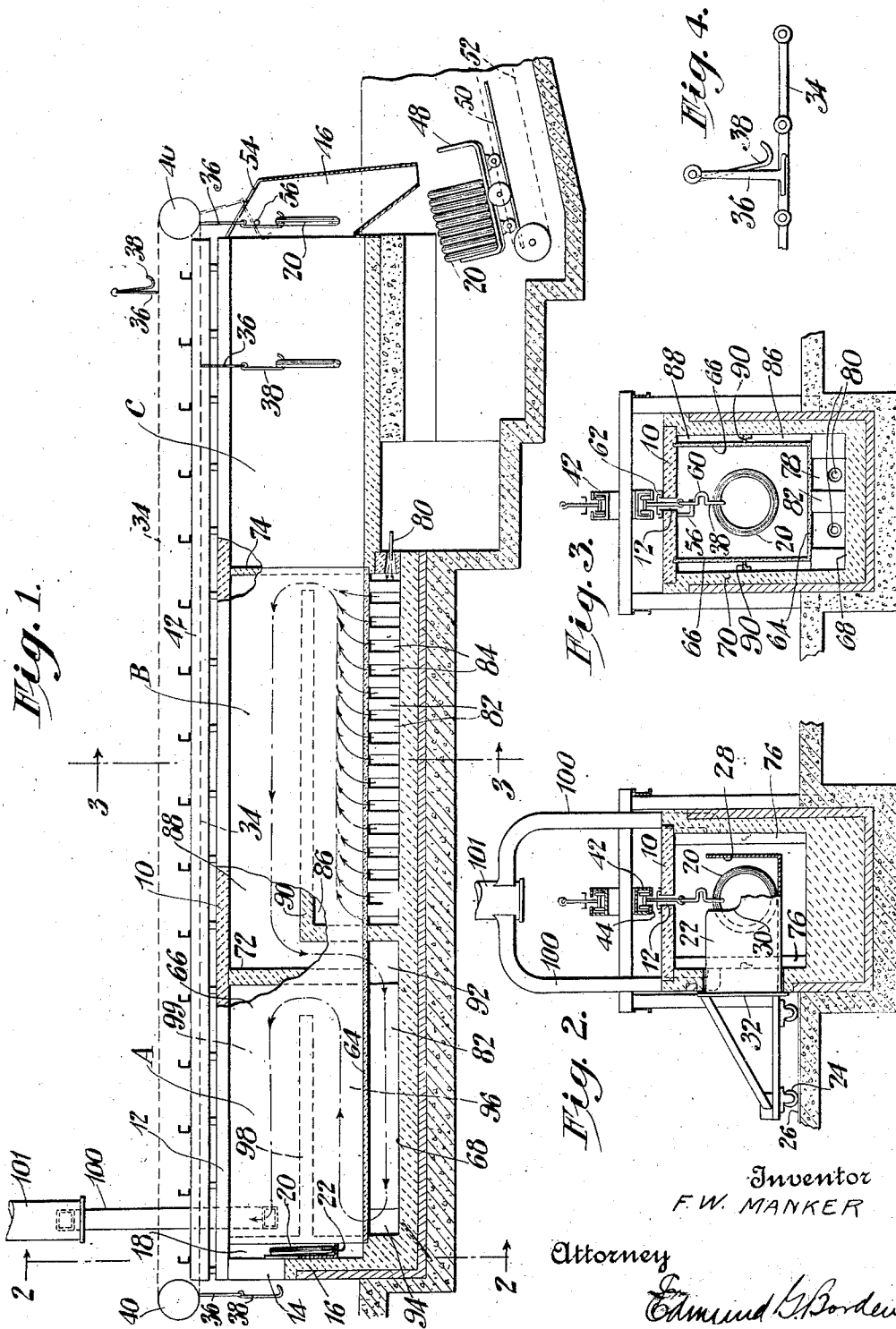


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WIRE ANNEALING FURNACE

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WIRE-ANNEALING FURNACE.

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This invention relates to improvements in annealing furnaces and more particularly to furnaces adapted for the annealing of wire.

