

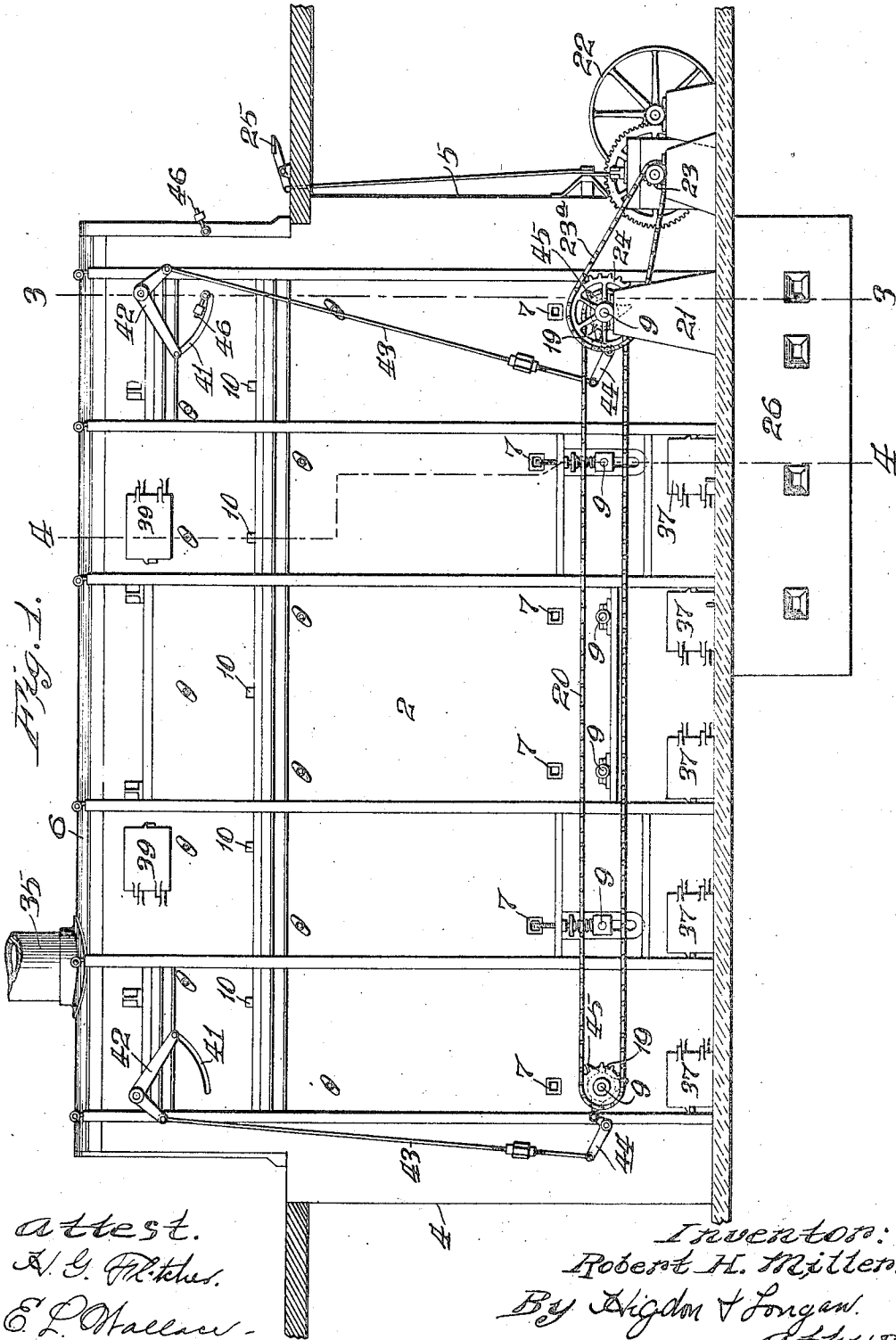
R. H. MILLER.
LEER.

APPLICATION FILED JULY 15, 1909.

1,070,509.

Patented Aug. 19, 1913.

3 SHEETS-SHEET 1.



attest.
A. G. McKee.
E. L. Hallen.

