# United States Patent

[11] 3,625,499



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[54] **FURNACE HAVING CONVEYOR WITH INTERMITTENT DRIVE**
**18 Claims, 11 Drawing Figs.**


[52] **U.S. Cl.** ..... **266/4 A,** 148/155, 263/8, 263/28
[51] **Int. Cl.** ..... **C21d 1/66**
[50] **Field of Search** ..... 266/1, 4, 4 A, 4 B, 4 E, 4 F, 6, 5 E, 8, 5 F; 263/8, 28; 148/12.4, 143, 144, 153, 155



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**ABSTRACT:** A furnace construction for heat treating metallic articles and having a conveyor extending through the heating zone thereof, the conveyor being intermittently driven to provide for step-by-step advancement of the metallic articles through the heating zone.


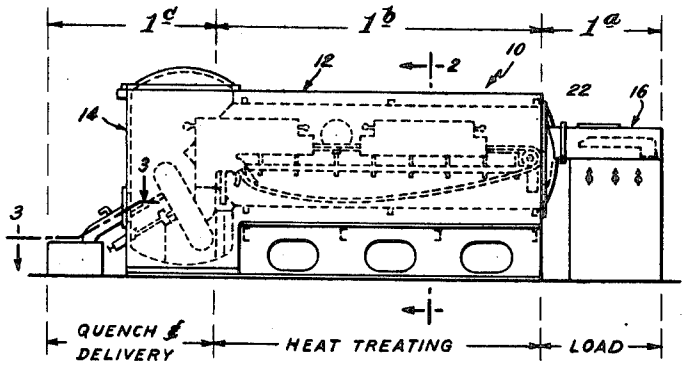

Fig. 1.

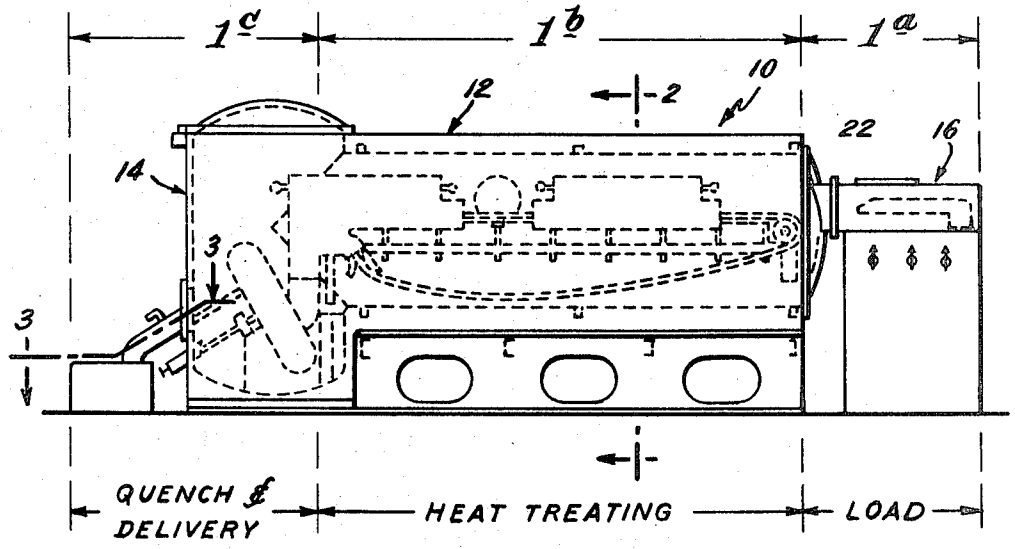


Fig. 3.

