April 1, 1930. W. M. HEPBURN 1,752,432

CONVEYER FOR USE WITH FURNACES

Filed Oct. 1, 1928

FIG 1.

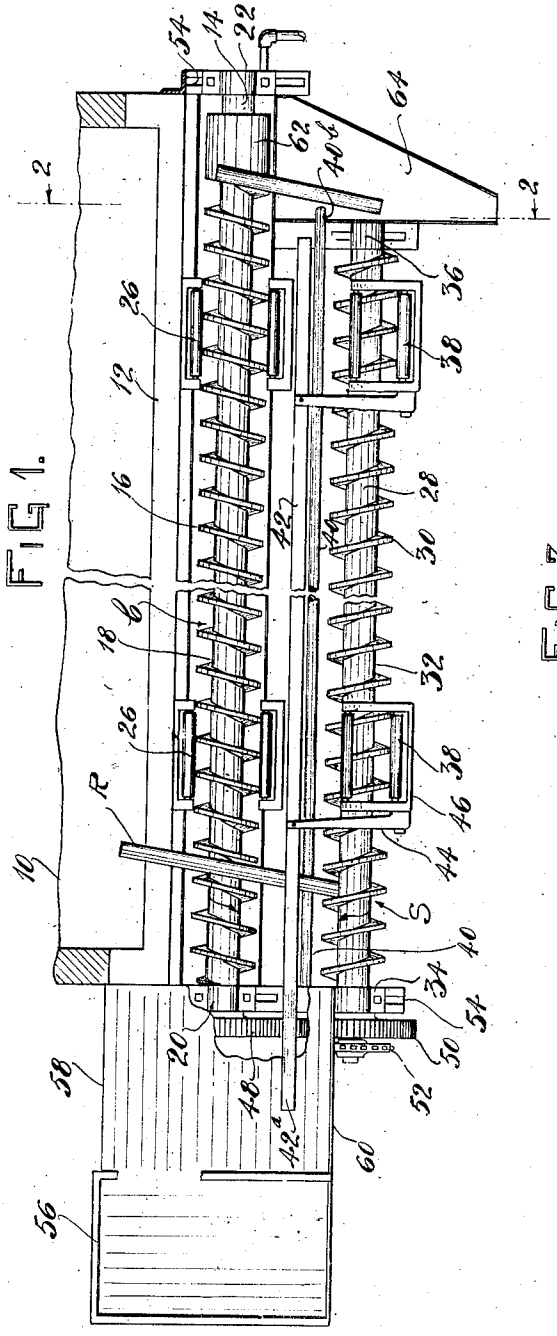


FIG 2.

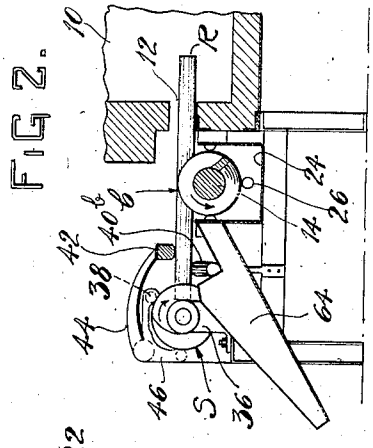
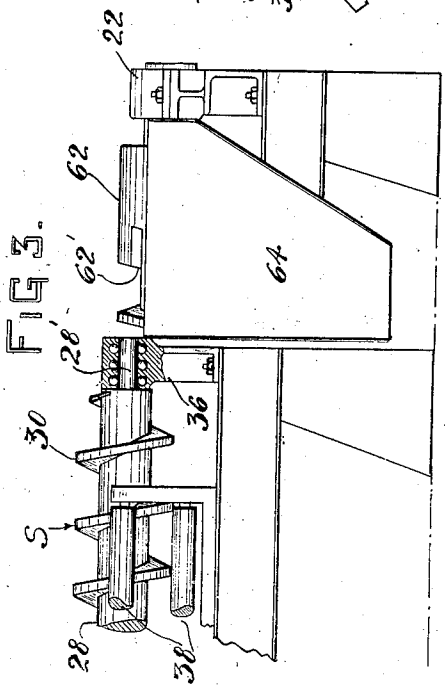


FIG 3.



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UNITED STATES PATENT OFFICE

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CONVEYER FOR USE WITH FURNACES

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This invention relates to improvements in conveyers and more particularly to conveyers for use in connection with heating furnaces for heating the ends of bolt stock and other relatively elongated objects.

The invention has for an object to provide a conveyer which shall be particularly well adapted for handling relatively short rods where one end of the rods is to be heated by insertion into a side opening in the side wall of the furnace. Other objects will more fully appear hereinafter.

In accordance with this invention there is provided alongside a longitudinally extending side opening in a heating furnace a conveyer screw on which the rods are supported in a manner to be moved axially of the screw as the latter rotates. Cooperating with said screw is a movable means for maintaining the rods in a given angular or transverse position with respect to said conveyer, said means preferably consisting of a screw of the same pitch as said conveyer screw. Means are also provided for discharging the rods from the conveying means.