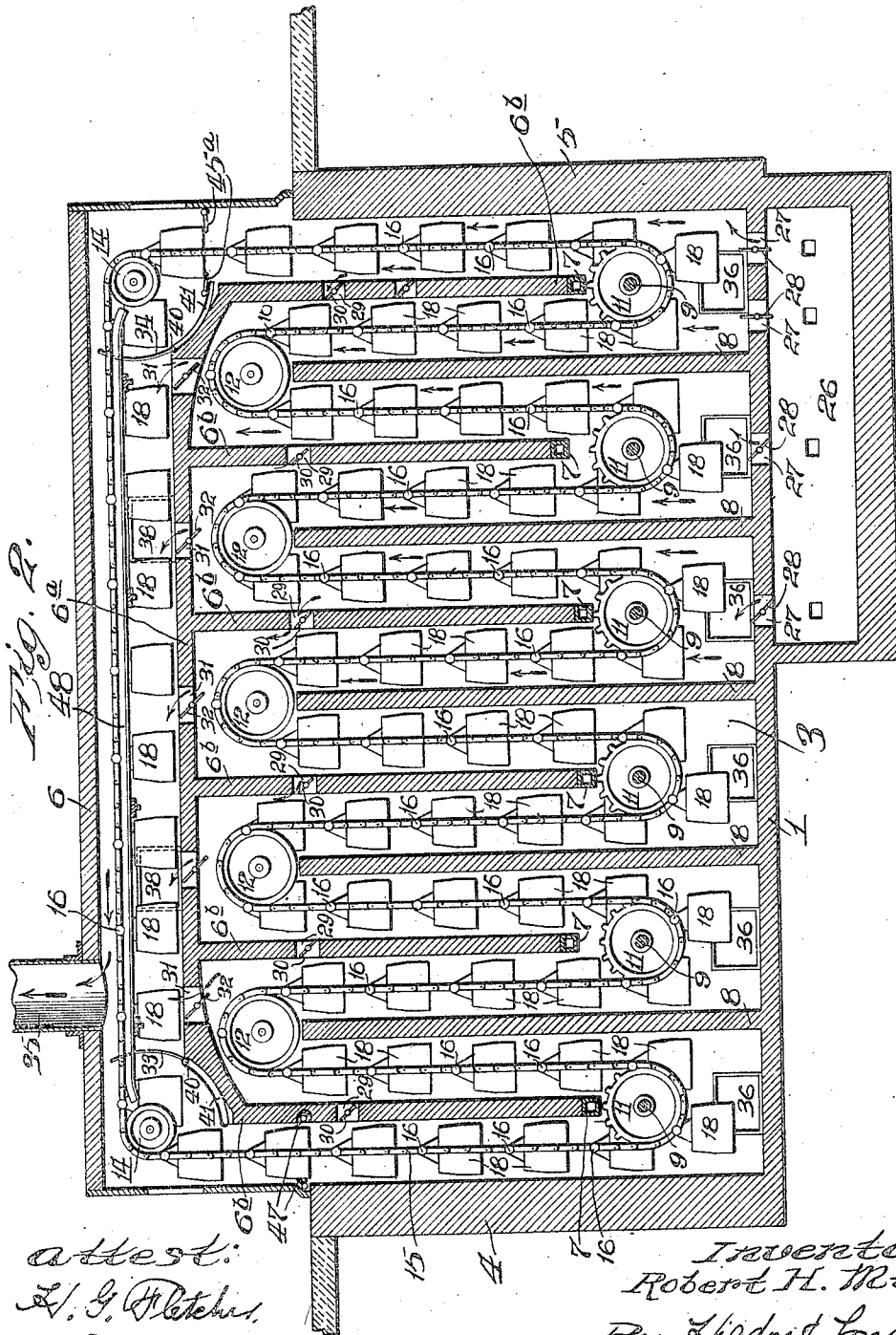
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3 SHEETS—SHEET 2.

