

Aug. 8, 1939.

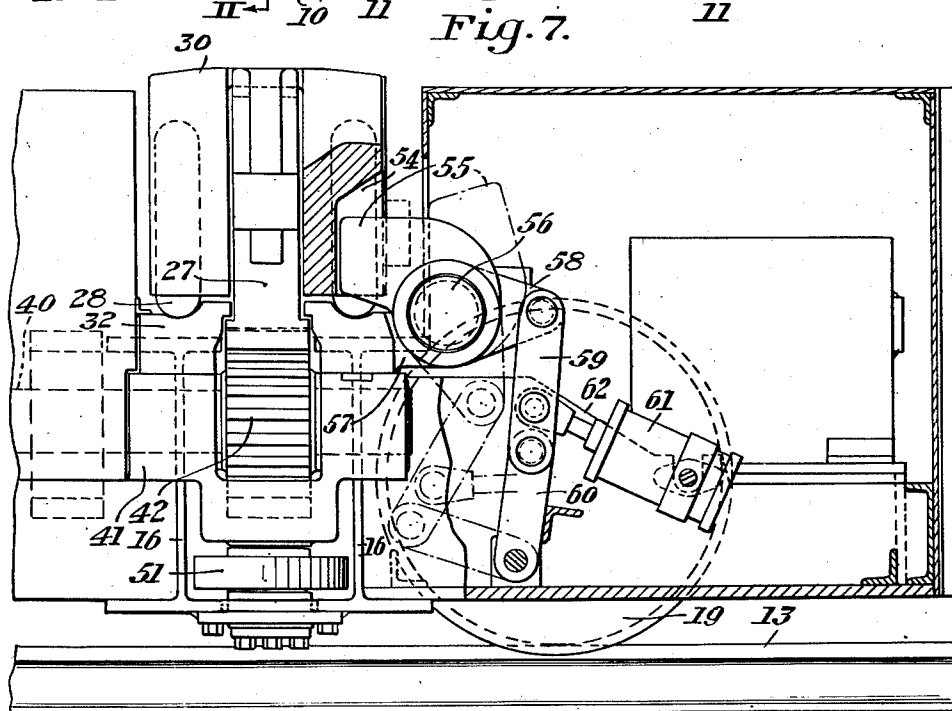
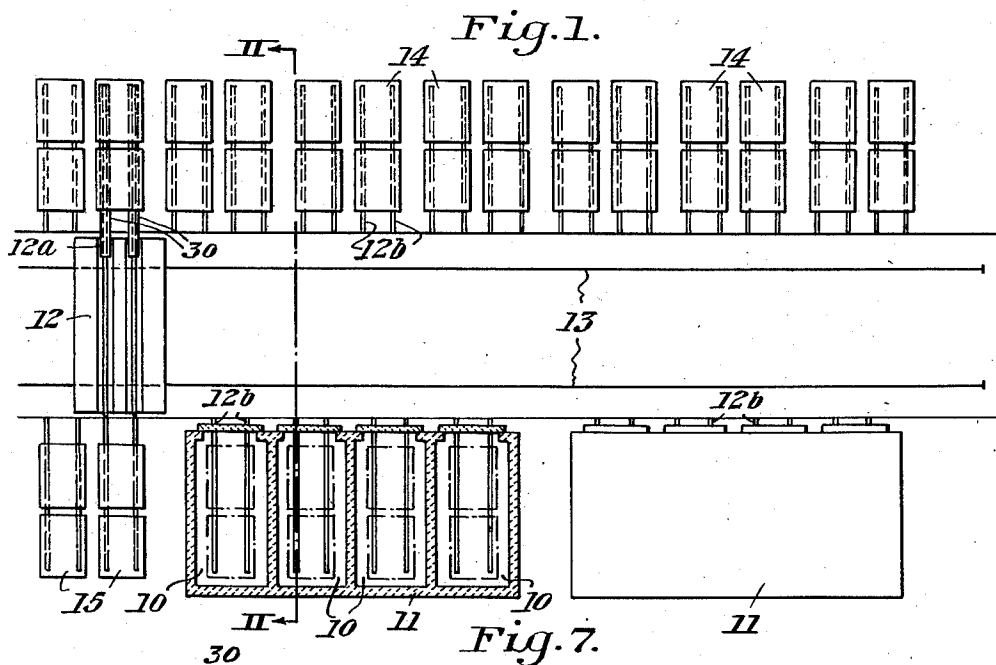
L. IVERSEN

2,168,527

ANNEALING PLANT

Filed Jan. 25, 1937

4 Sheets-Sheet 1



INVENTOR

Lorenz Iversen

by his attorneys

Stebbins, Blenko & Carmichael

Aug. 8, 1939.

