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1,649,926

CONVEYER

Filed Jan. 11, 1926

3 Sheets-Sheet 2

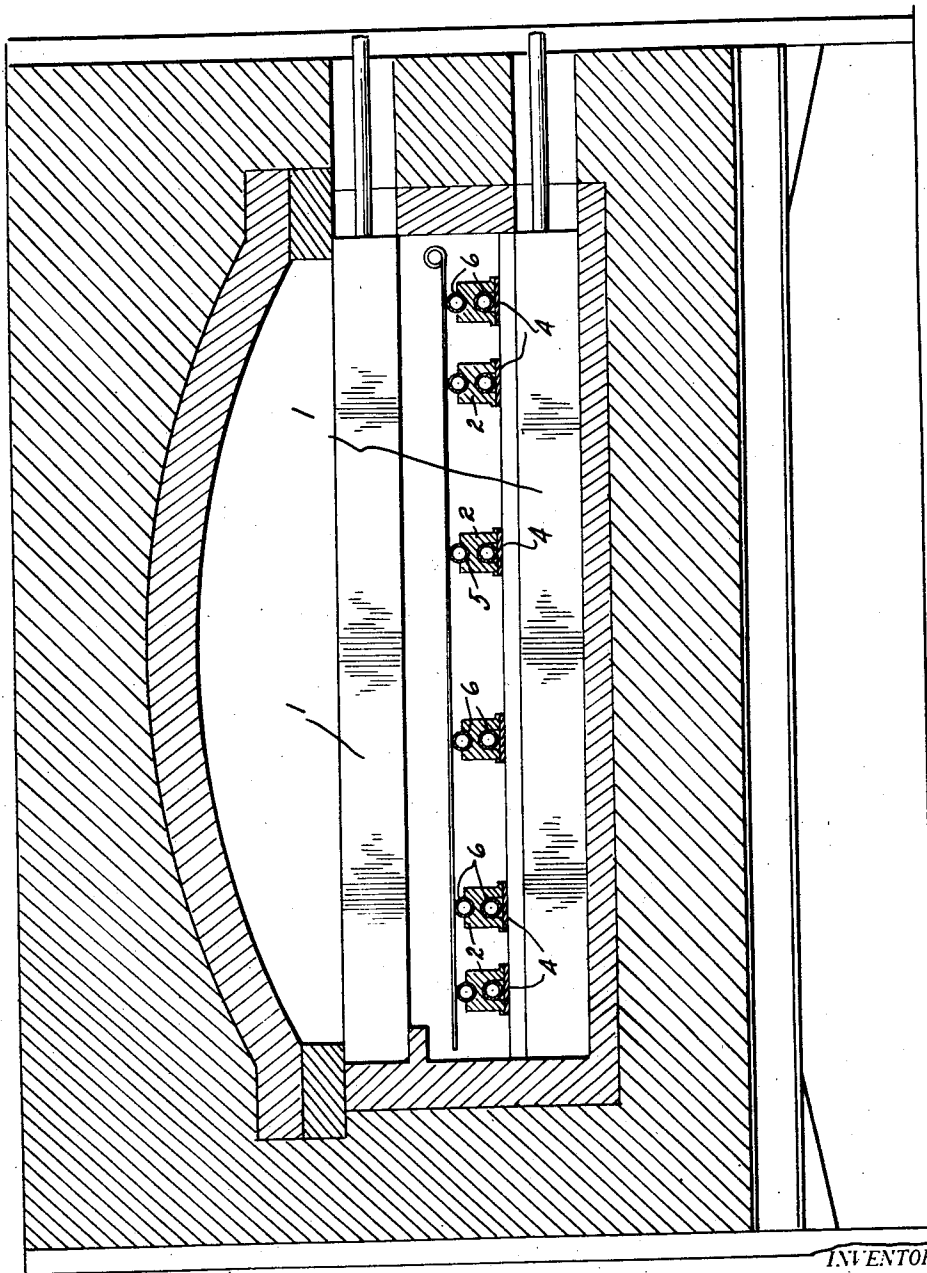


Fig. 2

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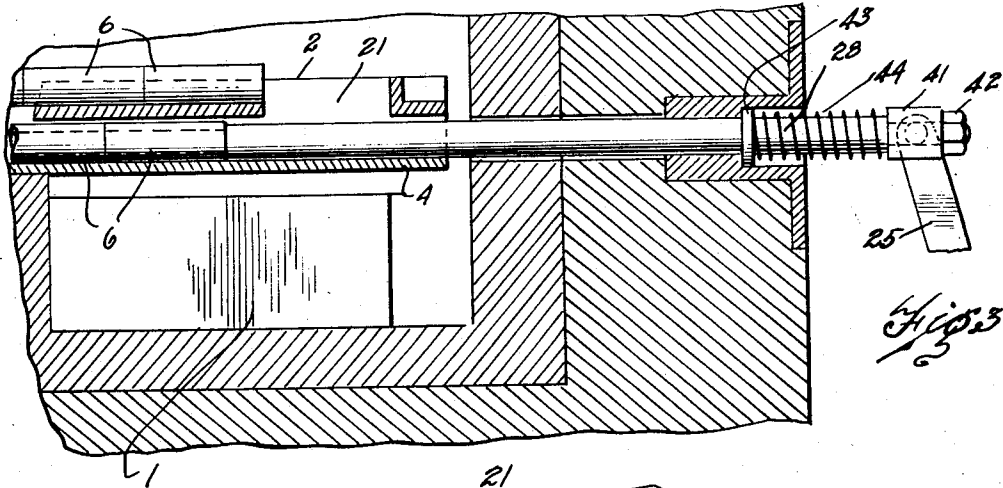
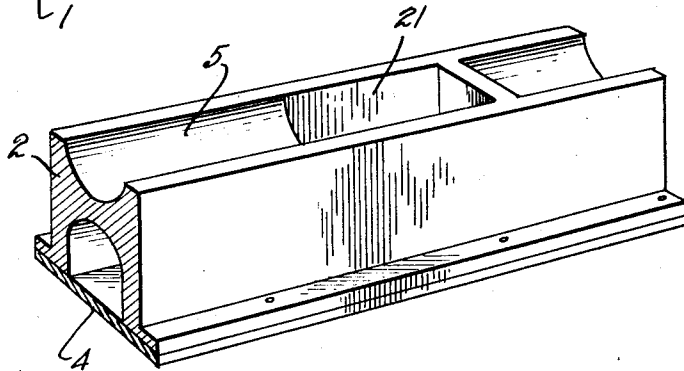
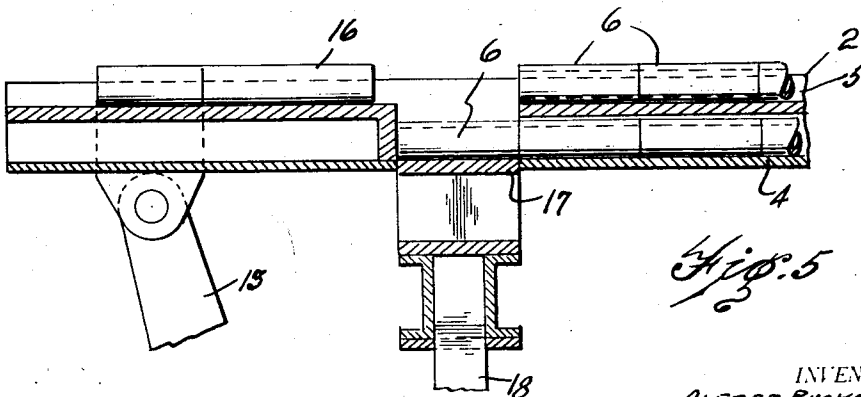
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3 Sheets-Sheet 3



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## UNITED STATES PATENT OFFICE.

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## CONVEYER.

Application filed January 11, 1926. Serial No. 80,500.

This invention relates to conveyers and the object of the invention is to provide a conveyer particularly for use in heat treating furnaces in which the heat of the furnace does not affect the operation of the conveyer.

Another object of the invention is to provide a conveyer in which the articles being heat treated are carried by the conveyer units and are prevented from coming into contact with any stationary part of the furnace.