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attest:
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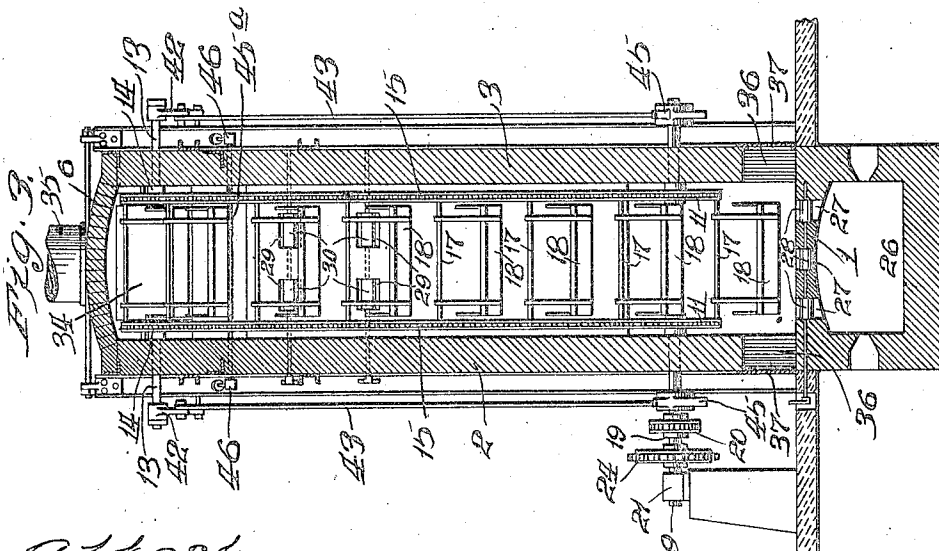
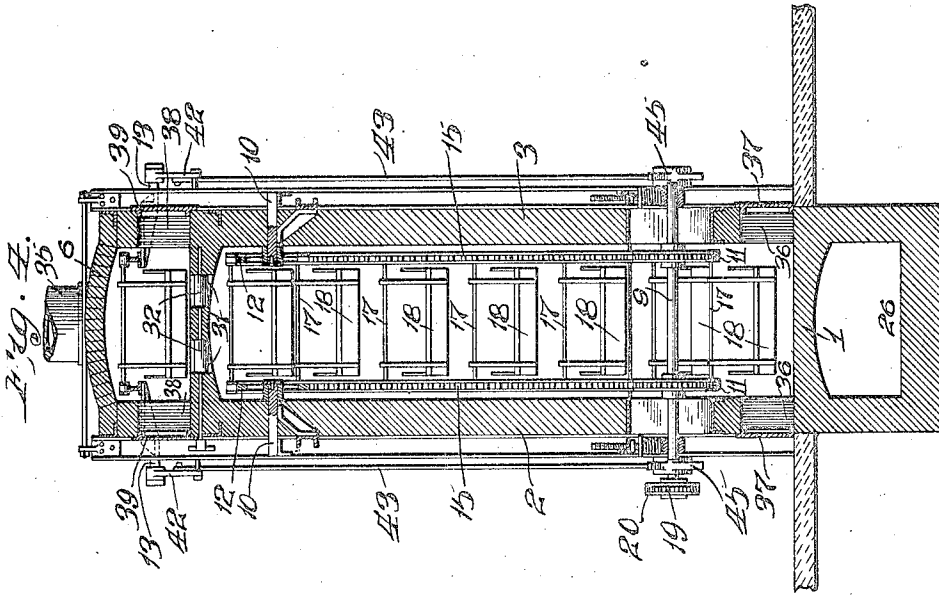
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3 SHEETS—SHEET 3.



Attest.

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UNITED STATES PATENT OFFICE.

ROBERT H. MILLER, OF ST. LOUIS, MISSOURI, ASSIGNOR TO LACLEDE-CHRISTY CLAY PRODUCTS COMPANY, OF ST. LOUIS, MISSOURI, A CORPORATION OF MISSOURI.

LEER.

1,070,509.

Specification of Letters Patent.

Patented Aug. 19, 1913.

Application filed July 15, 1909. Serial No. 507,737.

To all whom it may concern:

Be it known that I, ROBERT H. MILLER, a citizen of the United States, and resident of St. Louis, Missouri, have invented certain new and useful Improvements in Leers, of which the following is a specification containing a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention relates to improvements in leers, the object of my invention being to construct a leer in which a continuous conveyer is arranged to receive articles to be annealed and carry such articles through a series of compartments of varying temperatures, whereby the articles to be annealed are subjected to a gradually increasing then gradually diminishing temperature and not subjected to outside atmosphere until removed from the leer.

A further object of my invention is to construct a leer for annealing in which a maximum of annealing area is obtained occupying a minimum of floor space.

For the above purposes my invention consists in certain novel features of the construction and arrangement of parts as will be hereinafter more fully set forth, pointed out in my claims and illustrated in the accompanying drawings, in which:

Figure 1 is an elevation of the complete leer; Fig. 2 is a longitudinal, sectional elevation of the complete leer; Fig. 3 is a transverse, sectional elevation taken on line 3—3 of Fig. 1; and, Fig. 4 is a transverse sectional elevation taken on line 4—4 of Fig. 1.