L. IVERSEN

2,168,527

ANNEALING PLANT

Filed Jan. 25, 1937

4 Sheets-Sheet 2

Fig. 2.

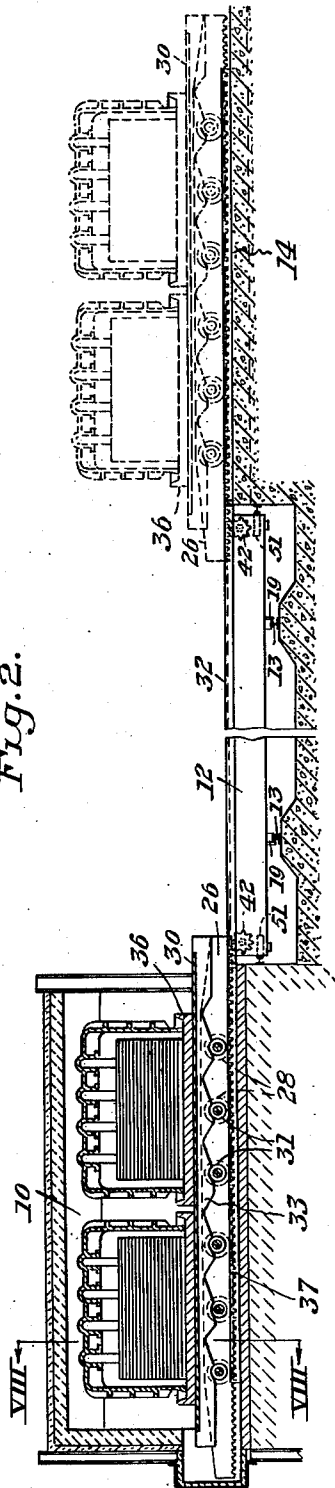
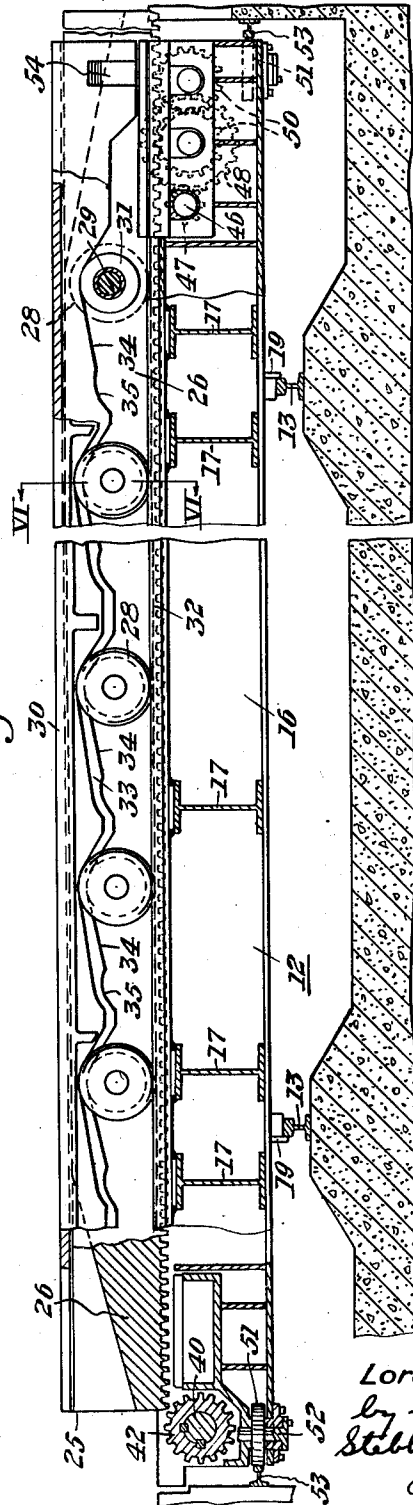


Fig. 4.