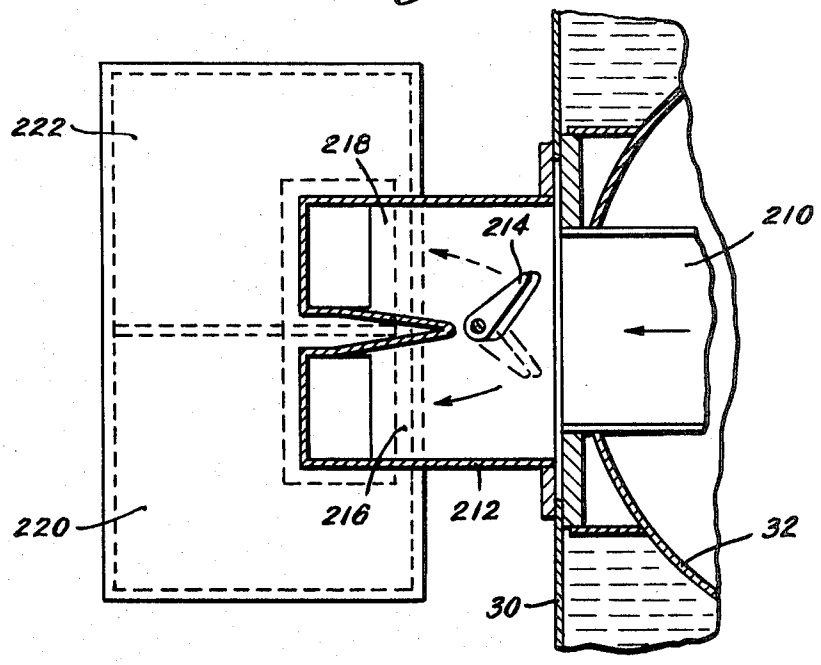


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Fig. 1a

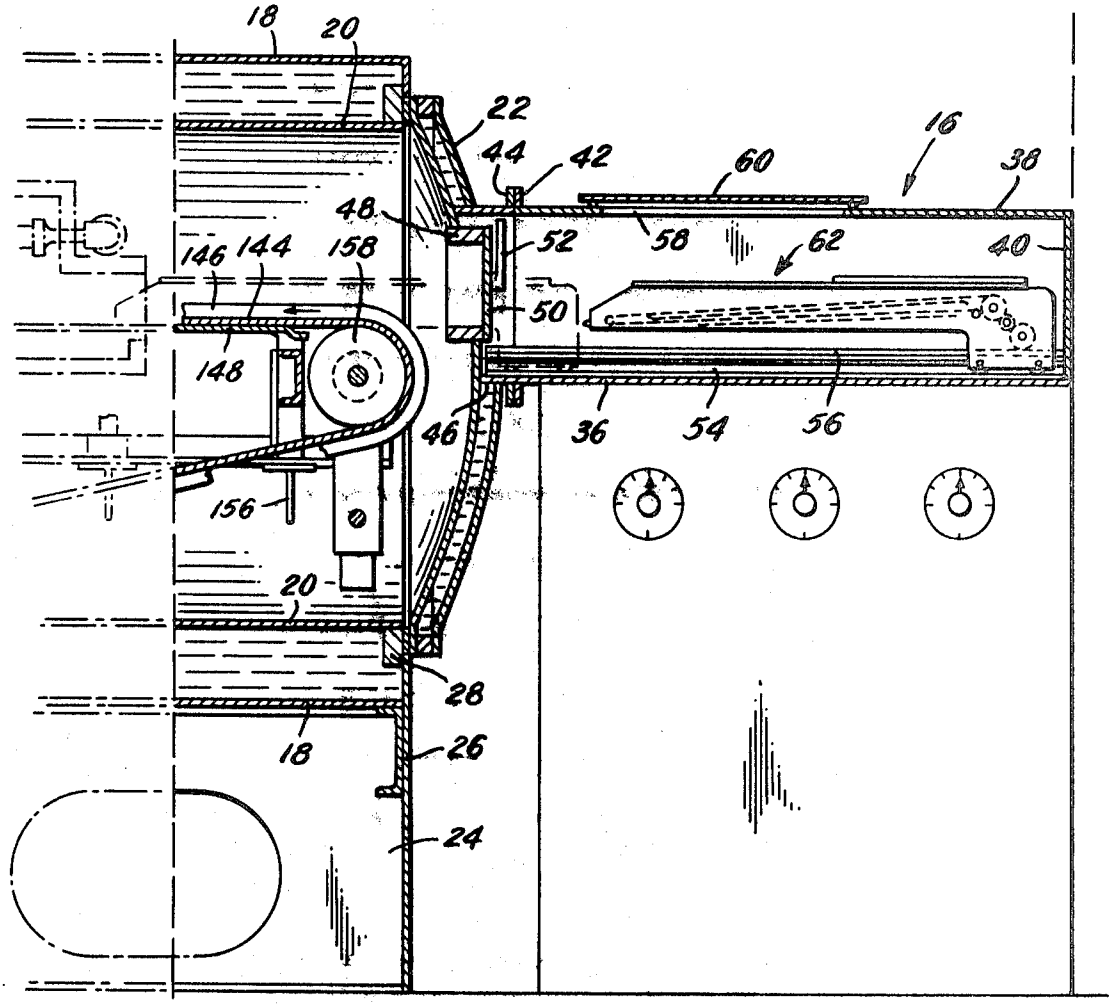


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Fig. 1b.

