

1,298,285.

Patented Mar. 25, 1919.

4 SHEETS—SHEET 1.

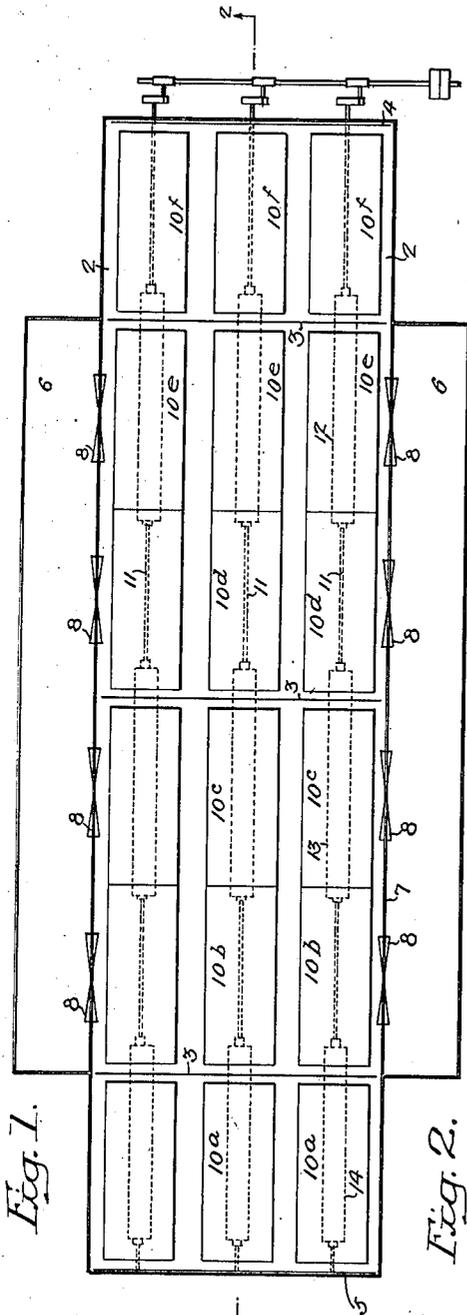


Fig. 1.

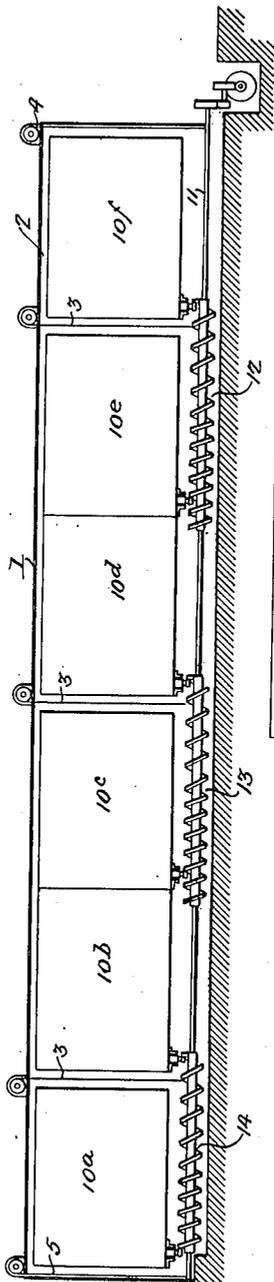


Fig. 2.

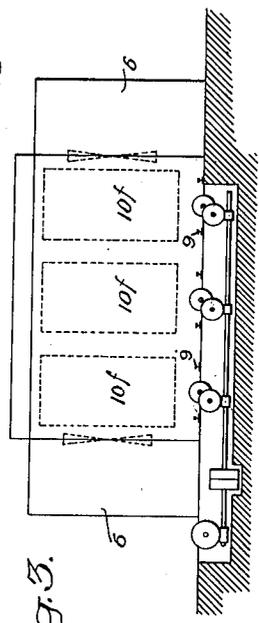


Fig. 3.