INVENTOR

Lorenz Iversen
by his attorneys
Stebbins, Blank
& Parmelee

Aug. 8, 1939.

L. IVERSEN

2,168,527

ANNEALING PLANT

Filed Jan. 25, 1937

4 Sheets-Sheet 3

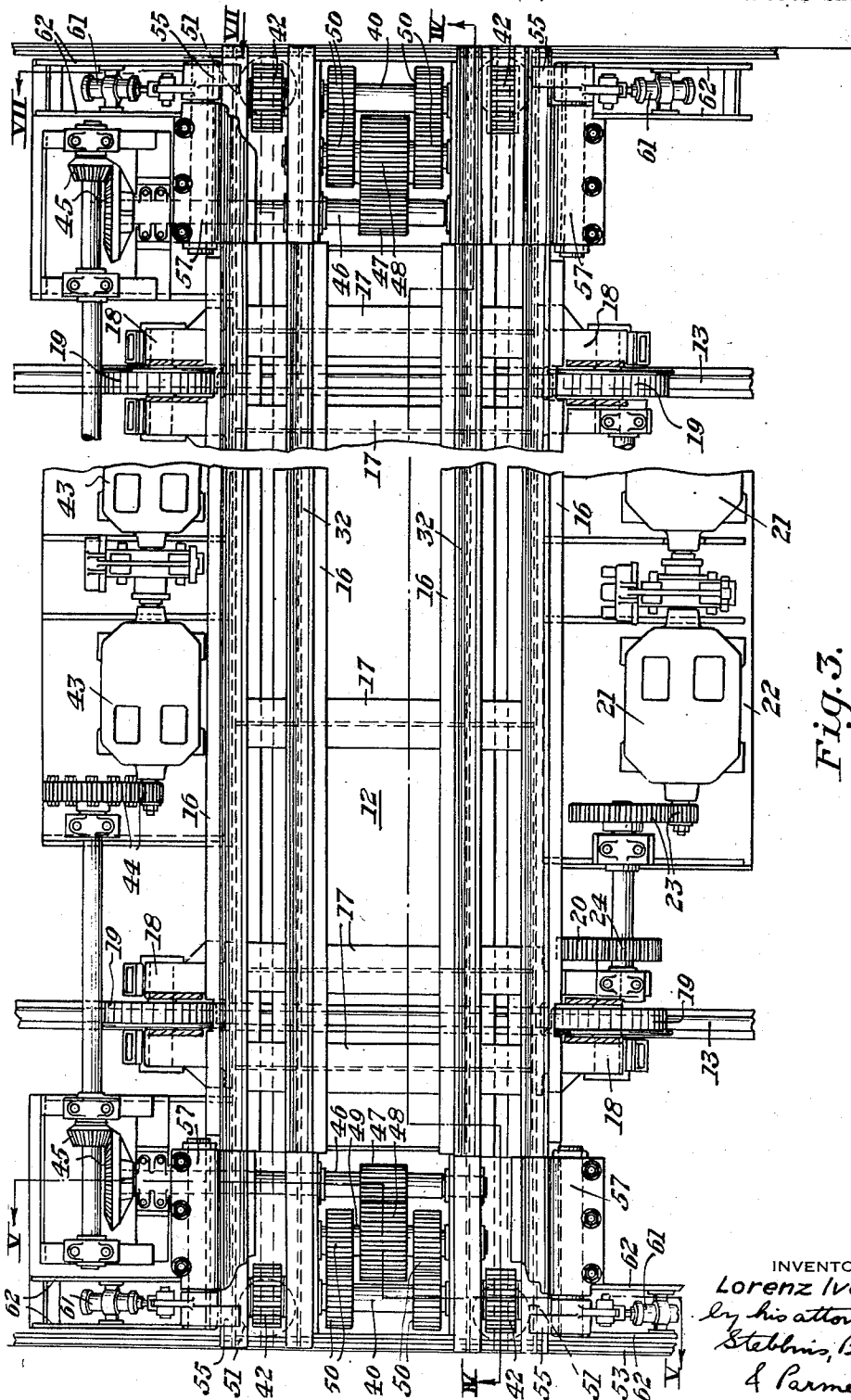


Fig. 3.