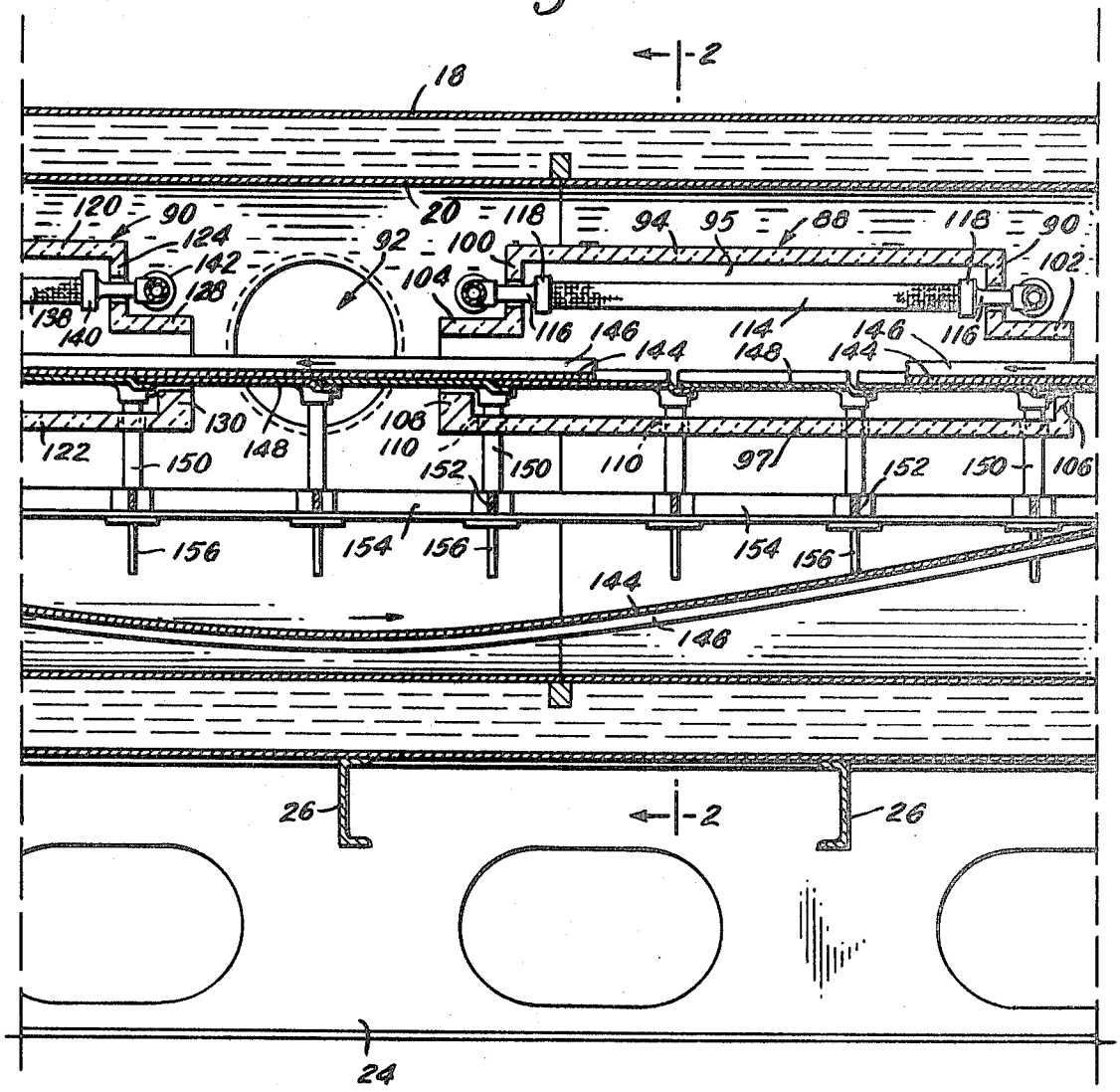


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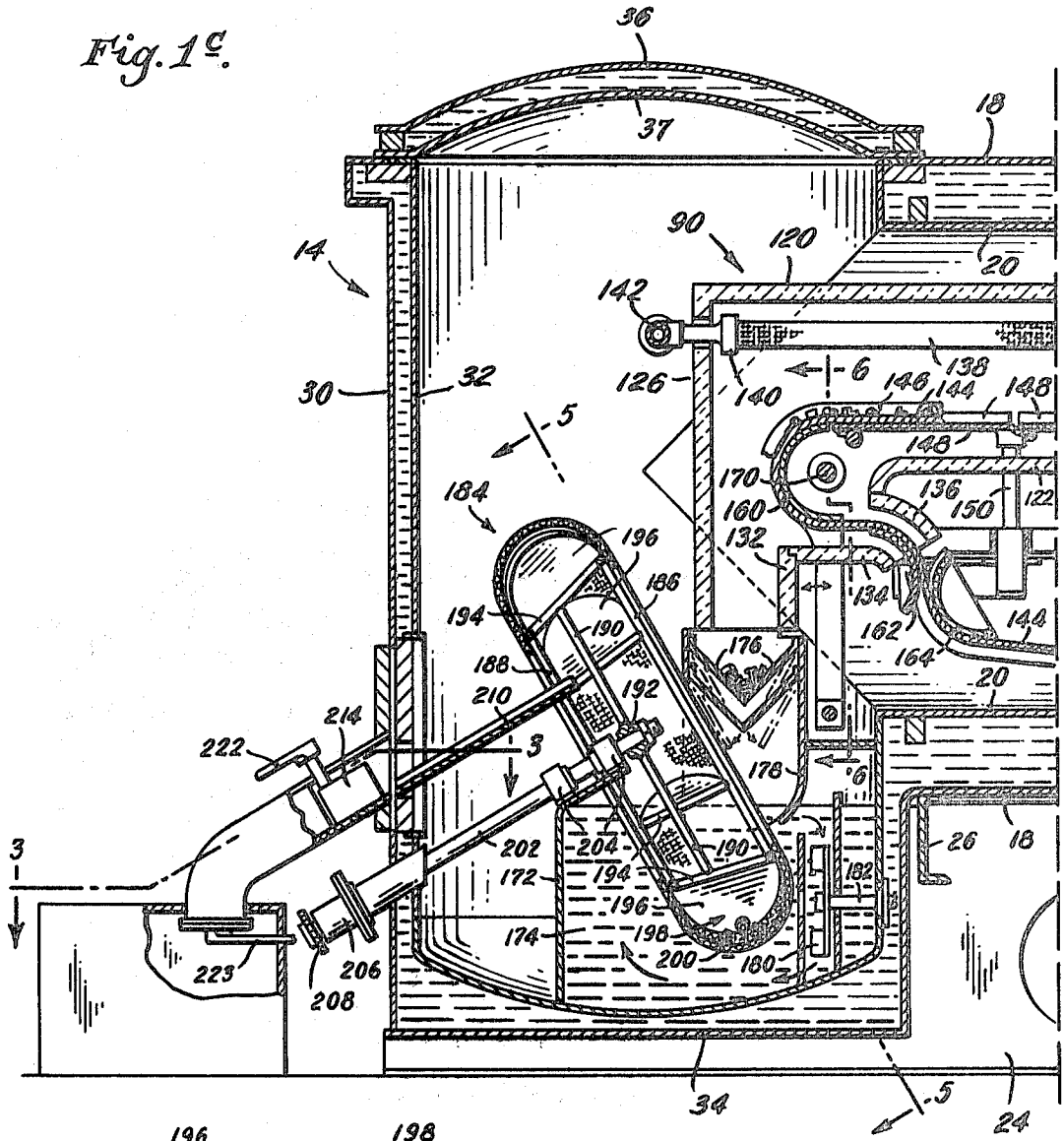
Fig. 1c.



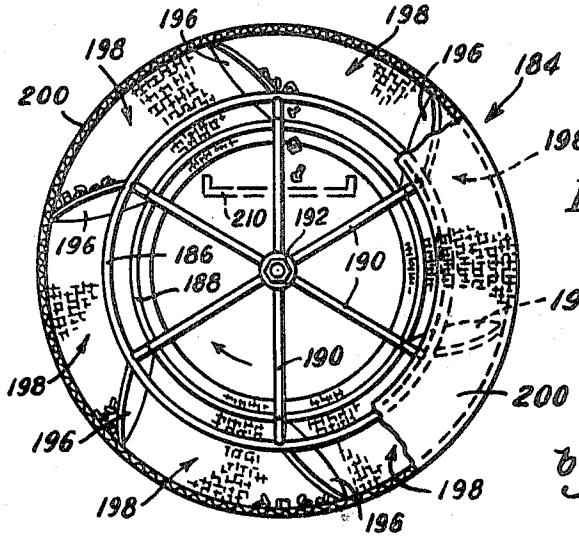




Fig. 5.

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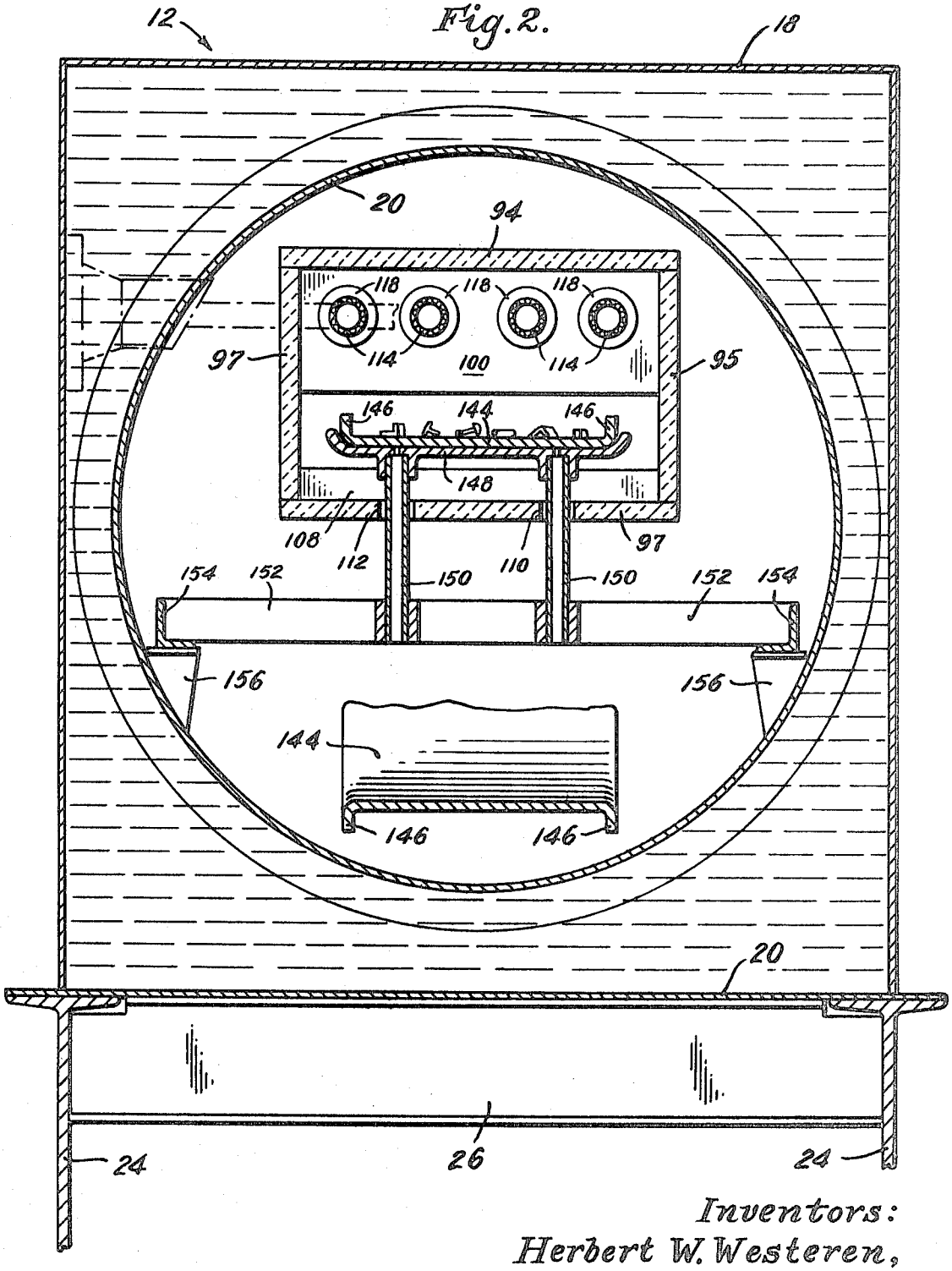
Fig. 2.