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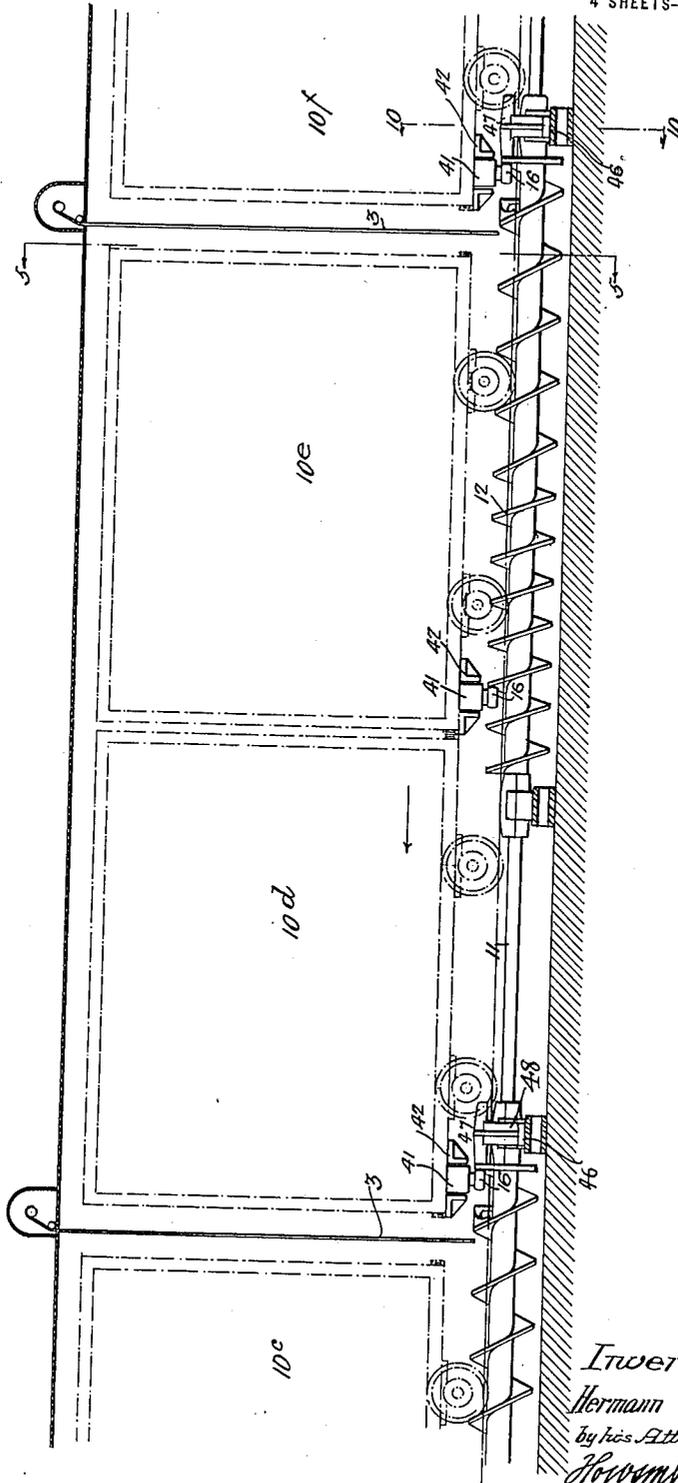
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DRYING APPARATUS.
APPLICATION FILED SEPT. 11, 1918.

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4 SHEETS—SHEET 2.

Fig. 4.



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4 SHEETS—SHEET 3.

Fig. 8.

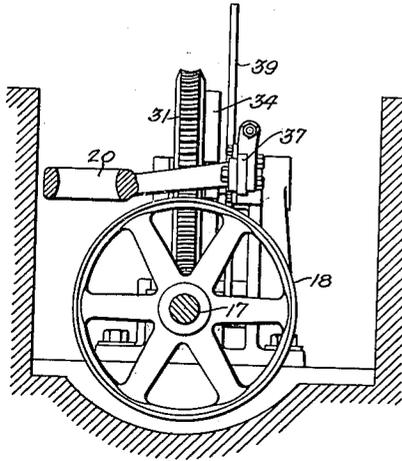


Fig. 9.