INVENTOR
Lorenz Iversen
by his attorneys
Stebbins, Blenko
& Parmelee

Aug. 8, 1939.

L. IVERSEN

2,168,527

ANNEALING PLANT

Filed Jan. 25, 1937

4 Sheets-Sheet 4

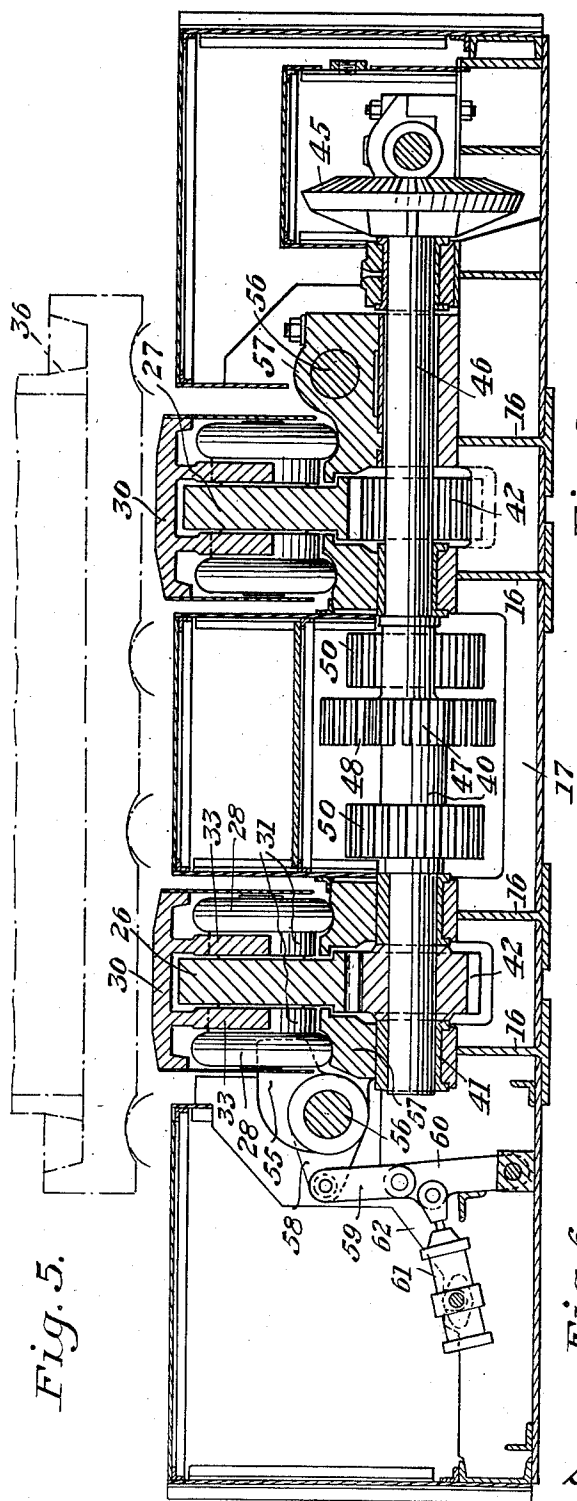


Fig. 8.

