

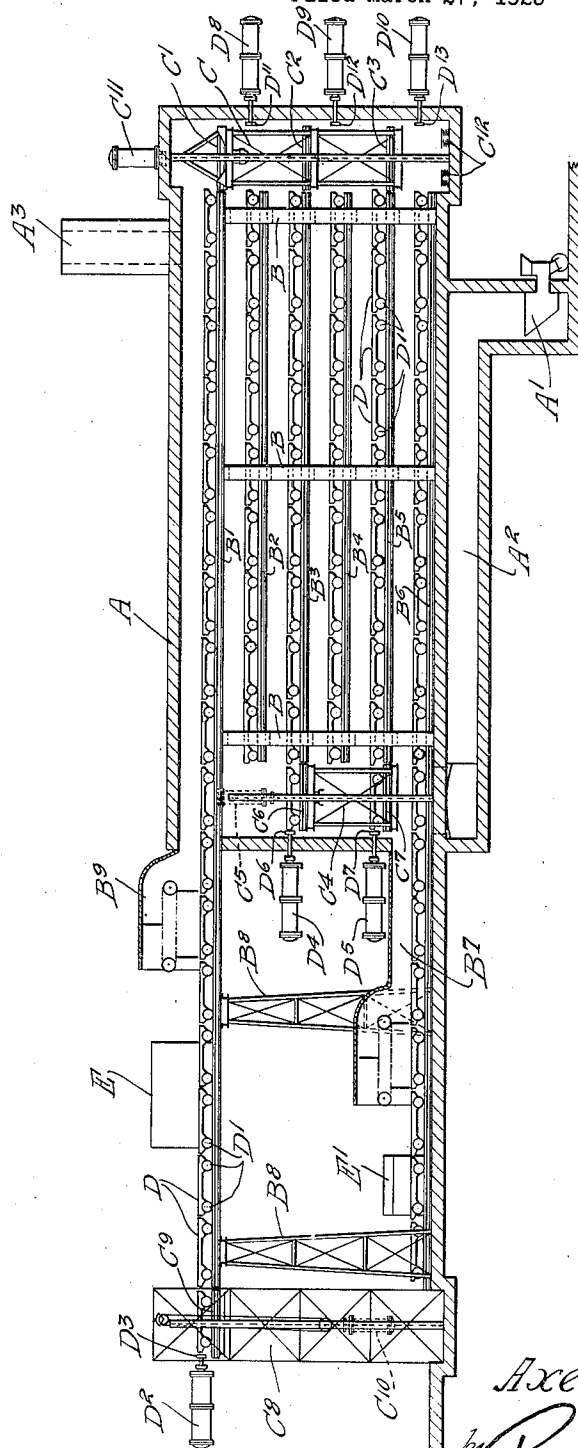
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OVEN AND CONVEYING SYSTEM THEREFOR

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UNITED STATES PATENT OFFICE.

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OVEN AND CONVEYING SYSTEM THEREFOR.

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To all whom it may concern:

Be it known that I, AXEL G. J. RAPP, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Ovens and Conveying Systems Therefor, of which the following is a specification.

My invention relates to improvements in ovens such as core ovens, enamel ovens and the like, and to conveying mechanisms and systems whereby the material to be treated in the oven is fed in gradually, successive articles being moved in step by step and moved step by step through the oven, and then discharged therefrom. This invention relates particularly to ovens of large size where the separate articles themselves are of large size and wherein a relatively large mass of material must move, and has for one object to provide means whereby such masses of material may be moved through the oven step by step with a minimum of power and delay. Another object is to provide a conveyor comprising a series of separate cars on a track moved forward step by step by pushing trains of cars in opposite directions; and to provide means whereby cars may be fed to and withdrawn from various lines or trains to permit control and manipulation.

The invention is illustrated more or less diagrammatically in the accompanying drawing, wherein the figure shows a vertical section through the oven with the conveying system in elevation.

A is an oven, in this case a core oven although it might be used for other purposes and might merely be a dryer. The oven is heated by hot air or gases from a furnace A¹, which gases pass up through a flue A² into the oven and out through a discharge flue A³. Means and arrangement for heating the oven are of no consequence to this present invention.

B, B are frame members contained within the oven and carrying horizontal tracks B¹, B², B³, B⁴, B⁵. B⁶ is a horizontal track on the bottom floor of the oven, extending out through the discharge tunnel B⁷ and extending a considerable distance beyond the end of the oven. B⁸ is a supporting framework outside the oven carrying an extension of the track B¹ which extends along the

upper portion of the oven out through an intake tunnel B⁹.