Referring by numerals to the accompanying drawings: 1 designates the base, 2 and 3 the side walls, 4 and 5 the end walls and 6 the top of the leer.

Extending longitudinally of the leer, adjacent the top 6, is a partition 6^a and connecting with said partition is a plurality of dividing walls 6^b supported by the hollow rectangular bars 7 extended through the side walls 2 and 3 some considerable distance above the base 1.

Intermediate each pair of dividing walls 6^b is a dividing wall 8 extending from the base 1 to a point some considerable distance below the partition 6^a. Shafts 9 are rotatably mounted in suitable bearings in each of the side walls 2 and 3 beneath the walls 6^b

and stub-shafts 10 are non-rotatably mounted in the side walls above the dividing walls 8. Carried by each shaft 9 is a pair of sprocket wheels 11, and carried by each stub-shaft 10 is a sprocket wheel 12, similar to the wheels 11. Stub-shafts 13 are non-rotatably mounted in the side walls 2 and 3 near each end of the leer, adjacent the top 6 and sprocket wheels 14 are supported by said stub-shaft 13. Endless chains 15 embrace the sprocket wheels 11, 12 and 14, and arranged at regular intervals on the chain are links 16 which carry the rods 17. Suspended from each rod 17 is a tray 18 the sides of which are vertical for a portion of their height, then incline inwardly toward each other for purposes hereinafter made clear. The shafts 9 at each end of the leer project beyond the side wall 2 and sprocket wheels 19 are mounted thereon and embraced by a chain 20. The shaft 9, at the right hand end of the leer, projects beyond the wall 2 a greater distance than the shaft 9 at the left hand end of the leer and is provided with a bearing 21. A driving mechanism 22 is positioned adjacent the right hand shaft 9 arranged to impart motion to the conveyer chains 15 through the medium of the sprocket wheel 23, chain 23^a, sprocket wheel 24 carried by the right hand shaft 9, the sprocket wheels 19 and chain 20.

I prefer to employ a continuously driven motor in connection with my driving mechanism and utilize a means such as a clutch (not shown) operated by a pedal 25 to set the conveyer in motion.

A furnace 26 is arranged, adjacent the right hand end of the leer, to discharge heat into a number of the compartments, formed by the walls 6^a and 8. As shown, the furnace is arranged for burning hydro-carbon, there being a greater number of burner openings in the right hand compartment than in the succeeding compartments.

Openings 27, formed in the base of the leer between the furnace and compartments, permit the heat to rise from the furnace into the compartments and dampers 28 are arranged in the openings for directing and controlling the heat from the furnace. An opening 29 is formed in each of the walls 6^b, adjacent their upper ends, and a damper 30 is arranged in each opening to direct the heat from one compartment to the other.

The partition 6^a is provided with openings 31 between the walls 6^b, and dampers 32 are arranged in such openings to control the discharge of heat from the compartments into the compartment formed by the top of the leer and the partition 6^a. At each end of said compartment, formed by the partition 6^a, are the shutters 3 and 34 arranged to close the ends of said compartment. A stack 35 is arranged adjacent the left hand of the leer through which the heat escapes after having passed through the compartments formed by the walls 6^b and 8 and the compartment formed by the partition 6^a and top of the leer.

Openings 36 are formed in the side walls 2 and 3, in each of the compartments formed by the walls 6^b and 8, adjacent the base of the leer and doors 37 are provided for closing the openings. Similar openings 38 are formed in the side walls communicating with the compartment between the partition 6^a and top of the leer and doors 39 are arranged for closing said openings.

When the conveyer is set in motion the shutters 33 and 34 are automatically operated and as shown are provided with rods 40 which ride in the slots 41. Bell-crank levers 42 are pivoted to the side walls of the leer and their long arms connected with the rods 40. Rods 43 are pivotally connected with the short arms of the lever 42 and with the bell-cranks 44 pivoted to the side of the leer adjacent the end shafts 9. Spiders 45 are carried by the end shafts 9 and arranged to engage the short arms of the bell-crank levers 44.

Plates 45^a are pivoted within the leer in the path of travel of the trays 18 and are provided with weighted levers 46 arranged to hold the plates 45 against the trays 18 to prevent escape of heat upwardly from the initial compartment formed by the end 5 of the leer and the initial wall 6^b. In the terminal compartment, formed by the end 4 of the leer and the wall 6^b, plates 47, similar to the plates 45, are arranged, in the path of travel of the trays, and are operated by the trays to permit their travel upwardly through the terminal compartment, which plates serve to prevent heat from escaping from said terminal compartment. Tracks 48 are arranged in the compartment, formed by the partition 6^a and top of the leer, for supporting the conveyer and trays between the sprocket wheels 13 and 14.