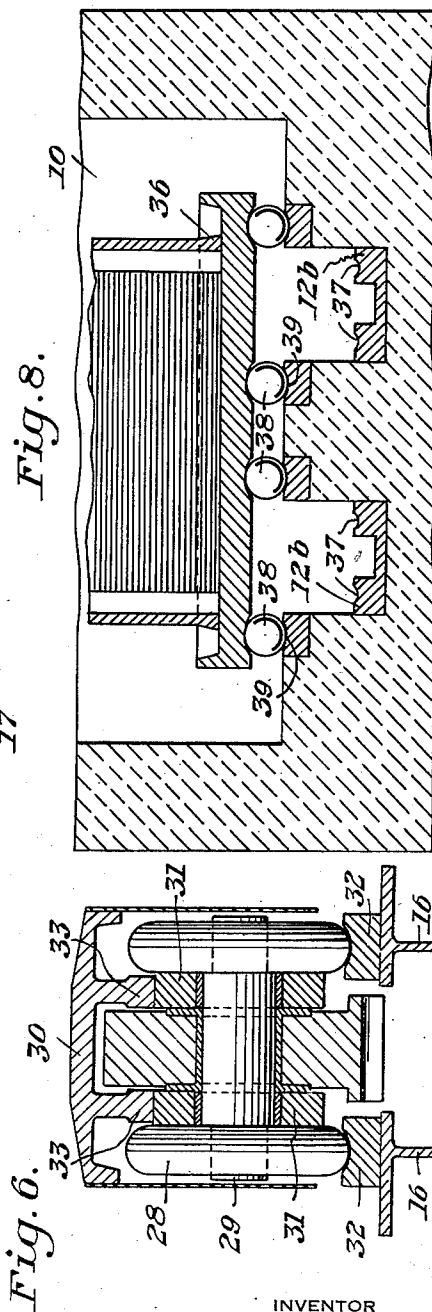


Fig. 6.

INVENTOR

Lorenz Iversen

by his attorneys

Stebbins, Blenck & Parmelee

UNITED STATES PATENT OFFICE

2,168,527

ANNEALING PLANT

Lorenz Iversen, Pittsburgh, Pa., assignor to
Mesta Machine Company, Pittsburgh, Pa., a
corporation of Pennsylvania

Application January 25, 1937, Serial No. 122,132

5 Claims. (Cl. 214—26)

This invention relates to an annealing plant and provides an improved apparatus for handling the material to be treated, whereby economies in mill space and manufacturing cost may be realized.

Annealing plants, as usually constructed heretofore, have comprised a plurality of annealing furnaces disposed side by side, and a plurality of loading and cooling stations also arranged side by side and in line with the furnaces. A transfer car movable along the ends of the furnaces and the loading and cooling stations has been employed to move loaded annealing boxes to and from the latter. The car is provided with a truck movable transversely thereof toward one side only, viz., that on which the loading stations and furnaces are located. The driving motor of the truck is located on the opposite side of the car, in the path of movement of the truck, limiting movement thereof away from the loading stations and furnaces, and preventing the handling of boxes on the side of the path of the car opposite that on which the loading stations and furnaces are disposed. This arrangement has required an unobstructed floor space of considerable extent. A further objection to the arrangement is that, as a practical matter, the sanding and desanding of the annealing boxes, prior to the introduction thereof into and after their removal from the furnaces, necessarily has to be conducted at the loading and cooling stations, with the result that it is difficult or impossible to prevent the sand from being accidentally scattered over the material.

I have invented an apparatus and method for annealing which overcomes the aforementioned objections to the previous practice. In accordance with my invention, I arrange the annealing furnaces on one side of the path of a transfer car, and the loading and cooling stations on the other side. I provide a transfer car having a truck including bearing members movable thereacross and capable of running onto a loading station, picking up annealing boxes thereon and, after moving back onto the car and being properly aligned with a furnace, running into the latter to dispose its load on suitable supports therein. The loading stations and furnaces have channels for receiving the bearing members, on movement thereof to pick up or deposit a load. After picking up the boxes and before depositing them in the furnace, however, I operate the transfer car to move them to a point remote from the loading and cooling stations for sanding. The boxes are likewise desanded at the

same point after removal from the furnace. I mount the car and truck drives out of the path of movement of the truck to permit movement thereof onto a loading station at one side of the car as well as into a furnace on the other side. Further objects and advantages of the invention will become apparent in the course of the following detailed description thereof, referring to the accompanying drawings illustrating a present preferred embodiment. In the drawings,

Fig. 1 is a diagrammatic plan view of an annealing or other heat-treating plant in accordance with my invention, parts being shown in horizontal section;

Fig. 2 is a sectional view to enlarged scale taken along the line II—II of Fig. 1;

Fig. 3 is a plan view, partly broken away, with parts omitted and parts in section, of the transfer car of my invention;

Fig. 4 is a sectional view along the line IV—IV of Fig. 3;

Fig. 5 is a sectional view through the car taken along the line V—V of Fig. 3;

Fig. 6 is a partial sectional view taken along the line VI—VI of Fig. 4;

Fig. 7 is a partial sectional view to somewhat enlarged scale, taken along the line VII—VII of Fig. 3; and

Fig. 8 is a sectional view, largely diagrammatic, taken along the line VIII—VIII of Fig. 2.