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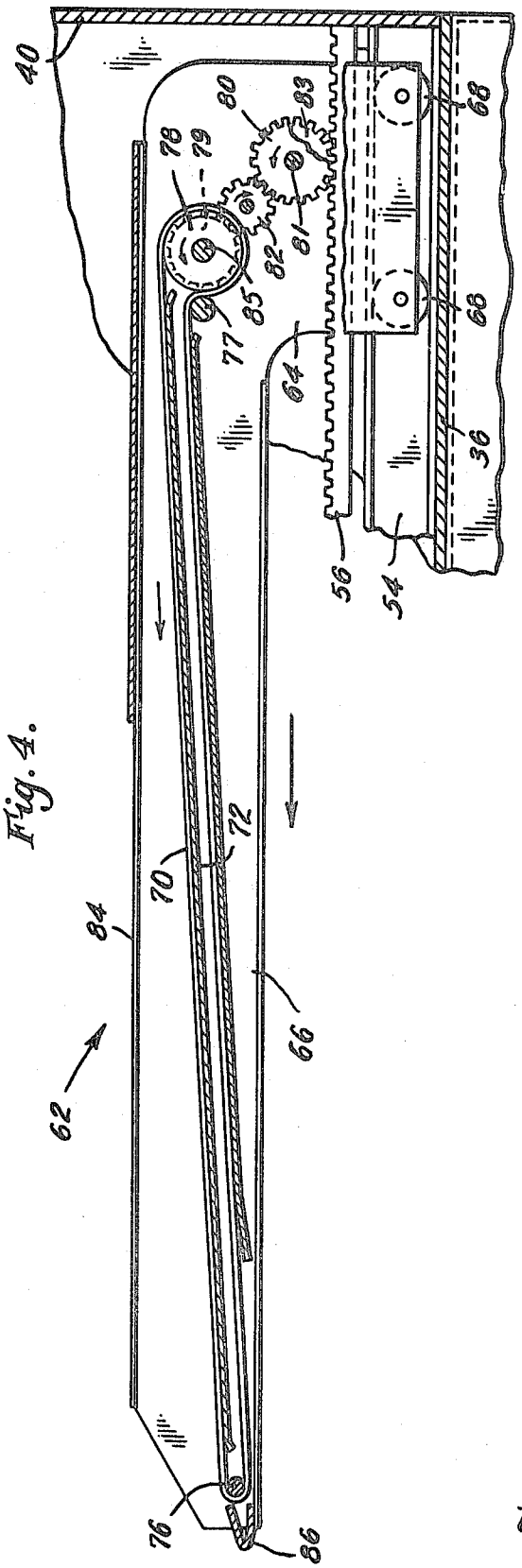


Fig. 4.

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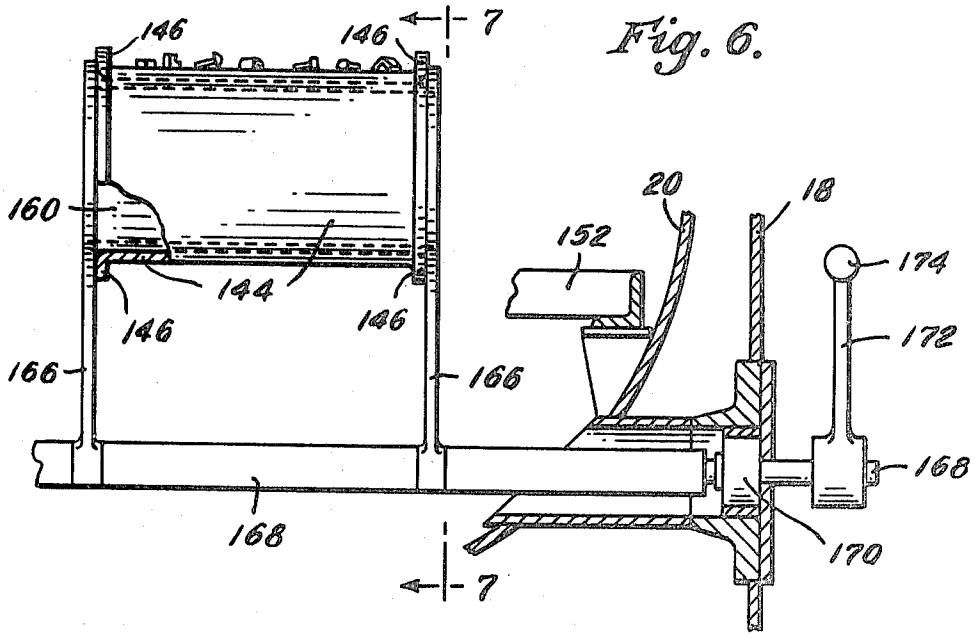


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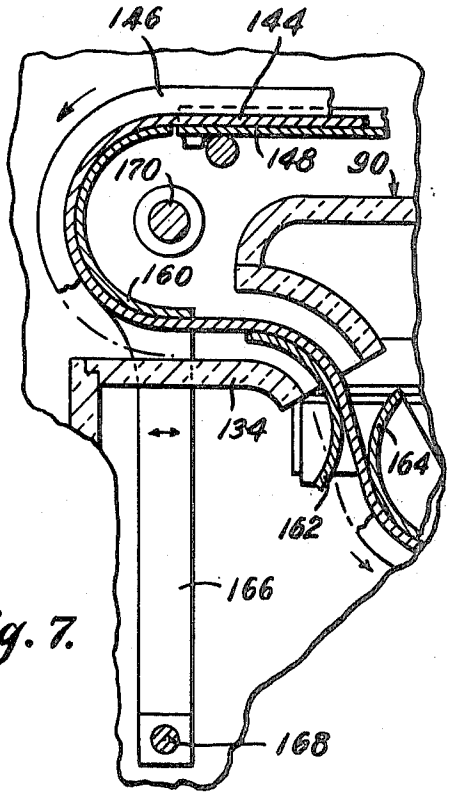


Fig. 7.

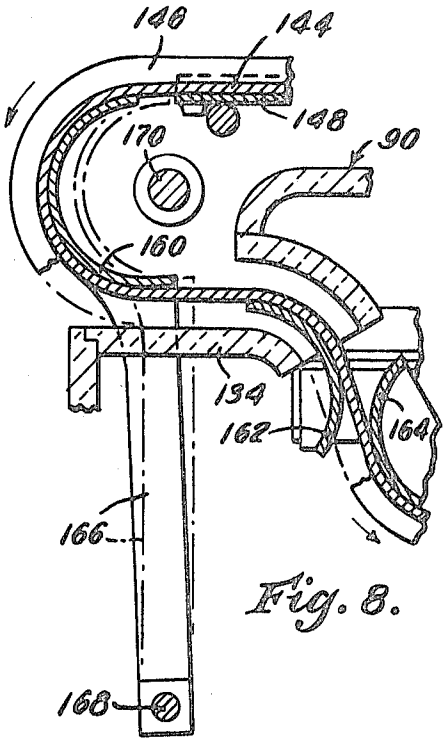


Fig. 8.

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# FURNACE HAVING CONVEYOR WITH INTERMITTENT DRIVE

## BACKGROUND OF THE INVENTION

The furnace embodied in the present invention is of the type that includes a conveyor belt that moves articles to be heat treated through a heating zone. The furnace as contemplated for use herein provides for heat treating articles under vacuum and further provides for quenching of the heat treated articles under vacuum and in a liquid medium, such as oil.