It is an object of the invention to provide a furnace which will permit bundles of wire to be continuously progressed through the furnace and which shall be so heated that an even and uniform heat may be imparted to the wire in its course through the furnace.

Another object of the invention is to provide a simple and efficient conveyer system for carrying the work or wire through the furnace, the conveyer system being so arranged that the major portions thereof shall be located on the exterior of the furnace whereby to reduce to a minimum the wastage of furnace heat in heating the conveyer mechanism.

Another object of the invention is to provide an annealing furnace which shall be provided with preheating, heating and cooling chambers the floor and side walls of the preheating and heating chambers being spaced from the corresponding floor and walls of the furnace structure and the spaces between the walls being provided with passes through which the products of combustion generated in the combustion chamber below the floor of the heating chamber may flow on their way to the stack, the arrangement being such that the maximum amount of heat is extracted from the hot gases as they flow from the combustion chamber on their way to the stack.

The above and other objects of the invention will more fully appear from the detailed description taken in connection with the accompanying drawing forming part of this specification.

Referring to the drawings

Fig. 1 is a longitudinal vertical section through the improved annealing furnace, parts being broken away to more fully illustrate the construction, the construction of the conveyer system being shown more or less diagrammatically.

Fig. 2 is a vertical transverse section taken on line 2—2 of Fig. 1 and showing among other things, the manner of inserting the coils of wire into the furnace, a portion of the carriage wall on which the wire is adapted to be supported being broken away for clarity of illustration.

Fig. 3 is a vertical transverse section

taken on line 3—3 of Fig. 1 and showing the manner in which a coil of wire is carried through the furnace.

Fig. 4 is a fragmentary side elevation of a portion of the endless conveyer and the position assumed by the coil carrier as it travels along the top of the furnace prior to being brought into position for passage through the furnace.

In the drawings the annealing furnace is shown as comprising three sections or chambers, namely, a preheating section A, a heating section B and a cooling section C. The roof 10 of the furnace is shown as provided with a longitudinally extending slot 12 running the entire length of the furnace, this slot being aligned with a vertically extending slot 14 in the end wall 16 at the entrance end of the furnace. The entry of work into the furnace is effected through an upright passage 18 in one of the side walls of the furnace adjacent the end wall 16. The work to be annealed, shown as in the form of wire coils 20, is entered into the furnace on a carriage 22 which is preferably constructed with wheels 24 adapted to run on laterally extending tracks 26. The work-supporting part of the carriage is preferably L-shaped in cross section (see Fig. 1) the coil of wire 20 being disposed thereon in an upright leaning position. In order to prevent the coil from rolling off from the platform of the carriage, a suitable upright abutment 28 may be provided thereon. The back plate of the carriage against which the coil is adapted to lean is provided with a cut-out or slot 30 extending downwardly from its upper edge to permit the carriers to pass therethrough and pick up the coils as will presently appear. The carriage may be provided with a peripheral flange 32 to limit the entrance of the carriage into the furnace and to form a seal around the passage 18 in the side-wall through which the carriage enters the furnace.

The means for picking up the coil of wire 20 on its carriage and transporting it through the furnace will now be explained. The transporting means preferably comprises an endless conveyer 34 of any approved construction as, for example, the form illustrated in Fig. 4, this conveyer being provided with transversely extending arms 36 to which are pivoted hooked carriers 38, the conveyer passing over pulleys 40 arranged at the ex-

treme ends of the furnace. Both the upper and lower runs of the endless conveyer are preferably arranged to run in tracks 42 as clearly indicated in Figs. 2 and 3, the upper run of the track being omitted in Fig. 1. The lower run of the track 42 is preferably so constructed as to provide inwardly turned flanges 44 on which the endless carrier may be supported in any approved manner as by means of rollers shown more or less diagrammatically in Figs. 2 and 3. Any suitable means may be employed for imparting movement to the conveyer.