The annealing plant shown in Fig. 1 comprises a plurality of annealing furnaces 10 arranged side by side in groups 11 on one side of the path of a transfer car 12. The path of movement of the car is defined by a track 13 over which the car travels. On the opposite side of the track from the furnaces, a plurality of loading and cooling stations 14 are arranged. Sanding and desanding stations 15 are located on the same side of the track as the furnaces, but spaced along the track therefrom. In accordance with the invention, annealing bases or bottoms are disposed at the stations 14 and a charge of sheets, for example, is deposited on each bottom. An annealing box is then placed over each charge. The car 12 has a pair of trucks 12a movable thereacross and onto the stations 14 under the annealing bottoms. The loading stations and furnaces have channels 12b for receiving the supporting members of the truck. The details of the car and truck will be described shortly. The truck is provided with lifting means whereby the boxes can be picked up from the loading stations. The truck then moves back onto the car 12, and the latter carries the boxes

to one of the sanding stations 15 remote from the loading stations, where the joints between the boxes and bottoms are closed by sand seals in the usual manner. The boxes are deposited
 5 at the sanding station by running the truck thereonto and lowering it so that the boxes rest on suitable supports at the sanding station. The car then picks up the boxes again and moves them into alignment with one of the furnaces 10, and the truck runs into the furnace to deposit the boxes therein. After the annealing operation has been completed, the boxes are removed to one of the stations 14 where they are permitted to cool. When cooled, the boxes are taken to the
 15 desanding station for the removal of the sand seal. The boxes are then returned to one of the stations 14 for removal of the box and the annealed charge. The entire cycle is then repeated.

The construction of the car 12 which adapts it
 20 for handling boxes in the manner above described will now be explained in detail with reference particularly to Figs. 2 through 8. The car 12 includes a frame composed of four H-beams 16 arranged in pairs, as shown in Figs. 3 and 5,
 25 extending transversely of the track 13. These beams are connected by longitudinal beams 17 resting on the flanges of the beams 16 and interrupted by the webs thereof. Bearing yokes 18 are secured by the webs of the outside beams 16
 30 in alignment with the outer beams 17 for supporting shafts on which track wheels 19 are journaled. The wheel shafts at one end of the car are extended to receive driving gears 20. Motors 21 carried on a base 22 supported on the adjacent transverse beam 16 are coupled together
 35 and drive the gears 20 through reduction gears 23 and pinions 24. Operation of the motors thus causes the car to move along the track 13.

A truck 12a (Figs. 4 and 5) is movable across the car 12 and comprises rack bars 26 and 27,
 40 having rollers 28 shrunk on shafts 29 extending therethrough, and bearing members 30 resting on discs 31 shrunk on the shafts 29. Means to be described shortly are provided for actuating the
 45 rack bars 26 and 27 in unison back and forth across the car 12. The rollers 28 run on grooved tracks 32 carried on the upper flanges of the beams 16. The bearing members 30 have depending flanges 33 shaped as shown in Fig. 4
 50 with inclined surfaces 34 terminating in valleys 35. Since the flanges 33 rest on the discs 31 as shown in Fig. 6, it is evident that movement of the rack bars relative to the bearing members will
 55 cause vertical movement of the latter. It is this movement which enables the truck to pick up annealing boxes, such as those shown at 36 in Fig. 2, and set them down either in one of the furnaces 10 or on one of the loading and cooling stations 14. The furnaces are provided with rails 37
 60 similar to the rails 32. The car rails, of course, are properly aligned with the rails in the furnace or on the loading station before movement of the truck. Supporting balls 38 are disposed in the furnaces in grooves 39. The balls receive the
 65 boxes as the bearing members 30 are lowered. The cooling stations 14 are provided with rails similar to those in the furnace, whereby the truck can travel under loaded boxes at the loading stations. The loading and cooling stations are provided with supporting rails to receive the boxes
 70 on lowering of the bearing members 30.

