet heating operations in a manner now common in the art to which the invention appertains.

To transfer the metal sheets from the lower heating chamber 6 to the upper heating chamber 7, a hydraulically operated sheet elevator 20 is arranged at the rear end of the furnace structure 1. The elevator 20 includes a vertically operating plunger 21, which carries a table 22 pivotally connected, as at 23, to the upper end thereof. A tilting rod 24 is pivotally connected as at 25, to the under side of the table 22 adjacent to the forward end of the latter. The tilting rod 24 extends vertically and is provided with a head 26 at its lower end. The rod 24 is slidably shiftable in an aperture 27, provided therefor in the top structure 28, of the elevator 20.

When the table 22 is in its lower position, as indicated in dash lines in Figure 1, the plane of the top thereof is preferably disposed slightly below the top of the conveying apparatus 8, which is mounted in the lower heating chamber 6. The position of the table 22, when in the lowered position, is such, that the operation of the conveying apparatus 8 in the lower heating chamber 6 will deposit the metal sheets, being conveyed thereon, directly upon the top of the table 22.

The operation of the elevator 20 will elevate the table 22 to a height above the top of the conveying apparatus 8 in the upper heating chamber 7. During such elevating operation, the rod 24 will slide idly in its aperture 27 until the head 26 of the former engages the top structure 28, of the elevator 20.

The vertical distance of travel permitted the rod 24 is somewhat less than the distance

of travel of the plunger 21, and in consequence the limited travel of the rod 24 will cause the forward tilting of the table 22 in a manner to allow the metal sheets 29 thereon to slide forwardly by gravity onto the conveying apparatus 8, in the upper heating chamber 7, to be conveyed forwardly in the latter.

In practice, the metal sheets to be heated are positioned on the conveying apparatus 8 through the front entrance of the lower heating chamber 6. The operation of the said conveying apparatus will cause the travel of the sheets in the rearward direction, through the lower heating chamber 6, and deposit the sheets on the top of the elevator table 22. The operation of the elevator 20 will elevate the table 22, and the automatic operation of the rod 24 will tilt the latter to deposit the sheets upon the conveying apparatus 8 in the upper heating chamber 7, through the rear entrance of the latter. The operation of the conveying apparatus 8 will then cause the travel of the sheets forwardly through the upper heating chamber 7.

It will, of course, be obvious that the operation of the elevator 20, to transfer the sheets from one heating chamber to the other in the manner stated, may be entirely automatic, and regulated and controlled by suitable mechanisms to meet conditions found in practice.

What I claim is:

In combination, a metal sheet heating furnace including an upper heating chamber, and a lower heating chamber, a sheet conveying apparatus mounted in said lower heating chamber and adapted for conveying the sheets rearwardly in the latter, a sheet conveying apparatus mounted in said upper heating chamber and adapted for conveying the sheets forwardly in the latter, an elevating element disposed at the rear of said heating chambers, a table for supporting the sheets being pivotally mounted on the top of said elevating element and adapted for receiving the sheets from said lower heating chamber while in its lowered position, a vertically disposed tilting rod slidably extending through the top of said elevating element and being pivotally connected to the forward end of said table, and a head being carried at the lower end of said tilting rod and engaging the top of said elevating element for limiting the upward movement of said tilting rod for tilting the said table forwardly to deposit the sheets in said upper heating chamber when said table is in its elevated position.

In testimony whereof I affix my signature.
WILLIAM A. BLOCKINGER.