For a more complete understanding of the invention reference is made to the detailed description taken in connection with the accompanying drawing wherein the preferred embodiment of the invention is shown:

Referring to the drawings:

Fig. 1 is a plan view of the conveyer showing it in position alongside of a heating furnace having a longitudinally extending side opening through which the rods are inserted into the furnace for heating;

Fig. 2 is vertical section on line 2—2 of Fig. 1; and

Fig. 3 is a fragmentary side elevation on an enlarged scale of the discharge end of the conveyer.

In the drawings, 10 indicates a portion of a heating furnace of any suitable type having a longitudinally extending side opening 12 through which rods or the like R may be inserted for heating.

Extending alongside of the opening 12 is a conveyer screw generally indicated at C which for convenience of description may be more particularly identified as a shaft 14 having a thread 16 which forms a spiral guideway 18 wherein the work or rods R may be received when disposed transversely of the shaft or screw. The top of the shaft 14 is arranged in substantially the same level as the bottom of the furnace slot 12. The ends of the shaft are supported in suitable bearings 20 and 22 respectively, supported on a suitable frame work. A water trough 24 extends below the screw and is sufficiently high to allow proper cooling of the screw. Where the screw is relatively long there may be provided at intervals additional supporting means in the form of rollers 26 for the screw, it being understood that these rollers are below the top of the shaft 14 of the screw to permit the rods R to pass.

Spaced from but parallel with the screw C is another screw S which is at a higher level than the screw C, the level being such that the adjacent end of the rods R may abut the screw. This screw like the other screw may for convenience of description be more particularly identified as a shaft 28 having a thread 30 which forms a spiral guideway 32 wherein the adjacent end of the work or rods R may be received. One end of the screw shaft 28 is supported in a suitable bearing 34 similar to the adjacent bearing 20 for the other screw shaft. The other end of the screw shaft 28 is supported in a bearing such as will permit the work or rods R to pass the bearing. A suitable bearing for this purpose is shown in detail in Fig. 3 and as shown consists of a standard 36 which is cored at its upper end to receive a reduced portion 28' of the screw shaft 28, the outside diameter of the bearing head being of substantially the same diameter as the screw shaft 28. Other ways of supporting the shaft will readily occur to those skilled in the art. Where the screw S is relatively long there may be at intervals additional supporting means in the form of rollers 38, these rollers being so positioned as to permit the work of rods R to pass.

The screws have been shown as having their threads running in opposite direction but this arrangement is optional. For example if both screws were the same as regards direc-

tion of threads, the same direction of screw rotation would cause the work to move axially of the shafts and to maintain a given angularity with respect thereto while being so moved. The reasons why the present showing is preferred will become apparent as the description proceeds.

Extending lengthwise of the screws therebetween is a work supporting bar 40, the level of this bar being such that when the work rests thereon the adjacent end of the work may abut the screw S at the front thereof as clearly indicated in Fig. 2. As viewed in Fig. 2 the screw C rotates counter-clock-wise and therefore the friction between screw C and the work R thereon tends to displace the work toward the screw S, or in other words tends to prevent it from being pushed into the furnace. The screw S, in the same view, rotates clockwise and therefore by reason of the frictional contact between it and the abutting end of the work tends to force the adjacent portion of the work into firm engagement with the bar 40. It will now be seen that if the screw S had its thread running in the same direction as screw C it would have to rotate in the same direction as screw C and the tendency would then be for the work, due to said frictional contact at its end, to move upwardly from the bar 40. For assisting in holding the work on the bar 40 there may be provided a pressure bar 42 hinged as by arms 44 to a suitable frame which as shown are the frames 46 within which the rollers 38 for the screw S are secured.

The shafts 14 and 28 of the screws C and S respectively, project beyond their end bearings 20 and 34 respectively and to the ends thereof are secured gears 48 and 50 respectively, which are in mesh. On one of the shafts is secured a driving member shown as a sprocket wheel 52 which is adapted to be connected to any suitable driving means, not shown.

The screws are preferably so mounted as to be relatively adjustable laterally with respect to each other and to the furnace. Slots 54 in the bearing supports may be provided for that purpose. Other arrangements may of course be employed and provision also made for correspondingly adjusting the roller bearings as will be readily understood. Adjustability of the shafts is desirable in order to accommodate different lengths of work.

The work R is deposited on the conveyer at its front or receiving end in any suitable manner. As shown, there is provided a hopper 56 wherein a supply of the rods R may be deposited. Leading downwardly and forwardly from the side of the hopper at the bottom thereof to a position adjacent the screws C and S is a slide 58 having at one side an upstanding flange 60 which is in line with the inside surface of the screw shaft 28. The rods R in passing from the slide 58 are received on the front screw shaft 18 and on the supporting rod 40 between the screws as will now be readily understood. The pressure bar 42 is preferably upwardly and forwardly inclined in advance of the screws C and S so that as the rods R slide downwardly on the slide 58 they may readily pass under the pressure bar, the extension being indicated at 42^a.