Shafts 40 are journaled in bearings seated on the transverse beams 16, the bearings being shown
 75 at 41. Pinions 42 on the shafts 40 mesh with rack

teeth formed on the bottoms of the bars 26, 27. The latter are long enough to mesh simultaneously with the pinions 42 at opposite sides of the car, so that each rack bar is always in mesh
 5 with at least one pinion. The pinions 42 are driven in unison by motors 43 coupled to each other, through reduction gearing 44 and bevel gearing 45 to pinion shafts 46. Pinions 47 on the
 10 shafts 46 mesh with the gears 48 on intermediate shafts 49. Pinions 50 on the shafts 49 mesh with gears 50 on the shafts 40. By appropriately controlling the motors 43, the truck 12a may be
 15 caused to travel back and forth across the car, onto the loading stations or into the furnaces. The motors 21 and 43 and their associated driving
 20 mechanisms are located below the plane of the members 30 in their lower positions, to provide clearance for the boxes.

Side wheels 51 journaled on vertical shafts 52 cooperate with rails 53 to withstand lateral thrust
 25 to which the car is subject in operation of the truck back and forth thereacross.

The bearing members 30 are raised and lowered by locking them relative to the car frame and actuating the rack bars so as to move the rollers
 25 28 and the discs 31 relative to the bearing members, causing vertical movement thereof. When the discs have ridden up the inclined surfaces 34 and rest in the valleys 35, the members 30 are maintained in raised position until reverse movement
 30 of the rack bars relative thereto. As the discs 31 are rotatable on the shafts 29, there is no tendency for rotation of the rollers 28 to cause shifting of the members 30 on the discs 31.

The means for locking the bearing members
 35 relative to the car frame are illustrated in Figs. 3, 5 and 7. The bearing members are provided with pockets 54 adjacent their ends adapted to receive locking lugs 55 carried on shafts 56. The shafts 56 are journaled in castings 57 providing
 40 bearings for the shafts 40 and 46. The tops of these castings are grooved to form a continuation of the rails 32. Levers 58 are formed integral with the lugs 55 and collapsible linkages 59, 60 are provided for swinging the levers and the locking
 45 lugs to the dotted line position in Fig. 7. Fluid-pressure cylinders 61 are pivoted between bearing plates 62 and are provided with pistons pivoted to the linkage for collapsing them when it is desired
 50 to withdraw the lugs 55. It will be understood that the lugs 55 are adapted to enter the pockets 54 at both ends of the bearing members, because it is necessary to move the latter vertically when
 55 extended onto the loading stations or into the furnaces, as well as when the truck is centered relative to the car.

The operation of the apparatus is as follows:

If it is assumed that the truck is centered on the car with the bearing members in their lower position and that loaded boxes on the loading
 60 stations await transfer to the sanding stations and thence to the furnaces, it is only necessary to withdraw the lugs 55 and operate the motors 43 to cause traversing movement of the bearing members onto a loading station with which the car
 65 has been aligned. The lugs 55 at the right-hand end of the car are then advanced into the pockets formed in the left-hand ends of the bearing members, and the motors 43 are again operated to shift the rack bars to cause upward movement of the
 70 bearing members 30. The loaded boxes are thus picked up off their supporting rails, as shown in Fig. 2. The locking lugs are then withdrawn and the truck retracted onto the car. The car may then be moved along the track 13 to one of the
 75

sanding stations 15 and the boxes deposited thereon by a reversal of the procedure just described. When properly sanded, the boxes may be picked up and placed in one of the furnaces in a similar manner, and thereafter removed therefrom, cooled on one of the stations 14, desanded at one of the stations 15, and then unloaded at one of the stations 14.

By sanding and desanding the boxes at a station 15 remote from the loading and unloading stations 14, possible injury to the material by the accidental deposit of sand thereon is avoided. The annealed material is thus of higher quality than that produced by the method previously practiced, and this fully justifies the extra movement of the material despite the great weight of the loaded boxes.

It will be apparent from the foregoing description that the invention provides an improved method and apparatus for handling material to be annealed or subjected to any other similar operation. The arrangement of the furnaces on one side of the track which the transfer car traverses, with the loading and cooling stations on the other side, reduces the extended floor space necessary for a plant arranged in the manner previously followed. The transfer car having its truck arranged for traversing the movement in both directions and toward opposite sides of the track 13 is well adapted to the handling of material through the cycle described.

Since the transfer car is capable of picking up and depositing boxes on both sides of the track on which the car travels, the loading and cooling stations, the sanding stations and the furnaces may be disposed in a wide variety of arrangements, on either or both sides of the track, lending great flexibility to the layout of an annealing plant.

Although I have illustrated and described herein a preferred embodiment and practice of the invention, changes therein may be made without departing from the spirit of the invention or the scope of the appended claims.