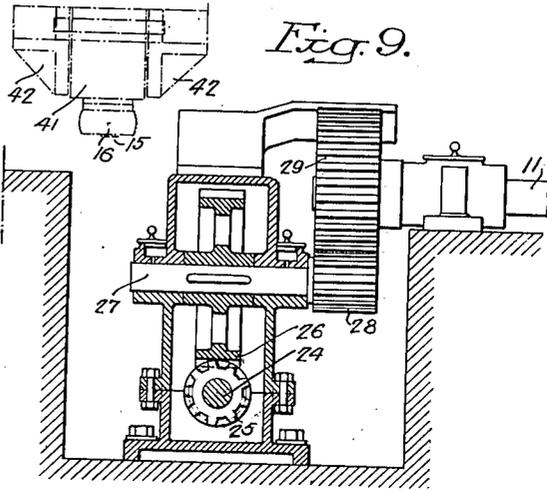


Fig. 11.

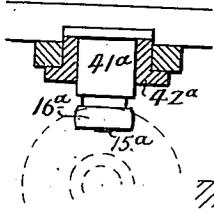


Fig. 5.

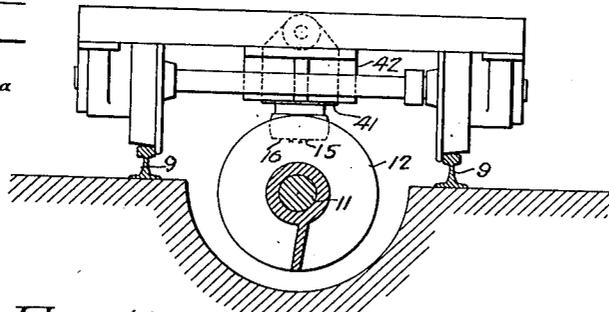
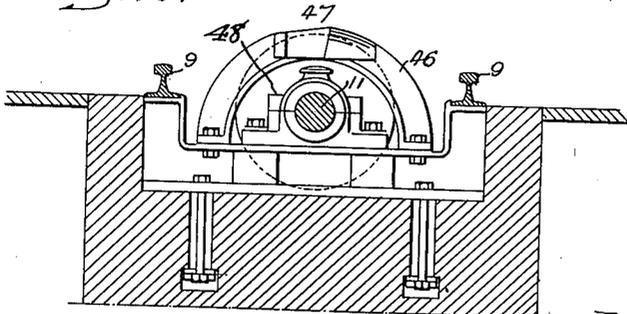


Fig. 10.



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4 SHEETS—SHEET 4.

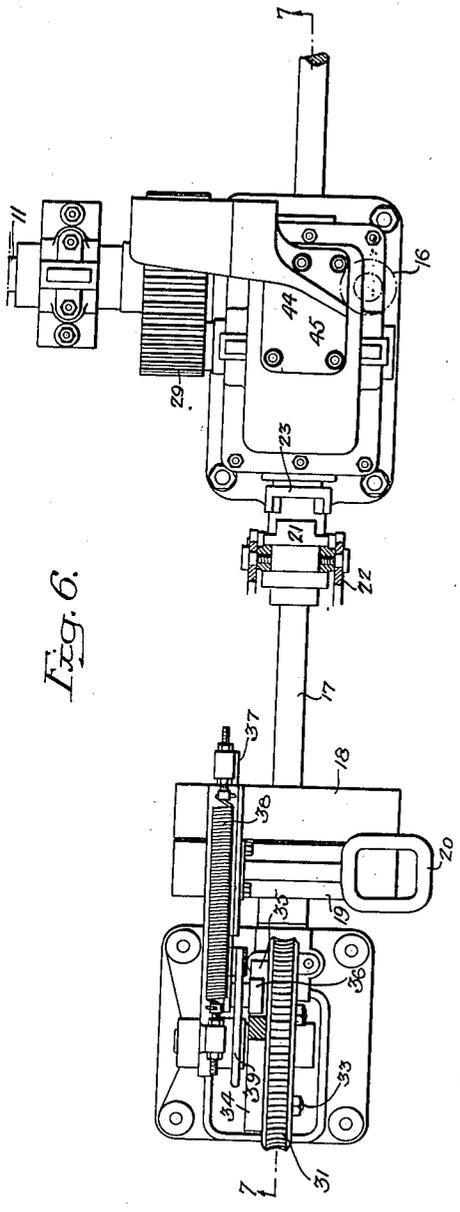


Fig. 6.