Another object of the invention is to provide a method by which the heat of the conveyer parts is absorbed by the articles to be heated.

A further object of the invention is to provide a conveyer in which the conveyer units are not connected together but are moved through the furnace in end to end relation and are returned in the same manner automatically.

The ordinary chain conveyer is impractical for this use in a heat treating furnace because the metal will expand and stretch under heat and it is impossible to lubricate a conveyer of this type on account of the heat thus causing frequent failures of the conveyer and consequent costly shut downs of the furnace.

These objects and the several novel features of the invention are hereinafter more fully described and claimed and the preferred form of construction by which these objects are attained is shown in the accompanying drawings in which—

Fig. 1 is a longitudinal section through a heat treating furnace embodying our invention.

Fig. 2 is a section taken on line 2—2 of Fig. 1.

Fig. 3 is an enlarged section through the device for returning the conveyer units.

Fig. 4 is a perspective view of the return end of one of the rails.

Fig. 5 is an enlarged section showing the transferring mechanism for the conveyer.

The electric furnace as shown in Fig. 1 is provided with a series of heating elements 1 which are positioned in compartments above and below the conveyer rails 2. These conveyer rails 2 as shown in Figs. 1 and 2 are supported on the partitions 3 between the heating elements and are substantially H

shaped in cross section, as shown in Fig. 4, a plate 4 being secured across the bottom of each rail. If desired instead of using the plate 4 on the bottom of the rail this part may be made integral with the rail to provide an enclosed channel for the conveyer units. These rails 2 extend longitudinally of the furnace and are each provided with an arcuate groove 5 in the top thereof in which a series of short lengths of tubing 6 are positioned as shown in Figs. 2, 3 and 5. These tube sections 6 are the conveyer units and provide supports for the material to be heat treated and are preferably about 6 inches in length. The material to be heat treated is laid across the conveyer units 6 and the units are automatically moved longitudinally of the furnace along the rails 2 to convey the material through the furnace. The mechanism for moving the conveyer units along the rails consists of an electric motor 7 shown in Fig. 1 which drives the worm 8. A worm gear 9 meshes with the worm 8 and is rotatable on the axis 10. A pitman 11 is pivoted to the worm gear 9 at 12 and at the opposite end is pivotally connected to the lever 13 at the point 14. This lever 13 is pivoted at 15 and is pivotally connected at the upper end to a member 16 which is movable longitudinally of the respective rail 2. As shown in Fig. 5 a plunger 17 is provided having a stem 18 which as shown in Fig. 1 is provided with a roller 19 riding on the cam 20 secured to rotate with the worm gear 9. With the parts in the position shown in Fig. 1 the plunger 17 is in the position shown in Fig. 5 and as the roller 19 moves onto the high part of the cam 20 the plunger 17 raises the respective conveyer unit 6 into alignment with the end of the member 16. At this time the lever 13 is turned on its pivot by means of the pitman 11 and moves the several conveyer units 6 along the respective rail groove 5 a distance equal to the length of one conveyer unit. Due to the worm and worm gear this action is comparatively slow and as the roller 19 rides onto the succeeding low part of the cam 20 the member 16 is returned to the position shown in Figs. 1 and 5. As the conveyer units are moved along the rail groove 5 by the member 16 the tube section at the end falls through the opening 21 in the end of the rail onto the

