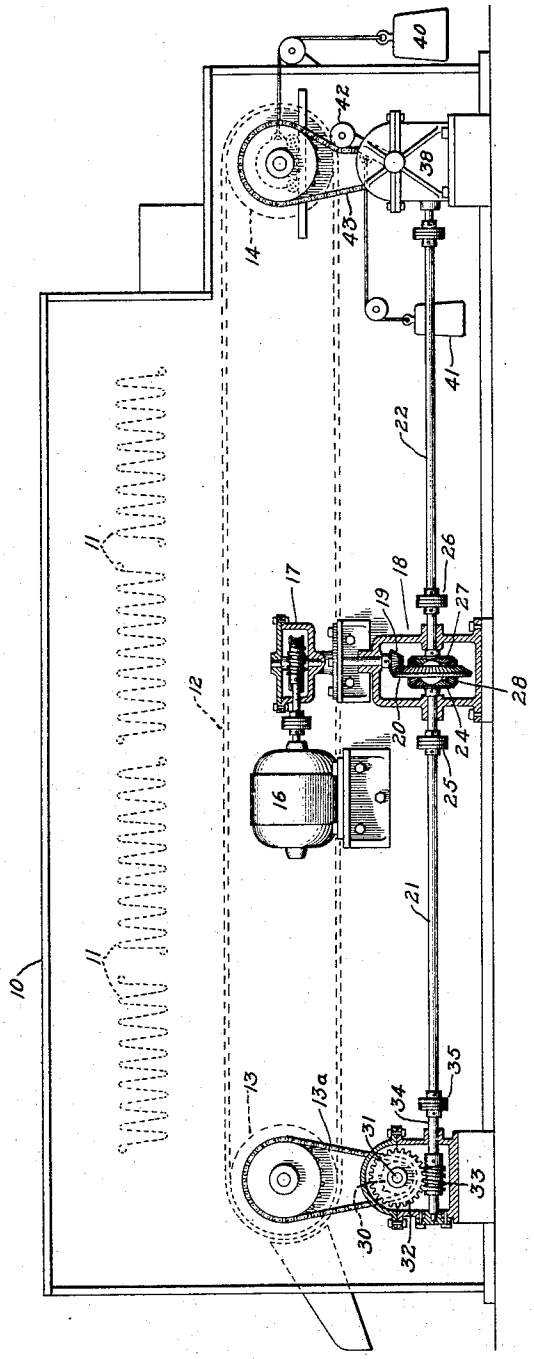
Jan. 17, 1933. A. N. OTIS 1,894,829

FURNACE CONVEYER DRIVE

Filed Feb. 27, 1932



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UNITED STATES PATENT OFFICE

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FURNACE CONVEYER DRIVE

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My invention relates to conveyer type furnaces wherein objects to be heat treated are continuously carried through the furnace and has for an object the elimination of undue stresses in the conveyor itself.

While it is not necessarily limited thereto, my invention is particularly applicable to furnaces having a conveyer carried at its ends on rotatable supports and located in the heating chamber. Heretofore it has been customary to apply the driving effort at one end of the conveyer. However, for relatively long conveyers, the driving effort required to drive the conveyer may be greater than the torque which may be transmitted by a single support or end drum. If both end drums are driven, to increase the driving effort, it is desirable to insure the equal peripheral speed of the end drums and to insure a substantially equal application of torque to the conveyer. Aside from the difficulties of manufacturing two end drums of exactly the same diameter, there will be an increase in diameter of a drum with rise in temperature. The tendency will then be for the drum having the greatest diameter to increase the speed of the conveyer. Consequently the conveyer itself is subjected to undue stresses and ultimately must slip on the end drums. The result will be a greater power input to the driving motor and possibly a shorter useful life for the conveyer.

In carrying out my invention in one form thereof I provide a differential mechanism through which an electric motor is arranged to drive both of the end supports of a conveyer thereby substantially eliminating undue stresses of the conveyer itself while securing greater efficiency in driving the conveyer.