In heat-treating furnaces known heretofore that included a conveyor for the transfer of the articles through the heat-treating chamber, the furnace was generally of the atmosphere type, whereby the heat-treating operation was carried out in the heating chamber into which a treatment atmosphere was introduced. Various types of air or gas curtains were arranged for generally confining the treatment atmosphere within the heating zone, since the conveyor for transferring the articles could not normally be confined entirely within the heat-treating zone. Some furnace constructions known heretofore also included muffles that extended through the heating chamber and operated to restrict the heat treatment of the articles within a relatively confined area. However, here again the conveyor that extended through the muffle projected outwardly on both sides thereof, and thus the heat treatment atmosphere had to be confined within the muffle by air curtains or the like.

The drive for the conveyor-type furnace for heat treating necessarily included the pinch-type of drive roller, since this type of drive was most convenient for imparting the required movement for the conveyor during the operation thereof. However, many times when pinch rolls are employed, it is desirable to use a conveyor belt that is free of projections. Such belts are not always practical since side flanges are useful in retaining the articles to be heat treated in place on the belt.

Heretofore many of the vacuum heat treating furnaces were restricted essentially to batch loading because of the special requirements for evacuating the heating chamber, and thus were not particularly adaptable for the use of a conveyor type of feed. This was particularly true in the vacuum furnace that incorporated a liquid quench therein. In a liquid quench vacuum furnace, a batch of the articles to be heat treated was removed from the heat-treating zone and was then transferred to the quench zone, after which the quench zone was either brought to atmospheric pressure for removal of the articles therefrom, or the articles were removed from the quench zone to a transfer zone and thereafter removed from the furnace after the transfer zone was brought to atmospheric conditions. This procedure required a certain amount of shutdown time for loading the furnace and bringing the transfer zone to a vacuum condition for introduction of the load thereto, or for removal of the articles from the quench tank for transfer to a delivery area for further handling.

## SUMMARY OF THE INVENTION

The present invention relates to a conveyor-type vacuum heat-treating furnace, preferably having a liquid quench incorporated therein. The furnace includes a loading chamber in which an auxiliary feed conveyor is located. The feed conveyor provides for deposit of the articles to be heat treated onto the main conveyor belt that is located within the furnace heating chamber. The conveyor belt is driven in an intermittent step-by-step manner, and for this purpose a pivotally mounted drive construction located at the rear of the conveyor engages the conveyor belt and, upon pivotal movement thereof, drags the conveyor belt over the support therefor to effect movement of the belt. The conveyor belt is located wholly within the heating chamber, which is also evacuated during the heat-treating cycle, heat treatment thus occurring in a predetermined subatmospheric environment. As the articles are moved in step-by-step relation on the belt through the heating chamber, they are dropped by gravity from the end of the conveyor belt through a series of baffles and into a quench tank located in a quench zone adjacent to and below the heating chamber. A unique transfer wheel continuously rotates within the liquid quench medium and is provided with pockets into which the articles are directed as the wheel rotates. The axis of the wheel is inclined so that, as the articles are lifted to a position opposite that from which they enter the wheel, they are directed by gravity to a delivery area for further handling.



Accordingly, it is an object of the present invention to provide a furnace for heat-treating metallic articles, wherein the articles are moved through a heating chamber in the furnace on a conveyor that is provided with an intermittent drive.

Another object of the invention is to provide a vacuum-type heat-treating furnace through which a conveyor belt extends for movement of the articles through the heating chamber thereon.

Still another object is to provide a continuous conveyor vacuum furnace having an oil quench, articles being directed onto the conveyor by an auxiliary feed belt that is located in a loading chamber at the forward end of the furnace.

Still another object is to provide a quench system for use in a continuous conveyor furnace having a rotating wheel that automatically transfers the quenched articles from a quench area to a delivery area after the quenching operation.

Still another object is to provide an intermittent drive for a conveyor belt as used in a heat treatment furnace, wherein the drive includes a pivotally mounted member that frictionally engages the conveyor belt and moves the belt forward in a step-by-step operation upon pivotal movement thereof.

Other objects, features and advantages of the invention will become apparent as the description thereof proceeds when considered in connection with the accompanying illustrative drawings.

## DESCRIPTION OF THE DRAWINGS

In the drawings which illustrate the best mode presently contemplated for carrying out the present invention:

FIG. 1 is an overall elevational view of the furnace construction embodied in the present invention showing the interior components thereof in phantom and further illustrating the relative position of the loading, heat treating, quench and delivery zones as contained in the furnace construction;

FIG. 1*a* is an enlarged sectional view of the loading zone of the furnace construction illustrated in FIG. 1;

FIG. 1*b* is an enlarged sectional view of a portion of the heat-treating chamber as illustrated in FIG. 1;

FIG. 1*c* is an enlarged sectional view showing the remainder of the heat-treating chamber and the quench and delivery zones as illustrated in FIG. 1;

FIG. 2 is a vertical sectional view taken along line 2—2 in FIG. 1;

FIG. 3 is a sectional view taken along line 3—3 in FIG. 1*c*;

FIG. 4 is an enlarged sectional view of the feed conveyor located in the loading zone;

FIG. 5 is a front elevational view of the transfer wheel shown in FIG. 1*c*;

FIG. 6 is an elevational view of the rear end of the conveyor belt and the pivotal drive that provides for intermittent movement thereof;

FIG. 7 is an elevational view showing the pivotal drive for the conveyor belt, the drive being disposed in the inactive position thereof; and

FIG. 8 is a view similar to FIG. 6 and showing the pivotal movement of the drive for the conveyor belt during the driving operation thereof.

## DESCRIPTION OF THE INVENTION

Referring now to the drawings and particularly to FIG. 1, the furnace construction embodied in the present invention is generally indicated at **10** and as shown includes a main housing generally indicated at **12** and a rear housing generally indicated at **14**. Joined to the main housing **12** is a loading chamber generally indicated at **16** into which the articles to be

heat treated are placed for delivery into the main housing 12 for the heat treatment operation.

The main housing 12 is constructed such that the longitudinal axis thereof is horizontal, and, as shown in FIG. 2, includes a rectangular outer shell 18 that encloses a cylindrical inner shell 20 in spaced relation with respect thereto. The spacing between the outer shell 18 and the inner shell 20 provides a cooling space through which a coolant liquid such as water is circulated. The rectangular configuration of the outer shell 18 provides for maximum cooling capacity so as to maintain the temperature of the inner shell 20 at a prescribed level. A domed end wall 22 is fixed to the forward end of the main housing 12 and also includes a cooling space therein, as illustrated in FIG. 1*a*, through which a cooling medium is circulated. It is understood that the domed end wall 22 is sealed to the main housing 12 at the end thereof in any convenient manner.