One form of mechanism for discharging the work from the conveying apparatus will next be described. As shown, the screw S is somewhat shorter than the screw C. On the screw shaft 14 (in front of its end bearing 22) is provided an abutment or thread stop 62 which may be considered as a portion of the shaft minus the thread 16. A chute 64 has its receiving end positioned alongside the stop 62. The adjacent end of the supporting bar 40 has its end bent downwardly and forwardly as indicated at 40^b. When the work or rod R reaches the end of the screw S it (the outer end thereof) slides down the inclined end 40^b of its supporting bar 40 and the whole rod falls or tends to move into the chute 64. Since the screw shaft C tends to displace the work outwardly from the furnace as previously explained the rod is assisted into the chute. If the furnace end of the rod reaches the stop it will ride up on the stop and thus assume such an angle of inclination that it must leave the screw C and drop into the chute. The guideway 18 on the screw shaft 14 is partially extended into the stop and comes to an abrupt stop so as to provide a shoulder thereon as indicated at 62′ in Fig. 3. This shoulder tends to positively push the rod R from the shaft as will be readily understood.

Since one end of the work R is supported on the bar 40 in front of the screw S it will be readily apparent that by terminating the bar 40 short of the outer end of the screw S, the work may be caused to leave the conveyer before it passes the bearing 36 for the screw S.

What is claimed is:

1. In a conveyer, the combination of a longitudinally extending object-supporting member, a shaft alongside of said member in such a plane that an elongated object may be disposed crosswise of the shaft and member for support, a second shaft alongside of said member in such a plane that the adjacent end of the object may abut the shaft below the top thereof whereby to prevent longitudinal displacement of said object in one direction, and a spiral guideway on each of said shafts adapted to shift said object axially of the shafts as the latter are rotated.

2. In a conveyer, the combination of a longitudinally extending object-supporting member, a shaft alongside of said member in such a plane that an elongated object may be disposed crosswise of the shaft and member for support, a second shaft alongside of said member in such a plane that the adjacent end

of the object may abut the shaft below the top thereof whereby to prevent longitudinal displacement of said object in one direction, and a spiral guideway on each of said shafts adapted to shift said object axially of the shafts as the latter are rotated, and means above the level of said member for preventing upward displacement of said object.

3. In a conveyer, the combination of a longitudinally extending object-supporting member, a shaft alongside of said member in such a plane that an elongated object may be disposed crosswise of the shaft and member for support, a second shaft alongside of said member in such a plane that the adjacent end of the object may abut the shaft below the top thereof whereby to prevent longitudinal displacement of said object in one direction, and a spiral guideway on each of said shafts adapted to shift said object axially of the shafts as the latter are rotated, means for rotating the first mentioned shaft in a direction tending to cause the object to move into abutting engagement with the second shaft, and means for rotating said second shaft in a direction tending to move the object downwardly.

4. In a conveyer, the combination of a longitudinally extending object-supporting member, a shaft alongside of said member in such a plane that an elongated object may be disposed crosswise of the shaft and member for support, a second shaft alongside of said member in such a plane that the adjacent end of the object may abut the shaft below the top thereof whereby to prevent longitudinal displacement of said object in one direction, and a spiral guideway on each of said shafts adapted to shift said object axially of the shafts as the latter are rotated, and means on the object-supporting shaft for elevating the object above the guideway thereon to discharge the object radially of the shaft.

5. In a conveyer, the combination of a longitudinally extending object-supporting member, a shaft alongside of said member in such a plane that an elongated object may be disposed crosswise of the shaft and member for support, a second shaft alongside of said member in such a plane that the adjacent end of the object may abut the shaft below the top thereof whereby to prevent longitudinal displacement of said object in one direction, and a spiral guideway on each of said shafts adapted to shift said object axially of the shafts as the latter are rotated, the object supporting shaft being rotated in a direction tending to cause the object supported thereon to move by frictional contact therewith into abutting relation with the other shaft.

6. In a conveyer, the combination of a pair of radially spaced screw shafts, a member extending lengthwise of and between said shafts and adapted in conjunction with one of said shafts to support an elongated object disposed thereacross, the object-supporting side of said member being between planes which are tangent to the upper and lower sides respectively of said shafts, and means for rotating said shafts in a manner to cause an elongated object supported on said member and said one shaft to move longitudinally of said shafts when in contact therewith.

7. In a conveyer, the combination of a pair of radially spaced screw shafts, a member extending lengthwise of and between said shafts and adapted in conjunction with one of said shafts to support an elongated object disposed thereacross, the object-supporting side of said member being between planes which are tangent to the upper and lower sides respectively of said shafts, and means for rotating said shafts in a manner to cause an elongated object supported on said member and said one shaft to move longitudinally of said shafts when in contact therewith, said one shaft being rotated in such a manner as will tend to force one end of said object against the other shaft.

In testimony whereof I affix my signature.

WILLIAM M. HEPBURN.