In the operation of the leer the operators fill the tray, adjacent the filling opening in the end of the leer, with articles to be annealed. The pedal 25 is then depressed which connects the conveyer with the driving mechanism and moves the entire conveyer until a second tray has passed the filling opening. In this manner the trays are successively filled and, during their travel

through the compartments are subjected to a gradually increasing temperature in the initial compartment and from thence are subjected to a gradually diminishing temperature. The trays are then successively emptied, which operations, the filling and emptying, may be continuous. In starting the leer and preparing it in condition to anneal articles, the burners in the furnace are ignited, and the temperatures of the various compartments, controlled by the various dampers, in the compartments, to the proper degrees. It will be obvious that the trays, in the compartment formed by the top of the leer and partition 6^a, will be heated and put in condition to receive articles to be annealed. The operator then causes the first tray, thus heated, to be moved to a position adjacent the filling opening, it being understood that with each movement of the conveyer the shutters 33 and 34 are automatically opened and closed during the passage of each tray. The operation of filling the trays is repeated in succession. As each tray is filled at one end of the leer operators remove the annealed articles from the trays at the opposite end of the leer. By this arrangement of leer and conveyer, I am enabled to subject articles to be annealed to a gradually increasing temperature in the initial compartment then subject the articles to a gradually diminishing temperature, and, by reason of the arrangement of the annealing compartments and great length of conveyer chains the articles are confined within the leer a considerable length of time and not subjected to outside air until removed from the leer. I am enabled, also, by this construction of leer, to obtain a maximum annealing area occupying a minimum of floor space, and, by this arrangement of leer I am enabled to place the leer almost entirely beneath the ground or floor line, thus doing away with conveyers or the like to the filling and emptying ends of the leer.

By the arrangement of the initial warming compartment, the annealing compartments, the dampered openings, between the annealing compartments and between the annealing compartments and the initial warming compartment, the inlets to various of the annealing compartments, for heat and products of combustion, and the stack; the draft may be controlled to permit of any desired direction of travel of the heat and the products of combustion. This control of the current is essential for a number of reasons well known to persons versed in the art, among which is that in heating up the leer in order to expel all of the cold air therein, the various dampers may be set in positions to direct the heat and products of combustion to travel through the entire leer, and, in order that the entire conveyer be

heated in this heating process, the conveyer is set in motion, the direction of the conveyer being the same as the direction of the current in the leer. After this heating up has been accomplished, and it be desired to anneal ware, certain of the dampers 30 and 32 are set in position to direct the heat in the annealing compartments, directly connected with the source of heat, to travel in any desired direction with relation to the travel of the conveyer.

I claim:

1. In a leer, a series of inter-communicating compartments, a furnace arranged to discharge heat into a number of said compartments, a conveyer arranged for travel within the compartments, and a separate compartment in the path of travel of heat from the series of compartments through which the conveyer travels before entering the series of compartments.

2. In a leer, a series of compartments, a furnace arranged to discharge heat into a number of the compartments, means for directing and controlling the heat between the compartments, a single compartment in the path of travel of the heat from the series of compartments, and a conveyer arranged for travel through all of the compartments.

3. In an annealing leer, a series of inter-communicating compartments, a furnace arranged to discharge heat into a number of the compartments, a single compartment arranged in the path of travel of the heat from the series of compartments, means for directing and controlling the heat between all of said compartments, and ware-carrying means arranged for travel through all of the compartments.

4. In a leer, a series of compartments, a furnace arranged to discharge heat into a number of the compartments, means for controlling and directing the heat between the compartments, a conveyer arranged for travel within the compartments there being openings in the leer to provide access to the conveyer and automatic means to prevent the escape of heat from the leer through said openings.

5. In a leer, a series of inter-communicating compartments, means for discharging heat into a number of said compartments, a single compartment in the path of travel of the heat from the series of compartments, means for controlling and directing the heat from said number of compartments to the remainder of the compartments, and an endless ware-carrying means arranged for travel first through the single compartment and then through the series of compartments.