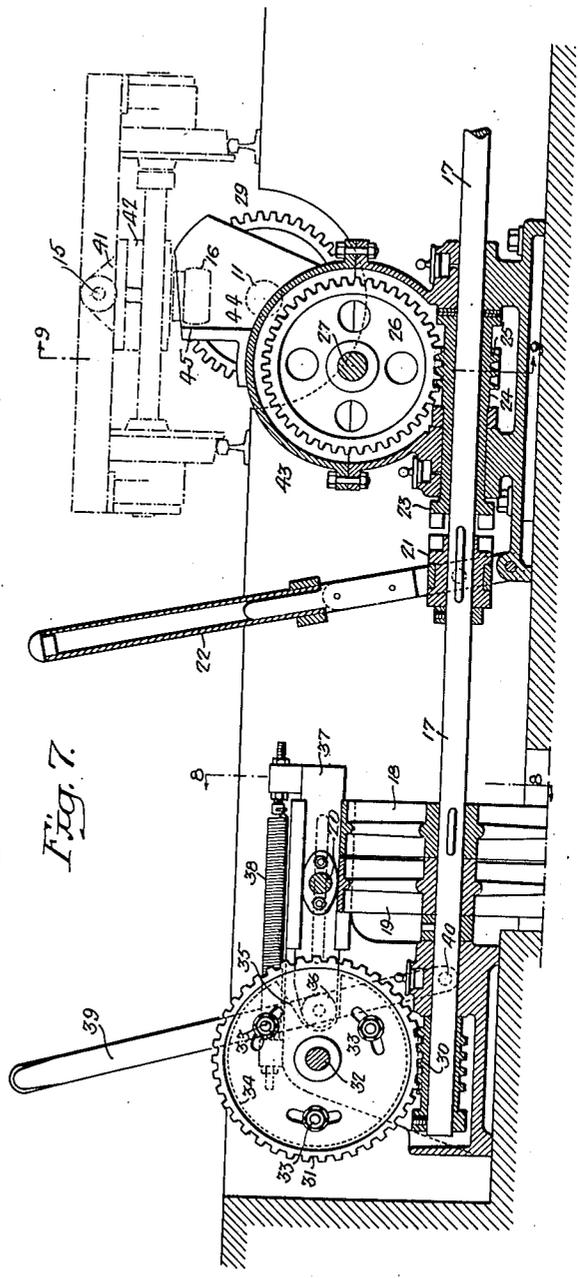


Fig. 7.

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UNITED STATES PATENT OFFICE.

HERMANN BOGATY, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE PHILADELPHIA TEXTILE MACHINERY COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

DRYING APPARATUS.

1,298,285.

Specification of Letters Patent. Patented Mar. 25, 1919.

Application filed September 11, 1918. Serial No. 253,559.

To all whom it may concern:

Be it known that I, HERMANN BOGATY, a citizen of Russia, (having declared my intention of becoming a citizen of the United States,) and a resident of Philadelphia, Pennsylvania, have invented certain Improvements in Drying Apparatus, of which the following is a specification.

My invention relates to certain improvements in drying apparatus in which there is a series of drying chambers divided at intervals by curtains so as to make independent heating compartments. Cars are arranged to travel through these chambers carrying the material to be dried. The drying apparatus in many instances is of considerable length and is divided into a number of heating compartments.

One object of my invention is to provide means for insuring the spacing of the cars a sufficient distance apart to allow the curtains to pass down between the cars.

A further object of the invention is to provide means for allowing the cars to come close together within the different compartments separated by the curtains, so as to prevent air currents passing around the material at the ends of the car instead of through the material. The invention also relates to certain improvements which will be fully described hereinafter.