plate 4 shown in Figs. 3 and 4. As shown in Fig. 1 a bar 22 extends the full length of the furnace and is pivotally connected at 23 to the lower end of the lever 13 while at the opposite end the bar 22 is connected at 24 to the lever 25. This lever 25 is pivotally mounted at 26 on a bracket 27 extending from the furnace wall and at the upper end as shown in Fig. 3 is pivotally connected to a block 41 which is slidable on the plunger 28 and is prevented from coming off from the plunger 28 by the nut 42. The plunger 28 is provided with a collar 43 and a spring 44 is positioned between the collar 43 and block 41. By this arrangement if one of the conveyer units sticks in the lower conduit movement of the lever 25 only compresses the spring 44 and does not damage the rail. When the member 16 is moved to the right of Fig. 1 it moves the conveyer units to the right and at the same time the plunger 28 is withdrawn from beneath the opening 21 in the rail 2 allowing the conveyer unit at the end to fall onto the plate 4. As the member 16 is returned to the position shown in Fig. 1 and the plunger 17 is returned to the position shown in Fig. 5 the plunger 28 is moved to the position shown in Fig. 3 which moves the conveyer units in the lower channel to the left of Figs. 1 and 3 thus placing a succeeding conveyer unit on the plunger 17. As this plunger is again raised by the cam 20 the member 16 again moves the conveyer units to the right while the plunger 28 is again withdrawn to allow the succeeding tube section to drop through the opening 21 onto the plate 4 in front of the plunger 28. As each conveyer unit is moved onto the top of the rail 2 by the member 16 an article to be heat treated such as a spring leaf is positioned on the companion conveyer units on the several rails 2 and is moved into the furnace on these respective conveyer units. By this arrangement the conveyer units are continuously returned without being connected together so that a conveyer is provided which will operate perfectly under the intense heat utilized in heat treating. The heat treated articles may be removed through the door 30 shown in Fig. 1 and a peep hole 31 may be provided in the end of the furnace.

One of the important features of this invention is that the conveyer units which support the articles being heat treated do not need to be cooled so that a considerable saving in heat is effected as about 100 pounds of conveyer units are moved through the furnace every fifteen minutes. With this type of conveyer odd shaped pieces may be conveyed through the furnace as well as straight pieces. In ordinary heat treating furnaces the articles being heat treated are slid along the rails instead of being con-

veyed, but this sliding of the articles along the rails tends to scratch the article being heat treated causing extra work removing scratches where finished surfaces are desired. This is particularly true in heat treating spring leaves which readily become scratched and then when put in service on an automobile very often break where scratched. With this device the articles are not moved in relation to the supporting members and therefor cannot become scratched during the heat treating process. These rails may also be formed to utilize conveyer units of different forms. For instance, the conveyer units may be made in the shape of shallow pans on which small articles such as springs, washers, bolts and similar articles may be carried through the furnace for heat treatment.

From the foregoing description it becomes evident that the device is very simple and efficient in operation, will not easily get out of order, provides a conveyer in which the conveying units are not connected together and further provides a device which accomplishes the objects described.

Having thus fully described our invention, its utility and mode of operation, what we claim and desire to secure by Letters Patent of the United States is—

1. A conveyer for heat treating furnaces comprising a rail extending longitudinally through the furnace and having an upper and a lower way extending longitudinally thereof, a worm, means for driving the worm, a worm gear meshing with the worm, a lever pivotally mounted at one end of the furnace intermediate its ends, a pitman pivotally connected to the lever and to the worm gear, a plunger on the upper end of the lever riding in the upper way of the rail, a lever pivotally mounted intermediate its ends at the opposite end of the furnace and carrying a plunger adapted for movement in the lower channel of the rail, an arm pivotally connecting the lower ends of the said levers, a series of conveyer units positioned in end to end relation in the upper and lower ways, a cam rotatable with the worm gear, a plunger actuated by the cam for raising the units in succession from the lower to the upper way at one end of the rail, the opposite end of the rail being provided with an opening between the upper and lower ways through which the conveyer units are adapted to pass.

2. A conveyer comprising a rail having an upper and a lower way extending longitudinally thereof, a series of conveyer units positioned in end to end relation in the ways, a lever pivotally mounted at each end of the rail, one lever having a means for engaging the units in the upper way and the other lever having a means for engaging the units in the lower way, an arm piv-

otally connecting the levers together, a worm, means for driving the worm, a worm gear meshing with the worm, a pitman connecting the worm gear and one of the levers, a cam rotatable with the worm, a plunger riding on the cam and adapted to raise the conveyer units at one end of the rail in succession from the lower way to the upper way, the opposite end of the rail being provided with an opening through which the units may pass from the upper way to the lower way.