Supporting the outer shell 18 are longitudinally extending beams 24 and suitably positioned cross beams 26. As shown in FIGS. 1*a* and 1*b* the inner shell 20 is mounted on spaced supports 28 that are fixed to the outer shell 18. The rear housing 14 which is located at the rearmost end of the main housing 12 and communicates with the heating chamber therein, also encloses quench and delivery zones, as will be described hereinafter. As illustrated in FIG. 1*c*, the rear housing 14 includes an outer shell 30 that is spaced from an inner shell 32 to define a cooling space therebetween. The outer shell is mounted on a suitable support 34, and mounted on the upper end of the rear housing is a domed top wall 36 from which a spaced inner wall 37 is spaced to define a cooling space therewith for circulation of a cooling medium therein. The top wall 36 is conveniently sealed to the upper end of the rear housing and to the outer shell 18 in any suitable manner.

Referring again to FIG. 1*a*, the loading chamber 16 is shown including a bottom wall 36, a top wall 38, an end wall 40, and a forward flange 42 that is interconnected to a flange 44 joined to an inlet sleeve 46 mounted in the end wall 22 of the housing 12. Disposed within the sleeve 46 of the end wall 22 is a neck section 48 with which a door 50 engages in sealing relation. An actuator 52 connected to the door 50 is adapted to be externally operated for moving the door to and from a sealing position on the neck section 48. Secured to the bottom wall 36 of the loading chamber 16 are spaced channels 54, only one of which is illustrated, that define tracks, and spaced above the tracks 54 is an elongated rack 56. Formed in the upper wall 38 of the loading chamber 16 is an opening 58 through which the articles to be heat treated are inserted; and covering the opening in sealed relation with respect to the upper wall 38 is a pivotally mounted door 60 that may be locked in position on the upper wall 38 by any suitable locking member.

Mounted for longitudinal movement within the loading chamber 16 is loading device or dolly generally indicated at 62, which, as illustrated in FIG. 4, includes a housing that is defined by a rear portion 64 and an elongated forward portion 66. Mounted on the lowermost ends of the rear portion 66 of the loading dolly 62 are spaced rollers 68 that are received in the tracks 54 for movement therein. The elongated forward portion 66 has a belt 70 rotatably mounted therein, the belt being received on spaced supports 72 and 74 and extending around a forward idler 76, a rear snub roll 77 and a pulley 78. The pulley 78 is mounted on a shaft 35 which also receives a gear 79 thereon. The gear 79 is interconnected to a drive gear 80 through an intermediate gear 82, the drive gear 80 being mounted on a shaft 81 which also receives a gear 83 that drivingly engages the elongated rack 56. The upper wall of the forward portion 66 of the loading dolly 62 is formed with an opening 84 through which the articles to be heat treated are directed for placement on the belt 70. The forwardmost end of the front portion 66 has a guide element 86 joined thereto that guides the loading device 62 through the neck section 48 of the furnace when the articles to be heat treated are moved into the heating chamber of the housing 12. Although not shown, the shaft 81 is interconnected to an overrunning clutch that is operable to drive the shaft 81 through the gear 80 only when the loading device 62 is being moved in a reverse direction. It is seen that during the loading operation, the loading dolly 62 is advanced into the housing 12 to the position illustrated in phantom in FIG. 1*a*. Upon reverse movement of the loading dolly the gear 80 is rotated through the gear 83, clutch and shaft 81 to drive the feed belt 70. The reverse movement of the loading dolly 62 as combined with the motion of the feed belt 70 and movement of the conveyor belt (to be described) acts to deposit the articles to be heat treated on the conveyor belt in the heating chamber at zero velocity.

Referring now to FIGS. 1*a*, 1*b* and 1*c*, the heating chamber is illustrated therein and as shown comprises a first heating zone generally indicated at 88 and a second heating zone generally indicated at 90 spaced from the first heating zone and separated therefrom by a cooling zone 92. The heating zone 88 is enclosed by insulated walls formed of laminated graphite belts which are indicated as a top wall 94, sidewalls 95 and 96, a bottom wall 97, and front and rear walls 98 and 100 to which extensions 102 and 104 respectively are joined. The extensions 102 and 104 cooperate with shortened portions 106 and 108 formed on the bottom wall 97 to define restricted openings through which the conveyor belt and articles located therein move during the heat-treating operation. The bottom wall 97 is also formed with spaced openings 110 and 112 for receiving support rods for the conveyor belt, as will be described. Extending longitudinally of the heating chamber 88 are a plurality of tubular graphite heating elements 114 that are held in position by graphite terminals 116, the terminals 116 in turn being connected to buss bars 118 that project outwardly of the housing walls for connection to a suitable source of current. The construction of the graphite heating elements 114 is illustrated in copending application Ser. No. 724,716 filed Apr. 29, 1968.

The heating zone 90 is constructed similarly to the heating zone 88 and includes a plurality of walls that are formed of layers of insulated graphite material to define a top wall 120, a bottom wall 122, a forward end wall 124, and an elongated rear wall 126. Suitable sidewalls are also joined to the top and bottom walls of the heating chamber 90 but are not indicated in the drawings. Shortened sections 128 and 130 are joined to the forward wall 124 and the bottom wall 122, respectively, to define a reduced section through which the conveyor belt and the articles thereon are directed when entering the heating zone 90. Additional insulated graphite sections are provided on the rear side of the heating zone 90, as indicated at 132, 134 and 136 that cooperate to provide passageways, the purposes of which will be described hereinafter. As shown in FIGS. 1*b* and 1*c* the tubular graphite heating elements 138 extend the length of the heating chamber 90 and are interconnected to graphite terminals 140 that in turn are joined to buss bars 142 that extend outwardly of the housing walls for connection to a suitable source of current. It is understood that the heating elements 114 and 138 may be located transversely in the heating zones, but this would require special connections. As previously described in connection with the bottom insulated wall 96, the bottom wall 122 of the insulated sections is also formed with suitable openings for receiving the supports of the main conveyor belt, as will be described.

In order to transfer the articles to be heat treated through the heating chambers 88 and 90, a conveyor belt indicated at 144 is provided, the belt 144 being formed of an alloy material and having marginal upturned edges 146 formed thereon, as indicated in FIG. 2. The belt 144 is supported by a plurality of hearth plates 148 that are joined in end-to-end relation by offsetting one end of each plate as illustrated in FIG. 1*b*, the hearth plates 148 in turn being mounted on tubular rods 150 that are disposed in pairs and that are fixed at the lower ends thereof in crossmembers 152. As also shown in FIG. 2, the crossmembers 152 are mounted on longitudinal beams 154 that are supported on the inner shell 20 of the housing 12 by brackets 156.

The present invention incorporates a unique intermittent drive for the conveyor belt 144 which is in contrast to the conventional continuous rotating drive normally employed in conveyor-type heat treating furnaces. As illustrated in FIG. 1*a*, the conveyor belt 144 idles around an adjustable roll 158 located at the forward end of the furnace unit. Mounted for pivotal movement at the rear end of the furnace unit is an arcuate shaped segment member 160 and as illustrated in FIGS. 1*c* and 6, 7 and 8, the conveyor belt 144 extends over the pivotally mounted segment member 160 in frictional engagement therewith and is then received between fixed segment members 162 and 164. Referring particularly to FIGS. 6, 7 and 8, the segment member 160 is shown being interconnected to spaced arms 166 that are fixed to a drive shaft 168, the drive shaft 168 extending through the inner and outer shells 20 and 18 by way of a sealed bearing assembly 170. Located on the end of the drive shaft 168 that is positioned externally of the furnace housing is a lever arm 172 interconnected to a drive arm 174, the drive arm 174, in turn, being reciprocated by any suitable drive mechanism such as an eccentric. It is seen that as the drive arm 174 reciprocates, the drive shaft 168 will oscillate, thereby pivotally driving the arms 166 and the segment member 160 joined thereto. As the segment member 160 is intermittently pivoted by the arms 166 to the position illustrated in FIG. 8, the conveyor belt 144 which is located in frictional engagement therewith is dragged rearwardly as indicated by the arrows in FIG. 8. When the arms 166 pivot back to the position illustrated in FIG. 7, the weight of the belt causes it to drop between the segment members 162 and 164. These two segment members are adjusted so that the conveyor belt is able to slip through in one direction only, resulting in a constant and even pull of the belt as the segment member 160 is periodically pivoted by the arms 166. It is seen that the intermittent pivotal action of the segment member 160 will result in a corresponding intermittent longitudinal movement of the conveyor belt over the plates 148.