In the accompanying drawings:—

Figure 1, is a diagrammatic plan view of a drying apparatus showing my improved means for conveying the cars through the drying chambers;

Fig. 2, is a longitudinal sectional view on the line 2—2, Fig. 1;

Fig. 3, is a view of the receiving end of the apparatus;

Fig. 4, is a longitudinal sectional view, showing more in detail the apparatus for conveying the cars through the drying chambers;

Fig. 5, is a sectional view on the line 5—5, Fig. 4;

Fig. 6, is a plan view of the means for driving the several screw shafts for conveying the carriages through the drying chambers;

Fig. 7, is a sectional view on the line 7—7, Fig. 6;

Fig. 8, is a transverse sectional view on the line 8—8, Fig. 7;

Fig. 9, is a transverse sectional view on the line 9—9, Fig. 7;

Fig. 10, is a sectional view on the line 10—10, Fig. 4; and

Fig. 11, is a view illustrating a modified form of pin with which the screws engage.

In the drawings 1 is the casing of the apparatus. 2 is the drying chamber which extends the full length of the machine and is divided into sections by transverse curtains 3. There are three of these dividing curtains in the present instance. At the receiving end there is a curtain 4 and at the discharge end there is a curtain 5. At each side of the drying chamber are the heating chambers 6 extending, in the present instance, the length of the two central drying chambers.

In the partition 7 between the drying chambers and the heating chambers is a series of fans 8, of any suitable construction. These fans cause a circulation of air transversely from one of the heating chambers through the drying chambers to one of the other heating chambers on the opposite side, and the currents of heated air may travel from one side to the other throughout the length of the apparatus, or in certain sections the heated air may travel in one direction and in another section it may travel in a reverse direction. This will depend considerably upon the character of the material being treated and the construction of the particular apparatus employed.

In the present instance, there are three tracks 9 extending through the drying chambers of the apparatus and cars 10, having wheels such as shown in Fig. 5, travel on the rails of these tracks and the cars are so proportioned in reference to the spaces between the curtains that a certain number of cars can be located in each compartment between the curtains. In the drawings I have shown a comparatively short apparatus in which there are four compartments, but it will be understood that the number of compartments may be increased without departing from the essential features of the invention.

The cars 10 are of such a length that they fit between the curtains of the first compartment, while two cars fit between the curtains of the second compartment, as well as the curtains of the third compartment,

and a single car fits between the curtains of the fourth compartment. In the first and fourth compartments there is practically no forced circulation of air; these compartments are the receiving and delivery compartments. It is essential that there should be a space between the cars at the curtains so that when the cars are placed in the compartments with the curtains in place, *i. e.*, lowered, the cars in one compartment are completely isolated from those in another compartment. It is also essential, if there are two or more cars in a compartment, that the cars be placed close together so as to prevent currents of air passing through the space between the cars, so that the drying action of the air will be equalized in passing through the material carried by the cars.

Extending longitudinally between the rails of each of the tracks is a screw shaft 11 and on this shaft are the screws 12, 13 and 14, in the present instance, spaced a given distance apart. These screws are differential, the pitch of the screws being greater toward the receiving end than at the delivery end. The cars, as clearly shown in Figs. 2 and 4, are so located in respect to the curtains that the steep pitched portions of the screws are at the curtains, and on each car is a depending pin 15, preferably having a roller 16 which is engaged by the blades of the screw, and the action is such that when the screw is turned the car 10^c will be rapidly moved from under the partition and will come in close contact with the car 10^b and will push the car 10^a until it is in the position shown in Fig. 4, between the two curtains 3, and in this position the two cars 10^c and 10^b are close together. On continuing the movement of the screw shaft 11 the car 10^c will be moved forward, after the curtain has been raised, at a greater speed than the car 10^b and this increased movement will cease when the cars are spaced a given distance apart, as between the cars 10^c and 10^a, Fig. 4. The cars will remain this distance apart so as to allow the curtain to be lowered between the two cars, the car 10^a in the meantime having caught up to the car 10^b so as to close the space between the two cars, and so that the currents of air are not forced through the space between the cars but through the material carried by the cars.

