The invention relates to work conveyors for use in heat treating furnaces and of that type which is commonly designated as walking-beam. Such construction includes parallelly arranged stationary rails extending longitudinally through the furnace chamber and one or more movable rails for periodically lifting the work from the stationary rails and advancing it a step. The movable rails are then depressed to reposition the work on the stationary rails and while thus depressed are returned to the original position ready for advancing the work another step in a succeeding cycle. Conveyors of this type are particularly adapted for use with work pieces having a long dimension which extends transversely across the spaced rails. Such work pieces, as for instance shafts or axles, are advanced step by step through the entire length of the furnace chamber and at a rate which gives the desired length of time for heat treatment before removal from the furnace. However, a difficulty encountered is that the individual work pieces may shift slightly transversely of the rails during this step by step movement. This may result in contacting one end with some obstruction, such as a side wall of the furnace, which would disarrange the whole series.

It is the object of the instant invention to prevent this creeping or misalignment of work pieces in the series and the invention consists in the construction for such purpose as hereinafter described.

In the drawings:
Figure 1 is a plan view of a work conveyor of the walking-beam type as arranged within a furnace chamber;
Figure 2 is a vertical longitudinal section through the furnace showing the conveyor and its operating mechanism in elevation;
Figure 3 is a cross-section through the furnace;
Figures 4, 5 and 6 are diagrammatic views illustrating the operation of the means for aligning the work on the conveyor.
Figure 7 is a side elevation of the mechanism at the left of Figure 3.

A is a furnace having a hearth portion A', side walls A2 and arched top A3 enclosing a furnace chamber. Within this chamber is a conveyor of the walking-beam type comprising spaced stationary rails B and B' extending the entire length of the furnace chamber and movable rails C and C' spaced to be on opposite sides of the rails B and B'. The rails C and C' are supported and actuated by mechanism including a series of supporting cross members D and hangers E and E' connected to opposite ends of these cross members and extending upward through apertures F in the arched top of said furnace to be connected with mechanism thereabove. This mechanism includes a series of rock shafts G, one for each pair of hangers and having laterally extending rock arms G' pivotally attached to the upper ends thereof. Each rock shaft is further provided with a pair of upwardly extending actuating rock arms G2 which are pivotally attached to a common actuating member extending longitudinally the entire length of the furnace. This member HH is composed of a plurality of short sections or links H2 pivotally attached to each other. At one end the member H' is connected by eccentric J5 with a rock arm I on a rock shaft J' which is actuated by mechanism to be later described. The movable rails C, C' are also connected at one end by links J with a reciprocating rod J' extending through the end wall of the furnace and connected to mechanism for actuating the same. The construction as thus far described is such that the operation of the rock shaft J' will impart simultaneous vertical movement to all of the hangers E and E', cross members D and rails C, C', while the rods J' through their actuating mechanism will impart longitudinal reciprocation to said rails C, C' in either the raised or lowered positions thereof. The normal position of the rails C and C' is in a plane lower than that of the rails B and B' and the cycle of operation includes, first, the raising of all of the hangers to lift the rails C, C' above the rails B, B', lifting off any work supported on the latter; second, a longitudinal movement of the rails while in raised position; third, a lowering of the hangers to depress the rails C, C' below the plane of the rails B, B'; and fourth, a return longitudinal movement to their original position, which completes the cycle. It will also be understood that any work supported on the rails B, B' and extending transversely thereof will be periodically lifted therefrom by the rails C, C', advanced a step and then redeposited on the rails B, B' so that the work will be progressively advanced step by step the entire length of the furnace chamber.

For operating the rock shaft J' and the rod J' in properly timed relation to each other there is provided a mechanism J2 which includes an eccentric J5 connected by a rod J6 to a rock arm I2 on the rock shaft I'. There is also an eccentric J6 connected by a rod J6 to the rock J'. While I have described a single set of rails B, B' and C,
C', a plurality of sets may be arranged within the furnace chamber and as shown in Figure 4 there are four of these.

The mechanism above described is similar to constructions heretofore used and forms no part of the instant invention, excepting as herein after further described.