In order to reduce the stress applied to the conveyor belt 144 as it is pulled by pivotal action of the segment member 160 and further to provide for an easier operating movement of the conveyor belt, a heating element 170 is placed within the hollow area of the segment portion 160. This heating element may be of the same type as described above and produces sufficient heat to adequately maintain a proper temperature of the belt as it moves around the segment member 160.

Although the concept of the intermittent drive for the conveyor belt 144 may be incorporated in any style of conveyor-type furnace, it is contemplated that the furnace illustrated herein will be employed for heat-treating articles under vacuum and then quenching the heat-treated articles under vacuum in an oil quench medium. For this purpose, a quench tank 172 having an oil quench medium 174 located therein is disposed below the heating zone 90 for receiving the articles as they are discharged from the conveyor belt 144 upon movement of the belt around the segment member 160 and toward the segment members 162 and 164. The insulating sections as defined by the walls 126 and 132 define a channel through which the articles are directed, a series of metallic baffles 176 that are connected in a chute 178, further directing the articles into the quench medium 174 located in the quench tank 172. The baffles 176 are formed of a light gage metallic material and act to prevent oil and vapors from entering the heating zone 90. A fan 180 located in the quench tank 172 and driven by an externally mounted motor that is interconnected to a shaft 182 joined to the fan 80, acts to circulate the oil within the tank 172 so as to increase the quenching action during the quenching cycle and further acts to entrain and entrap oil vapors that might tend to backflow into the heating zone 90.

Another of the unique features of the present invention is that the heat-treated articles are automatically transferred from the quench tank 172 to a discharge area and without the requirement of the operator backfilling the heating chamber or the quench zone with an atmosphere or removing the quench tank from the furnace unit. This is accomplished by providing a transfer wheel generally indicated at 184 in FIG. 1*c*. Referring also to FIG. 5, the transfer wheel 184 includes a spider assembly defined by an outer ring 186, an inner ring 188, and a plurality of spokes 190 that are joined to a hub 192 and to crossmembers 194 that are interconnected between the outer and inner rings 186, 188. Fixed to each of the crossmembers 194 and the inner and outer rings are a plurality of plates 196 that are inclined with respect to the spokes 192 and that define a plurality of pockets 198 therebetween. A wire mesh hood 200 extends peripherally around the plates 196 and cooperates with the plates 196 to form the pockets 198.

A shaft 202 mounted in bearings 204 that are located on the quench tank 172 extends through the inner and outer shells 32 and 30 of the housing 14 by way of a sealed connection 206. A sprocket wheel 208 mounted on the outermost end of the shaft 202 receives an appropriate drive chain (not shown) thereon that is interconnected to a drive unit, such as an electric motor. As shown in FIG. 1*c*, the shaft 202 is inclined with respect to the horizontal so as to dispose the axis of the transfer wheel 188 at the same angle. The pockets 198 are thus received within the quench tank 172 as the wheel rotates and receive the heat-treated articles as they fall downwardly from the conveyor belt 144 through the chute 178. As illustrated in FIG. 5, as the articles are received within a pocket 198, they are transferred by the wheel 184 to an upper position, at which point they fall by gravity from the plates 196 onto a transfer chute 210 that extends through a sealed connection in the inner and outer shells 30, 32 of the rear housing 14. It is understood that the transfer wheel 184 is rotated at a speed that is slow enough to provide for sufficient immersion time of the articles within the quench tank 172 to effect proper quenching thereof.

Referring now to FIG. 3, the chute 210 is illustrated projecting through the walls 30, 32 of the rear housing 14, and communicating with the chute 210 is an enclosed slide 212 that is divided by a pivotally mounted deflector 214 into passageways 216 and 218. Each of the passageways 216 and 218 communicates with a sealed bin 220 and 222, respectively, and both of the bins communicate with a vacuum pump that provides for evacuation of the bins in sequential relation, depending upon which of the bins is receiving the heat-treated and quenched articles that are transferred to the chute 210 and the slide 212. It is seen that the pivotally mounted deflector 214 which is provided with an exterior handle control 222 is moved in such a position as to deflect the articles received from the chute 210 through the appropriate passageway for introduction into the bin that has been evacuated to a pressure equal to that of the main vessel.

## OPERATION

In operation of the furnace 10, it is first presumed that articles to be heat treated will be loaded onto the conveyor belt 144 by the loading device 62. With the door 50 located in a sealed position so as to protect the heating chamber, the door 60 is pivoted to an open position, and the articles to be heat treated are placed on the feed belt 70. The loading door 60 is then sealed, and the load chamber is then pumped out to a pressure equal to that of the heating zones in the heating chamber. The door 50 is then moved to an open position, and the loading device 62 is moved forwardly on the track 36 to the position illustrated in dotted lines in FIG. 1*a*. Although the gear 83 is moving on the rack 56, as the feeding device advances into the heating chamber, the overrunning clutch prevents rotation of the drive gear 80. As the loading device 62 is moved rearwardly out of the heating chamber, the overrunning clutch on the shaft 81 is locked in to cause the gear 83 moving on the rack 56 to drivingly rotate the pulley 78, thereby moving the feed belt 70. The combination of the speed of the conveyor belt 144, the movement of the feed belt

70 and the reverse motion of the feed apparatus 62 enables the articles on the feed belt 70 to be deposited onto the main conveyor belt 144 at approximately zero velocity. After the loading device 62 is withdrawn from the heating chamber, the door 50 is once again moved to the sealed position, and the load chamber is again brought to atmospheric pressure ready for the next loading operation.

The articles as located on the conveyor belt 144 are transferred through the heating zone 88, cooling zone 92 and heating zone 90, at which they are subjected to the required heat treatment cycle. Transfer of the articles through the heating zones 88 and 90 is produced by pivotal movement of the segment member 160 which is pivoted upon oscillating movement of the drive shaft 168. As the segment member 160 is pivoted to the left, as seen in FIGS. 1c, 7 and 8, the conveyor belt 144 is dragged therewith. As the segment member 160 returns to the normal position, the excess portion of the conveyor belt 144 overlying the segment member 160 falls by the weight thereof through the fixed segment members 162 and 164. The intermittent feed of the conveyor belt 144 as described provides for a sufficient heat-treating cycle, as the articles are transferred through the heating zones. It is also seen that since the conveyor belt 144 does not pass through pinch rolls, the upturned side sections 146 may be formed on the margins of the belt without any interference with the drive of the belt.