As shown in the drawings the conveyer arms 36 are of a length to extend through the slot 12 in the roof of the furnace and the hooked carriers 38 are of a length to extend below the upper loop of the coils of wire whereby to pick off the coils from the wire supporting carriage 22, it being understood that the carriers 38 pass through the slot 30 in the wall of the carirage and also that they just pass through the slot 14 in the end wall 16 of the preheating chamber A. After the coil has been picked up by a carrier it is moved slowly through the furnace first through the preheating chamber A and then through the heating chamber B and finally through the cooling section or chamber C as will be readily understood. After the coils have been transported through the furnace as indicated they are dislodged from their carriers in any suitable manner and allowed to descend through a chute 46 for deposit on a truck 48 supported on an inclined track 50 below the chute. The truck 48 is controlled as by an endless chain 52 in such a manner that it may be appropriately positioned below the chute 46 to receive the coils of wire passing therefrom and to permit the truck to be removed when the same has been filled. The discharge end of the chute is preferably positioned below the level of the floor of the cooling chamber so as to constitute an air still against the entry of cold air.

The top of the chute is provided with a slot 54 to permit the passage of the conveyer arms 36 and the carriers 38 therethrough after the coil has been dislodged from the carrier. The means for dislodging the coils of wire from their carriers has been shown as comprising an L-shaped arm or trip 56 secured in a fixed position in the path of the carriers 38 in a manner to permit each carrier to wipe the trip and swing into the position shown in dotted lines in Fig. 1 with the result that the coil of wire on the carrier is dislodged from the hooked end thereof. In order to enable the carrier to pass the trip 56 after engagement therewith the carrier is provided with a lateral U-shaped bend 60, the laterally extending portion of the trip passing through the bend when the carrier has swung back the required distance as will be readily understood.

In order to minimize the escape of hot gases from the furnace through the slot in the roof thereof any suitable type of seal as generally indicated at 62 may be provided. As shown this seal comprises U-shaped channels on each side of the slot and an inverted U-shaped channel movable with the endless carrier, the side flanges of the inverted channel being adapted to extend into the channels on either side of the slot as will be readily understood.

The furnace proper is preferably of a construction now to be described. The floor of both the preheating and heating chambers A and B respectively is preferably of relatively thin refractory, such as carborundum, this floor being indicated by numeral 64. The side walls 66 of said chambers are preferably also formed of relatively thin carborundum. Floor 64 is arranged in spaced relation with respect to the bottom or floor 68 of the furnace construction and the side walls 66 are also arranged in spaced relation with respect to the corresponding side wall 70 of the furnace. An upright partition wall 72 between the chamber walls 66 and the furnace walls 70 separates the two chambers A and B from one another. The cooling chamber C is separated from the heating chamber A by means of a suitable partition 74. A suitable closure 76 at the entrance end of the preheating chamber closes off the space between the chamber and furnace walls from the interior of the furnace.

The space below the floor of the heating chamber constitutes the combustion chamber; this combustion chamber being generally indicated at 78 (Fig. 3). This combustion chamber is arranged and adapted for the burning of liquid fuel preferably gas, the fuel being entered into the combustion chamber by suitable conduits 80 shown in Fig. 1. The floors of both the chambers A and B are preferably supported on longitudinally extending piers 82, these piers in the combustion chamber being provided with a plurality of lateral passages 84 through which the products of combustion may pass upwardly between the chamber and furnace walls. The space between these walls is formed into lower and upper communicating passes 86 and 88 respectively by means of a longitudinally extending body 90. The products of combustion formed in the combustion chamber pass through the lateral passages 84 and into the lower pass 86 and flow toward the discharge end of the chamber B as indicated by arrows in Fig. 1 and from thence flow through the communicating passage at the end of the body 90 and back toward the entrance end of the chamber from whence they flow downwardly under the foot of the partition wall 72 by way of a passage 92 and thence flow forwardly between the longitudinally extending piers 82 under the floor of

the chamber A. Traversing the length of the floor space beneath the chamber A they pass therefrom through lateral passages 94 and flow upwardly and rearwardly into a pass 96 formed by a longitudinally extending body 98 arranged between the side walls of the chamber and the furnace construction. The gases then flow through a passage which communicates with an upper pass 99 and flow forwardly and out to the atmosphere through passages 100 which communicate with the last named pass. These passages 100 lead into a stack 101 as shown diagrammatically in Figs. 1 and 2.