In the operation of the above mechanism there is danger of the work pieces becoming misaligned during their step by step advancement along the stationary rails B and B'. I have therefore provided means for periodically imparting endwise movement to said work pieces, which shifts the position thereof with respect to the rails on which they are supported. Such operation is effected by providing upwardly extending flanges or rails K and K' which are secured to the moveable rails C, C' and extend upwardly to be above the plane of the stationary rails B and B'. Certain of said cross members D are provided with a downwardly extending flange L at one end thereof which vertically slidable engages a slot M in a head M' of a rod M', which latter extends outward through a side wall of the furnace. The rods M' are periodically reciprocated axially thereof by mechanism later to be described so as to impart a similar reciprocation to the cross members D. As this movement is relative to the stationary rails B and B' it is obvious that any work pieces extending transversely of said rails will be moved endwise thereon by contact with the flanges K or K'. One of these flanges shifts the work in one direction transversely of the rails while the other correspondingly shifts the work in the opposite direction. The normal clearance between the ends of the work pieces and the flanges K and K' is such that when centrally arranged on the rails they will clear such flanges. However, during the reciprocation of the members D any previous shifting of the work pieces in either direction with respect to the rails will project the same into the path of one or other of the members K, K' which will return the work to a central position.

Any suitable mechanism may be employed for periodically actuating the rods M' to effect the centralization of the work upon the rails, but as shown the construction is as follows:

Outside the furnace on the side through which the rods M' extend, there is mounted a motor N. This drives a pinion N' which is in mesh with a gear wheel N". the latter being sleeved upon a shaft N' but not directly coupled thereto. O is a clutch, one member O' of which is secured to the gear wheel N", while the cooperating member O" is splined to the shaft N'. The members O' and O" are normally disconnected but may be periodically moved into engagement by the operation of an electromagnetic mechanism P (not shown in detail) to couple the shaft N' to the gear wheel N". Upon the shaft N' is an eccentric Q having a rod Q" connected to a rock arm R on a rock shaft R', which latter extends longitudinally of the furnace and is mounted on a suitable framework E. The rock shaft R' is connected by a plurality of rock arms R2 to the respective rods M'. The arrangement being such that whenever the clutch O is engaged to couple the gear wheel N" to the shaft N', the eccentric will be rotated through one revolution and the rock arm R will rock the shaft R' and rock arms R2 simultaneously actuating all of the rods M'. Normally the eccentric Q is in a position from which the first quarter revolution will rock the arm R downward. The succeeding half revolution will rock the arm R upward through twice the angle of its downward movement and the final quarter revolution will return the arm R to its original position. Thus it will be understood that the first movement will actuate the rods M2 in an outward direction imparting corresponding movement to the members D and flanges K and K' as above described. The flange K' (which moves in a vertical plane) will contact with any work pieces which may have been displaced to the right and return them to a central position of alignment on the rails B, B'. The succeeding half revolution of the eccentric will move the flange K into contact with any work pieces which may have been displaced to the left and will return them to the central position. The final quarter revolution will move the flanges K and K' to their normal positions where they provide clearance for the opposite ends of all of the centralized work pieces. The electromagnetic operating mechanism P is controlled by a limit switch (not shown), when the parts are in position with the rails C and C' below the rails B, B'. A similar mechanism driven by the pinion N' will operate the centralizing means for the upper tier of work advancing means.

What I claim as my invention is:

1. In a heat treating furnace provided with step by step work advancing means of the walking-beam type including parallel, stationary and movable rails with means for imparting to the latter a cyclic movement within said rails spaced from the ends of the work pieces when supported upon said extending transversely across said rails, and means for periodically imparting a transverse reciprocating movement to said members to abut the opposite ends of and endwise shift said work pieces to center the same on said rails.

2. The construction as in claim 1 in which said members are carried with said movable rails.

3. The construction as in claim 2 in which said movable rails are suspended by hangers permitting said transverse reciprocation as well as said cyclic movement.

4. The construction as in claim 3 in which the transverse reciprocating means includes one or more rods extending through apertures in a side wall of the furnace, a connection between the inner end of each rod and said movable rails permitting the free vertical and longitudinal relative movement of the latter, and mechanism external to the furnace for periodically reciprocating said rods.

5. The construction as in claim 4 in which the connection between said rod and said movable rails includes an enlarged head on the rod having a slot therein extending in a vertical longitudinal plane, and a member connected to said rails slidably engaging said slot.

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No references cited.