I claim:

1. A charging car comprising a wheeled frame adapted to travel along spaced rails, tracks disposed in spaced parallel relation on said frame transversely of said rails, trucks movable along said tracks, each of said trucks including an elongated bearing member extending along said tracks and having inclined lower surfaces, a rack bar provided with rollers traveling on said tracks and discs engaging said surfaces, pinion shafts journaled near each side of said car having pinions thereon meshing with said rack bars, whereby said trucks may be run out to either side of said car onto tracks in alignment with those before mentioned, power means for driving said shafts mounted on said frame below the level of said members and offset therefrom, and locking means pivoted on said frame for engagement with said bearing members to hold them against longitudinal movement while said rack bars are moved thereunder to raise or lower said bearing members by movement of said inclined surfaces.

2. A charging car comprising a wheeled frame adapted to travel along spaced rails, tracks disposed in spaced parallel relation on said frame transversely of said rails, trucks movable along said tracks, each of said trucks including an elongated bearing member extending along said tracks and having inclined lower surfaces, a rack bar provided with rollers traveling on said tracks and discs engaging said surfaces, pinion shafts

journaled near each side of said car having pinions thereon meshing with said rack bars, whereby said trucks may be run out to either side of said car onto tracks in alignment with those before mentioned, power means for driving said shafts mounted on said frame below the level of said members and offset therefrom, locking lugs pivoted on said frame, and pockets at each end of said bearing members adapted to receive said lugs for preventing longitudinal movement of said members whether they are in extended or retracted position, while said rack bars are moved thereunder to raise or lower said bearing members by means of said inclined surfaces.

3. An annealing plant comprising a car track, a charging car movable along the track, the car having a transverse track thereon, a truck movable on the transverse track to a position on either side of the car track, as desired, annealing boxes, charging stations alongside the track where the annealing boxes may be filled or emptied, truck tracks at the charging stations extending transversely of the car track, annealing furnaces alongside the track on the side opposite the charging stations, the furnaces being adapted to receive charged annealing boxes, truck tracks in the furnaces extending transversely of the car track, means for moving the car to desired positions facing a charging station or a furnace with the transverse track on the car in alignment with the truck track thereat, whereby the truck may be moved from the transverse track onto the truck track or vice versa, means for supporting annealing boxes at the charging stations and at the furnaces so that the truck may travel on the truck tracks to positions to engage the annealing boxes, lifting mechanism on the truck adapted to engage and lift annealing boxes from said supporting means, means for actuating the lift mechanism so as to raise an annealing box and thus movably support it on the truck tracks, and means for moving the truck from a position on the truck tracks to a position on the transverse track on the charging car and thence to a position on another truck track.

4. An annealing plant comprising a car track, a charging car movable along the track, the car having a transverse track thereon, a truck movable on the transverse track, annealing boxes, charging stations alongside the track where the annealing boxes may be filled or emptied, truck tracks at the charging stations extending transversely of the car track, annealing furnaces alongside the track on the side opposite the charging station adapted to receive charged annealing boxes, truck tracks in the furnaces extending transversely of the car track, means for moving the car to desired positions facing a charging station or a furnace with the transverse track on the car in alignment with the truck track thereat, whereby the truck may be moved from the transverse track onto the truck track or vice versa, means for supporting annealing boxes at the charging stations and at the furnaces so that the truck may travel on the truck tracks to positions to engage the annealing boxes, lifting mechanism on the truck adapted to engage and lift annealing boxes from said supporting means, means for actuating the lift mechanism so as to raise an annealing box and thus movably support it on the truck tracks, and means for moving the truck from a position on the truck tracks to a position on the transverse track on the charging car at either side of the

truck track and hence to a position on another truck track.

3. A lift mechanism comprising a wheeled carriage, means for moving it back and forth, a support mounted on the carriage and adapted for limited movement relative thereto in the direction of travel of the carriage, means for causing relative vertical movement of the support and the carriage upon said limited relative movement

in the direction of travel of the carriage, and means for locking the support against movement in the direction of travel of the carriage while permitting vertical movement of the support, whereby the support when not locked may be moved back and forth with the carriage, and when locked may be moved vertically upon limited movement of the carriage.

LORENZ IVERSEN.