It will now be seen that the products of combustion generated in the combustion chamber below the floor of the heating chamber B pass through the lateral ports 84 formed in the piers below the floor, thence into a lower pass 86 in which they flow rearwardly, and after negotiating this pass they flow forwardly along the upper pass and then downwardly into the space below the floor of the heating chamber A from which after having traversed the length of the floor space they pass upwardly into a lower pass 96 and flow rearwardly after which they flow upwardly and then forwardly from an upper pass 99 and finally out to the atmosphere or stack from the passages 100.

This manner of conducting the gases from the furnace permits the extraction of the maximum amount of heat from the gases and by reason of the fact that the walls and the floor of the heating chambers are made of relatively thin material, the heat absorbed from the gases by the walls and floors gives a uniform annealing temperature in the furnace.

The cooling chamber C as previously indicated is cut off from the flow of the combustion products by the partition wall 74. By reason of the fact that both ends of the annealing furnace are effectually sealed there is no tendency for convection currents to be set up within the furnace and consequently no heat will be carried to the cooling chamber, it being remembered that the chute 46 has its discharge end below the level of the floor in the cooling chamber thus providing an air seal. While no independent means are shown for effecting the reduction of temperature in the cooling chamber it is within the spirit of the invention to provide any suitable means for this purpose.

It will be further appreciated that the conveyer system is relatively simple and that very little heat will be absorbed by such parts of the conveyer system as extend into the furnace. This arrangement is therefore conducive to material saving of heat.

While the invention has been described with considerable particularity of detail it is to be distinctly understood that no limits

are intended except as may be defined by the appended claims.

What is claimed is:

1. In combination, a furnace provided with a lateral passage at one end thereof, a work holder adapted to extend into the furnace through said passage, carriers extending from below the roof of the furnace, means for moving said carriers through the furnace, and means on said carriers adapted to pick up the work supported by said work holder.

2. In combination, a furnace, carriers extending from below the roof of the furnace and movable therethrough from one end to the other, work-supporting means at one end of the furnace adapted to support the work in the path of the moving carriers, means on said carriers for picking up the work disposed in the path thereof, and a chute at the discharge end of the furnace through which the work may pass out of the furnace, said chute having its discharge end below the level of the furnace floor.

3. An annealing furnace having an end wall shutting off direct access thereto and provided with a vertical slot in its upper portion, the roof of the furnace being provided with a slot alined with that in said wall, an upright work-entering passage in the furnace side, an endless conveyer disposed above the furnace roof, and carriers depending from the conveyer and adapted to enter the furnace through said slots and pick up the work introduced into the furnace through the work-entering passage.

4. The combination with a furnace provided with an overhead conveyer adapted to convey wire coils in suspended position through the furnace, of means for loading the coils on the conveyer comprising coil-carrying means movable through the side of the furnace and disposable in coil-transferring relation to the conveyer.

5. The combination with a furnace provided with an overhead conveyer adapted to convey wire coils in suspended position through the furnace, of means for loading the coils on the conveyer comprising coil-carrying means movable laterally with respect to the conveyer and disposable in coil-transferring relation to the conveyer.

6. The combination with a furnace provided with an overhead conveyer adapted to convey wire coils in suspended position through the furnace, of means for loading the coils on the conveyer comprising coil-carrying means projectable into the furnace through a side wall thereof and disposable in coil-transferring relation to the conveyer.

7. The combination with a furnace provided with an overhead conveyer adapted to convey wire coils in suspended position through the furnace, of means for loading

the coils on the conveyer comprising coil-carrying means, projectable toward the conveyer from a coil-receiving position and disposable in coil-transferring relation to the conveyer.

8. In a furnace for annealing wire in coils, the combination with an endless conveyer operable through the furnace roof and on which conveyer the coils may be individually suspended while being carried through the furnace, of a restricted passage-

way at the front of the furnace for the passage of the conveyer elements which enter the furnace, the front end of the furnace being otherwise substantially closed from the bottom upwardly, and an upright-charging passage in the side of the furnace through which the coils may be entered for suspension on the conveyer.

In testimony whereof I affix my signature.

FORREST W. MANKER.