For a more complete understanding of my invention, reference should now be had to the drawing, the single figure of which shows an elevation partly in section of a furnace drive embodying my invention.

Referring now to the drawing, I have shown my invention in one form thereof as applied to a furnace 10 which is electrically heated by means of the resistors 11. An endless conveyer 12 is supported upon end supports shown as two smooth-surface end drums 13 and 14 of substantially equal diameter. These end drums are arranged to be driven by means of an electric motor 16 mechanically connected by a gear box 17 to a differential mechanism 18. A driving gear 19 in meshing relation with the ring gear 20 of the differential serves to transmit torque in substantially equal amounts to the shafts 21 and 22. The shaft 21 is connected to the bevel gear 24 of the differential 18 by means of a coupling 25. Similarly, the shaft 22 is connected by means of a coupling 26 to the bevel gear 27 of the differential drive. The bevel gears 28 carried by the ring gear are in meshing relation with the bevel gears 24 and 27 and serve to equalize the torque which is transmitted to the shafts 21 and 22. The end drum 13 is driven by means of a chain 13*a* from a sprocket wheel 30 secured to a shaft 31. This shaft is driven by means of a gear 32 which is in meshing relation with a worm gear 33 secured to a shaft 34 which shaft is connected by means of a coupling 35 to the shaft 21. The end drum 14 is similarly driven through the gear box 38. It will be observed, however, that the end drum 14 is mounted upon a movable support so that the weight 40 maintains a constant tension on the conveyer 12. Due to the movement of the end drum 14 a weight 41 is arranged to urge a roller 42 against the driving chain 43, so as to insure at all times the engagement of the driving chain with its respective sprocket gears.

It may be observed from the location of the end drum 13 with respect to end drum 14 that the former drum will be subjected to a greater amount of heat than the drum 14, inasmuch as it is located in the high temperature portion of the furnace. Consequently,

the end drum 13 will expand more than the end drum 14, causing its diameter to be thereby increased. With the arrangement shown, however, the difference in diameter does not subject the conveyer 12 to a strain, inasmuch as the differential mechanism 18 operates to equalize the torque transmitted to the end drums by the driving motor. This will be clearly apparent by observing that the increased diameter of the drum 13 tends to increase the speed of the conveyer by the application of a greater torque. The result, however, is not an increase in speed of the drum 13 because spur gears 28 mounted on the ring gear 20 in conjunction with bevel gears 24 and 27 operate to maintain equal torque division so that the drum 14 is accelerated until its peripheral speed equals that of the drum 13.

If it is desired to design one of the conveyer drums with a smaller diameter than the other, it will be understood that the differential mechanism will equalize the drive so that the peripheral speed of the drums will remain the same.

While I have shown a particular embodiment of my invention, it will be understood, of course, that I do not wish to be limited thereto, since many modifications may be made, and I therefore contemplate by the appended claims to cover any such modifications as fall within the true spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. In combination, a furnace provided with an endless conveyer, a plurality of rotatable supports for said conveyer, driving means for said supports, and means for equalizing the driving effort between said supports comprising a differential mechanism connected between said driving means and said supports.

2. The combination with a furnace provided with an endless conveyer mounted on rotatable end supports, of a driving motor therefor, a differential mechanism, and a pair of shafts each of which is connected to an end support and to said differential mechanism, and means for connecting said driving motor to said mechanism whereby substantially equal values of torque may be transmitted by said motor through said differential mechanism to said end supports.

3. The combination with a furnace provided with an endless conveyer, rotatably mounted end supports for said conveyer of a driving motor therefor, means for eliminating undue driving stresses on said conveyer comprising a differential mechanism, means for connecting said motor to said mechanism, and means for driving said end supports through said differential mechanism.

4. The combination with a furnace provided with an endless conveyer mounted on rotatable end supports, of a driving motor arranged to drive said end supports, means for maintaining the peripheral speeds of said supports equal irrespective of the diameters of said supports comprising a differential mechanism connected between said motor and said supports.

In witness whereof I have hereunto set my hand.

ALBERT N. OTIS.