6. In an annealing leer, a series of compartments, means for heating a number of the series to an annealing temperature,

means for directing the heat from the annealing compartments to the remaining compartments so that there is a lower degree of temperature in the remaining compartments, a single compartment in the path of travel of the heat from the series of compartments, and a conveyer arranged for travel through the single compartment and thence through the series of compartments.

7. In a leer, a series of compartments, a single compartment, a furnace arranged to discharge heat into a number of the compartments in the series, means for directing and controlling the heat between the series of compartments, means for directing and controlling the heat from the series of compartments to the single compartment, a conveyer arranged for travel through the compartments there being openings formed in the leer to provide access to the conveyer and means to prevent the escape of heat from the leer through said openings.

8. In a leer, a series of compartments, a single compartment, a furnace arranged to discharge heat into a number of compartments in the series, means for directing and controlling the heat between the compartments in said series, means for directing and controlling the heat from the series of compartments to the single compartment, a conveyer arranged for travel through the compartments, means actuated by the conveyer to prevent escape of heat from the initial and terminal compartments of said series, there being openings formed in the leer to provide access to the conveyer and means to prevent escape of heat from the leer through said openings.

9. In a leer, a series of compartments, a single compartment, a furnace arranged to discharge heat into a number of the compartments in the series, means for directing and controlling the heat between the compartments in said series, means for directing and controlling the heat from the series of compartments to the single compartment, sprocket wheels mounted in each of the compartments, chains embracing the sprocket wheels, trays carried by said chains, means actuated by the trays to prevent escape of heat from the initial and terminal compartments in the series, there being openings formed in the leer to provide access to the trays, shutters arranged at each end of the single compartment, to prevent the ingress of atmospheric air and escape of heat from said compartment and means for operating the shutters to permit travel of the trays.

10. In an annealing leer, an inclosure, a furnace arranged to discharge heat into the inclosure, walls within the inclosure dividing the same into a series of inter-communicating compartments and a single, separate compartment in the path of travel of the

heat from the series of compartments, means for controlling the heat from the furnace so that there is an annealing temperature in a number of the compartments of the series, and a lower temperature in the remaining compartments, and a ware-carrying conveyer arranged for travel first through the single compartment thence through the series of compartments whereby the conveyer is heated and put in condition to receive the ware and the ware subjected first to a gradually increasing then to a gradually decreasing temperature.

11. In a leer, an inclosure, a furnace arranged to discharge heat into the inclosure, a conveyer arranged for travel through the inclosure, means for directing and controlling the heat through said inclosure, there being openings in the leer to provide access to the conveyer, means to prevent escape of heat from the leer through said openings, whereby articles carried by the conveyer to be annealed are first subjected to a gradually increasing then to a gradually diminishing heat and not subjected to outside air during their travel between said openings and a separate compartment in the path of travel of the heat from the inclosure through which said conveyer travels before entering the inclosure.

12. In an annealing leer, an inclosure, means for discharging heat into the inclosure, means for dividing the inclosure into a series of vertically disposed compartments, and a single compartment horizontally disposed and in the path of travel of heat from the series of compartments, dampered-openings for directing and controlling the heat between the compartments of the series and between the series of compartments and the single compartment, an endless ware-carrying conveyer arranged for travel first through the single compartment thence through the series of compartments, and means for closing at times the communi-

cations between the single compartment and the series of compartments.

13. In a leer, an inclosure, means for dividing the inclosure into a series of vertically arranged compartments and a single horizontal compartment, means for discharging heat into a number of the compartments in the series at one end of the inclosure, a stack leading from the single compartment adjacent the opposite end of the inclosure, dampered-openings for controlling the heat between the compartments of the series and between the series and the single compartment, and an endless conveyer arranged for travel first through the single compartment and thence through the compartments of the series.

14. In a leer, an inclosure, means for dividing the inclosure into a series of vertically arranged compartments and a single horizontal compartment, means for discharging heat into a number of the compartments in the series at one end of the inclosure, a stack leading from the single compartment adjacent the opposite end of the inclosure, dampered-openings for controlling the heat between the compartments of the series and between the series and the single compartment, an endless conveyer arranged for travel first through the single compartment and thence through the compartments of the series, there being openings providing access to the inclosure adjacent the ends of the single compartment, and means, operable by said conveyer, for closing the ends of the single compartment at times.

In testimony whereof, I have signed my name to this specification, in presence of two subscribing witnesses.

ROBERT H. MILLER.

Witnesses:

E. E. LONGAN,
E. L. WALLACE.