The heat-treated articles fall by gravity from the conveyor belt 144 through the chute 178 and into the quench liquid 174 as contained in the quench tank 172. As the articles fall into the quench tank 172, they are directed by the chute 178 into a pocket 198 of the transfer wheel 184. Since the transfer wheel 184 is continuously rotated, the articles are moved upwardly out of the quench tank and fall by gravity at the uppermost position thereof onto the chute 210. Either the bin 220 or 222 is open to communication with the chute 210 through its passageway and has been evacuated to a pressure equal to that of the main vessel. An interior door of the other bin is sealed during this interval. When the bin to which the articles are directed is filled, that bin is sealed and the opposite bin is evacuated to the pressure of the main vessel, whereafter the deflector 214 is rotated to then direct the articles to the unfilled bin. The articles in the filled bin may then be removed therefrom for further handling.

It is seen that the heat-treating cycle is essentially continuous and articles may be introduced into the heating chamber at intervals without backfilling the heating chamber or shutting down the furnace. Quenching of the articles and removal thereof from the quench tank is also carried out automatically and without backfilling the quench tank or removing the quench tank from its position within the vessel.

What is claimed is:

1. In a furnace construction for heat-treating metallic articles, a heating chamber, a conveyor belt extending through said heating chamber and receiving said metallic articles thereon for transfer through said heating chamber during the heat-treating cycle, means for supporting said conveyor belt along the length thereof, means for driving said conveyor belt in an intermittent motion including a pivotally mounted member with which said belt is engaged in frictional relation, and means for periodically pivoting said member in a direction toward the rear of the furnace construction, wherein said belt is dragged periodically in the same direction to effect an intermittent advancing movement of said belt through said heating chamber.

2. In a furnace construction as set forth in claim 1, said pivotally mounted member having an arcuate surface over which said conveyor belt is received and being located at the rearmost end of said supporting means in disconnected relation with respect thereto, wherein pivotal movement of said member imparts a corresponding longitudinal movement of said conveyor belt.

3. In a furnace construction as set forth in claim 2, said supporting means including a plurality of plates that are disposed in end-to-end horizontal relation and that define a bed over which said belt is slidably moved during the intermittent movement thereof.

4. In a furnace construction as set forth in claim 3, said belt having upturned marginal edges formed thereon that act to retain the articles in place on said belt.

5. In a furnace construction as set forth in claim 2, means for heating said pivotally mounted member so as to maintain the temperature of the area at which said member is located substantially the same as in said heating zone, thereby providing for continued heat treatment of the articles as said belt moves over said member, and to provide for minimum stress on said belt during the movement thereof.

6. In a furnace construction as set forth in claim 1, a quench zone located adjacent to the rearmost end of said conveyor belt, for receiving the heat-treated articles therefrom for quenching, and rotating means located at said quench zone for automatically transferring the quenched articles from said quench zone to a discharge area for further handling.

7. In a furnace construction as set forth in claim 6, said quench zone including a tank in which a quench liquid is located, said rotating means including a transfer wheel having a plurality of pockets that are intermittently immersed in said quench liquid and that receive the articles therein, the axis of said wheel being inclined so that upon movement of a pocket out of the quench liquid to a position opposed thereto, said articles drop from the pocket by gravity to said discharge area.

8. In a furnace construction as set forth in claim 1, a loading station located forwardly of said heating zone, means for loading said articles onto said conveyor belt at said loading station including a feed belt, means for driving said feed belt at a predetermined speed, wherein said feed belt cooperates with said intermittently moving conveyor belt to deposit said articles on said conveyor belt in said heating chamber.

9. In a furnace construction as set forth in claim 8, means for sealing said loading station from said heating chamber, after the loading of said articles on said conveyor belt, wherein the heating chamber is isolated during the heat-treating cycle.

10. In a furnace construction as set forth in claim 1, said heating chamber being located in a vacuum vessel, wherein the heat-treating cycle of said articles is carried out in a predetermined vacuum and at a predetermined temperature.

11. In a furnace construction as set forth in claim 10, a loading station at which said articles are introduced into said furnace construction, a feed belt located at said loading station for receiving said articles thereon, and means for driving said feed belt at a predetermined speed, wherein said feed belt cooperates with said intermittently moving conveyor belt to deposit said articles on said conveyor belt in said heating chamber.

12. In a furnace construction as set forth in claim 10, a quench zone located adjacent to said heating chamber, said quench zone including a quench tank having a liquid quench medium contained therein, and means received in said quench tank for automatically transferring the quenched articles to a delivery station for further handling.

13. In a furnace construction as set forth in claim 12, said pivotally mounted member being located at the discharge end of said heating chamber and being disconnected from said supporting means, wherein pivotal movement of said member imparts a corresponding longitudinal movement of said conveyor belt that is located in frictional engagement therewith.

14. In a furnace construction as set forth in claim 13, said supporting means including a plurality of plates that are disposed in end-to-end horizontal relation and that define a bed over which said belt is slidably moved during the intermittent movement thereof.

15. In a furnace construction as set forth in claim 12, said transferring means including a wheel having a plurality of spaced pockets formed therein that are periodically movable into said quench tank for receiving the quenched articles therein, the axis of said wheel being inclined so that upon movement of a pocket out of the quench tank to a position op-

posite thereto, the articles therein drop from the pocket by gravity to said delivery station.

16. In a furnace construction for heat treating metallic articles, a heating chamber, a conveyor belt extending through said heating chamber and receiving said metallic articles thereon for transfer through said heating chamber during the heat treating cycle, means for driving said conveyor belt, means located at a loading station for loading said articles onto said conveyor belt at the entrance to said heating chamber including a longitudinally movable loading device having a feed conveyor mounted for movement thereon, and means responsive to movement of said loading device for controlling movement of said feed conveyor, wherein said articles are transferred from said feed conveyor to said conveyor belt only when said loading device is moving in a longitudinal direction.

17. In a furnace construction as set forth in claim 16, a rack located in fixed relation at said loading station, a gear on said loading device engaging said rack and rotatable thereon upon longitudinal movement of said loading device, said feed conveyor being interconnected to said gear and driven thereby, and clutch means responsive to rotation of said gear to permit movement of said feed conveyor only upon reverse longitudinal movement of said loading device, wherein the movement of said conveyor belt and reverse movement of said loading device that provides for movement of said feed conveyor deposits said articles from said feed conveyor onto said conveyor belt at approximately zero velocity.

18. In a furnace construction for heat-treating metallic articles, a heating chamber, a conveyor belt extending through said heating chamber and receiving said articles thereon for transfer through said heating chamber during the heat-treating cycle, means for driving said conveyor belt, said heating chamber being maintained at a subatmospheric pressure during the heating cycle so that heat treating is carried out in a vacuum, a quench zone communicating with said heating chamber and receiving the heat-treated articles for quenching therein, and a rotatable transfer device extending into said quench zone for automatically transferring said articles from said quench zone to a delivery zone for further handling, said transfer device including a wheel having a plurality of spaced pockets formed therein that are periodically movable into said quench zone for receiving the quenched articles therein, the axis of said wheel being inclined so that upon rotating movement thereof each of said pockets is moved through the quench zone to a position opposite thereto, wherein the articles received in said quench zone drop by gravity to said delivery zone.

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