3. A conveyer comprising a rail having an upper and a lower way extending longitudinally thereof, a series of conveyer units positioned in end to end relation in the said ways, a lever pivotally mounted at each end of the rail, one lever having a means for engaging the units in the upper way and the other lever having a means for engaging the units in the lower way, means for oscillating the levers on their pivots in unison, and means for transferring the conveyer units from one way to the other at each end of the rail.

4. In a conveyer, a series of rails each having an upper and lower way extending longitudinally thereof, a series of conveyer units positioned in end to end relation in the said ways, a lever pivotally mounted at each end of the rails, one lever having an end engaging the conveyer units in the upper way of the respective rail and the other lever having an end engaging the conveyer units in the lower way of the said rail, a worm gear, means for driving the worm gear, and a pitman pivotally connected to the worm gear and adapted to oscillate the levers on their pivots.

5. A conveyer comprising a series of rails each having an upper and lower way extending longitudinally thereof, a series of conveyer units positioned in end to end relation in the said ways, a lever pivotally mounted at each end of the rails, an arm connecting the levers together at the lower ends, means for oscillating the levers on their pivots to alternately move the conveyer units in the upper and lower ways and means for transferring the conveyer units from one way to the other.

6. In a conveyer, the combination with a furnace having a heating chamber therein, of a series of rails extending into the furnace longitudinally of the chamber, each rail having an upper open way and a lower closed way directly therebeneath, a series of conveyer units consisting of short lengths of tubing positioned in end to end engagement in both of said ways, alternately operated means for moving the conveyer units in one direction in one way and in the opposite direction in the other way, automatically operated means for raising the conveyer units in succession from the lower way to

the upper way in timed relation with said alternately operated means, the rail being provided with an opening at the discharge end of the upper way through which the conveyer units may fall by gravity into the lower way.

7. In a conveyer, the combination with a furnace having a heating chamber therein, of a series of rails extending into the furnace longitudinally of the chamber, each rail having an upper open way and a lower closed way directly therebeneath, a series of conveyer units positioned in end to end engagement in the said ways, alternately operated means for moving the conveyer units in one direction in one way and in the opposite direction in the other way, automatically operated means for raising the conveyer units in succession from the lower way to the upper way in timed relation with said alternately operated means, the rail being provided with an opening at the discharge end of the upper way through which the conveyer units may fall into the lower way.

8. A conveyer comprising a rail having an upper way therein arcuate in cross section and a second way directly therebeneath, a series of conveyer units consisting of short lengths of tubing positioned in end to end engagement in both the said ways, automatically operated means for moving the conveyer units in one direction in one way and in the opposite direction in the other way in alternate relation, automatic means operating in timed relation with the aforesaid means for raising the conveyer units in succession from the lower way to the upper way at one end of the rail, the rail being provided with an opening at the opposite end thereof between the upper way and the lower way through which the conveyer units may fall by gravity into the lower way.

9. A conveyer comprising a rail having an upper way therein open at the top side and a lower closed way directly therebeneath, a series of conveyer units formed from short lengths of tubing positioned in end to end engagement in the said ways, means for alternately moving the conveyer units in one direction in one way and in the opposite direction in the other way, automatically operated means for raising the conveyer units in succession from the lower way to the upper way, the rail being provided with an opening at the discharge end of the upper way through which the conveyer units may fall into the lower way.

10. A conveyer comprising a rail having an upper way therein open at the top side and a lower closed way directly therebeneath, a series of conveyer units positioned in end to end engagement in the said ways, the conveyer units in the upper way extending above the upper surface of the rail, automatically operated means for transferring

the conveyer units one at a time from one way to the other, and automatic means operating in timed relation with the transferring means for moving the units longitudinally of the ways. 5

11. A conveyer comprising a rail having an upper way therein open at the top side and a lower way closed on the sides, a series of conveyer units positioned in end to end engagement in the said ways, means for feeding the conveyer units in one direction in one way and in the opposite direction in the 10

other way, automatically operated means for raising the conveyer units in succession from the lower way to the upper way, the rail being provided with an opening at the discharge end of the upper way through which the conveyer units may fall by gravity into the lower way. 15

In testimony whereof we sign this specification. 20

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