The tracks B¹ to B⁶ all terminate short of the end of the oven and have associated with them a lowerator C. This lowerator comprises a cage having short track members C¹ C² C³, there being but three of them on the lowerator to co-operate with six tracks in the furnace. C¹¹ is a hydraulic or pneumatic ram adapted to raise or lower the lowerator, and C¹² buffer springs adapted to cushion it on its downward movement. It will be noted that the space between the tracks C¹ and C², and C² and C³ is equal to the distance between the tracks B⁶ and B⁴, and B⁵ and B³, and B⁴ and B², or B³ and B¹, so that when the tracks C¹ C² C³ are at the upper limit of the excursion of the lowerator they are in line with the tracks B¹ B³ B⁵, and at the downward limit in line with the tracks B² B⁴ B⁶. The tracks B² B³ B⁴ and B⁵ also terminate short of the other end of the furnace and are associated with a lowerator C⁴ operated by a similar hydraulic or pneumatic ram or cylinder C⁵, and carrying tracks C⁶ C⁷, the spacing between these two tracks being the same as the spacing between the tracks C¹ C² or C² C³ and the arrangement being such that the tracks C⁶ C⁷ may be in line with the tracks B³ B⁵ or B² B⁴. C⁸ is an elevator having a single track C⁹ operated by a ram or cylinder C¹⁰, and this track C⁹ may be moved into line either with the track B¹ or with the track B⁶.

Travelling along all of the tracks is a series of cars or trams D mounted on wheels or rollers D¹ engaging the track elements. These cars abut end to end and there is such a number of them that each track is at all times filled from end to end with these abutting cars. There are also three additional trams or cars and with the parts in the position shown in the drawings, one of these cars will be on the track C⁹ on the elevator C⁸ and one of the cars will be on each of the tracks C⁶ C⁷ of the lowerator C⁴. D² is a hydraulic or pneumatic ram or cylinder with a pusher head D³ adapted to engage the end of the car on the track C⁹ and to push all the cars on the track C⁹ and B¹ forward. When this is done the car will be pushed off the elevator C⁸ and onto the track C¹ on the

lowerator C. D⁴ D⁵ are hydraulic or pneumatic rams having pusher heads D⁶ D⁷ adapted to engage the cars on the tracks C⁶ C⁷ on the lowerator C⁴, and push these cars and the cars on the tracks B³ B⁵ respectively as a unit forward to bring the end cars on these two tracks onto the tracks C² C³ on the lowerator C. Preferably these three hydraulic rams D² D⁴ D⁵ will be operated in unison and all the cars on the tracks B¹ B³ B⁵ will be moved forward to the right one car length, after which the hydraulic rams will withdraw, leaving the elevator C⁸ and the lowerator C⁴ empty and the lowerator C loaded. Meanwhile the cars on the track B² B⁴ and B⁶ will remain at rest. The lowerator track C with its load of cars will then drop down one step bringing the car which has just left the track B¹ into line with the track B², the car which has just left the track B³ into line with the cars on the track B⁴ and the car which has just left the track B⁵ into line with the cars on the track B⁶. Meanwhile, the empty elevator C⁸ will drop down and bring its track C⁹ into line with the track B⁶ and the empty lowerator C⁴ will move up bringing its track C⁶ into line with the track B² and its track C⁷ into line with the track B⁴. When the elevator and the two lowerators are in the new position the hydraulic rams D⁸ D⁹ D¹⁰ will be operated to force the pressure heads D¹¹ D¹² D¹³ against the three cars on the lowerator C and push them off onto the tracks B² B⁴ and B⁶ thus pushing the whole train forward and loading the lowerator C⁴ and the elevator C⁸. Meanwhile the cars on the tracks B¹ B³ and B⁵ will be at rest. Then the elevator track C⁸ will raise the car which has just left the track C⁹ up into line with the cars on the track B¹. The lowerator C⁴ will move the cars which have just left the tracks B² and B⁴ down into line with the tracks B³ and B⁵. The lowerator C will move up so as to bring its track sections into line with the tracks B¹ B³ and B⁵ ready for a repetition of the cycle. The result of this arrangement is that step by step each individual car is fed forward from the left hand end of the track B¹ to the right hand end, dropped down to the track B² fed back in the left hand direction to the end of that track, dropped down to the track B³ fed to the right on that and, to the left on track B⁴, to the right on track B⁵, to the left on track B⁶ out of the system.

E is a core machine or other mechanism adapted to place successive objects on the cars B which objects pass with the cars through the furnace and are taken off after leaving the furnace by the unloading machine E¹.

Thus half of the cars in the system are in motion at any one time and the other half

are at rest either in the furnace or outside of it and the movement of the cars is gradual and controlled, the train of cars or conveyor elements being separately moved in straight line direction either parallel with or perpendicular to the tracks.

It will be evident that while I have shown in my drawings, an operative device, still many changes might be made in the size, shape and disposition of parts without departing materially from the spirit of my invention and I wish, therefore, that my showing be taken as in a sense diagrammatic.

I claim:—

1. In a conveyor system, a plurality of parallel tracks, means for moving continuous trains of cars there along, means for moving each successive car as it passes beyond the end of a track into line with the next track and moving it there along in a reverse direction.

2. In a conveyor system, a plurality of parallel tracks, means for moving continuous trains of cars there along, means for moving each successive car as it passes beyond the end of a track into line with the next track and moving it there along in a reverse direction, the cars on each track always being moved in the same direction there along.

3. In a conveyor system, a plurality of parallel tracks, arranged one above the other, means for moving continuous trains of cars there along means for raising each successive car as it passes beyond the end of a track into line with the track next above and moving it there along in a reverse direction.

4. In a conveyor system, a plurality of parallel tracks, cars arranged end to end on and movable along and completely filling each track, means for moving all the cars on each alternate track in one direction so as to force a car off the end of each such track, means for moving each car thus forced off a track into line with the next adjacent track and moving it on to such track to move all the cars thereon in a reverse direction and force a car off the end of each such track and means for moving each car thus forced off into line with the next adjacent track and repeating the movements in a reverse direction.

5. The combination with a housing of a plurality of parallel tracks arranged one above the other therein the top and bottom tracks extending out through the wall of the housing and an elevator in line with the outer ends of said track, the inner ends of said tracks and both ends of all the intermediate tracks terminating short of the walls of the housing, lowerators arranged at the ends of said tracks having track sections adapted to be brought into line with

the tracks, cars arranged on all said tracks extending from end to end thereof and filling them completely and in addition cars adapted to lie on the elevator tracks and lowerator tracks, there being one less car than the total number of elevator and lowerator tracks.

6. In a conveying system a plurality of parallel tracks, the outside tracks in the group being longer than the remainder of the tracks, a continuous series of cars filling all said tracks, a transfer table adapted to convey cars from one to the other of the outside tracks at the ends furthest removed from the remainder of the tracks, transfer tables arranged adjacent to ends of all the shorter tracks and adjacent the other ends of the outside tracks, said tables being adapted to convey cars from one track to the next, there being half as many tables as there are tracks.

7. In a conveying system a plurality of parallel tracks the outside tracks in the group being longer than the remainder, a continuous series of cars filling all the tracks, a transfer table adapted to convey cars from one to the other of the outside tracks at the ends furthest removed from the remainder of the tracks, transfer tables arranged adjacent to the ends of all the remainder of the tracks and adjacent the ends of the outside tracks, said tables being adapted to convey cars from one track to the next, there being half as many tables as there are tracks, and means located adjacent the transfer tables for engaging the cars thereon and forcing them off the transfer tables on the tracks.

8. The process of treating materials which consist in propelling separate charges thereof through a treating zone in a step by step motion and feeding such charges in opposite directions in parallel paths and bodily displacing the charge from one path to the next as each charge reaches the end of such path.

9. In a conveying system, a plurality of parallel tracks, a continuous series of cars filling all the tracks, a transfer means adapted to convey cars from one to the other of the outside tracks at the ends furthest removed from the remainder of the tracks, transfer means arranged adjacent the ends of all the remainder of the tracks and ad-

jacent the ends of the outside tracks, said means being adapted to convey cars from one track to the next.

10. In a conveying system, a plurality of parallel tracks, a continuous series of cars filling all the tracks, a transfer means adapted to convey cars from one to the other of the outside tracks at the ends furthest removed from the remainder of the tracks, transfer means arranged adjacent the ends of all the remainder of the tracks and adjacent the ends of the outside tracks, said means being adapted to convey cars from one track to the next, and means located adjacent the transfer means for engaging the cars thereon and forcing them off upon the tracks.

11. In a conveying system, a plurality of parallel tracks, a continuous series of cars filling all the tracks, a transfer means adapted to convey cars from one to the other of the outside tracks at the ends furthest removed from the remainder of the tracks, transfer means arranged adjacent the ends of all the remainder of the tracks and adjacent the ends of the outside tracks, said means being adapted to convey cars from one track to the next, and means located adjacent the transfer means for engaging the cars thereon and forcing them off upon the tracks, comprising pistons aligned with said tracks and transfer means.

12. In a conveyor system, a plurality of parallel tracks, cars arranged end to end on each track, means, operable in unison, for moving all of the cars on each track in one direction to force a car off the end of each such track, means operable in unison for moving each car thus forced off of a track into line with the next adjacent track, and means, operable in unison, for moving such cars along such adjacent tracks to move all the cars on each such track in a reverse direction and to force a car off the end of each such track and means for moving each such car thus forced off into line with the next adjacent track and for repeating the movement on said adjacent track in a reverse direction.

Signed at Chicago, county of Cook and State of Illinois, this 24th day of March, 1925.

AXEL G. J. RAPP.