The screws are driven from the driving shaft 17 at one end of the machine. The detail of this particular construction is shown clearly in Figs. 6 to 9, inclusive, 18 and 19 are the fast and loose pulleys and 20 is the belt shifter, the device being belt driven, in the present instance. On the shaft is a clutch sleeve 21, which is actuated by a lever 22 so as to throw it into engagement with the clutch face 23 on a tubular shaft 24 through which extends the shaft 17. On the tubular shaft 24 is a worm 25,

which meshes with a worm wheel 26 on a shaft 27, and on this shaft 27 is a pinion 28 which meshes with a gear wheel 29 on a screw shaft 11, so that when the clutch 21 is thrown in motion will be imparted to the screw shaft 11 and will move the carriages in that particular part of the drying chamber forward until the mechanism is stopped by the shifting of the belt.

I provide means for shifting the belt when a carriage comes to a given point in front of where the curtain will drop, thus insuring accuracy, as it will be understood that the mechanism is inclosed within what is practically a dark chamber. This mechanism consists, in the present instance, of a worm 30 on the main driving shaft 17, which meshes with a worm wheel 31 on a shaft 32, and on the wheel 31 are pins 33, which are adapted to slots in the wheel and secure a disk 34 to said wheel. This disk has a notch 35, and a roller 36 on a slide 37 is adapted to enter this notch or to roll against the periphery of the disk 34. The slide 37 carries a shifter 20 and a spring 38 tends to draw the slide in toward the shaft 32, so that the shifter will be normally in line with the pulley, as the mechanism is at rest except at the time when the cars are being shifted from one compartment to another.

39 is a lever pivoted at 40 and this lever is for the purpose of moving the roller out of the notch 35 in the disk so that on holding this lever until the notch passes the roller, the roller will rest against the periphery of the disk, holding the belt shifter in line with the fast pulley, and this will hold the belt until the notch again comes in position in front of the roller, when the roller will be forced into the notch and the belt will be shifted to the loose pulley and the mechanism will be stopped. The pin 15 is mounted on a pivoted rocker 41 adapted to a bracket 42 on the under side of the frame of each car and the pivot of the rocker is arranged so that the rocker will swing laterally to avoid the bearings for the screw shaft. I provide the first bearing, directly above the housings 43 for the worm wheel 26, with a switch 44, which has an inclined rail 45 against which the roller comes in contact so as to shift the rocker 41 on its pivot and carry it over the gear wheel 29, and I preferably mount above each bearing an arch 46 having a switch rail 47 with which the roller engages so as to insure the roller clearing itself of the bearings 48, which are located at intervals to support the screw shaft properly. In some instances, in place of the pivoted rocker shown in Fig. 5, a plunger 41^a may be used, as shown in Fig. 11, adapted to a cylinder or guide 42^a, and on the plunger is the pin 15^a carrying the roller 16^a.

The operation is as follows:—I will describe this apparatus as used in connection

with the process of drying bricks and like articles, but it will be understood that the apparatus can be used for drying any material which can be arranged on cars or

5 trucks.

The material is loaded on the cars in such a manner that air can circulate freely through the material. The particular method of arranging the material will depend entirely upon its character. If, for instance, it is desired to dry bricks the bricks are placed on the cars in such a manner that there are spaces between the bricks through which the air can pass. If, for instance, a

15 car is loaded and is ready to enter the drying chamber and where there is a single track, then only one car at a time is moved, but if there are three tracks, as shown in the drawings, then three cars will be loaded and

20 will enter the drying chamber simultaneously. The curtains 3, 4 and 5 are raised and the mechanism is set in motion and the screws move all of the cars that are in the drying chamber forward, carrying the first

25 car of the series outside of the drying chamber, while the next to last takes its place in the last compartment. This leaves the first compartment empty and the cars are moved into position so that their pins will engage

30 the first screw. By making the screws differential the cars are separated at the curtains a sufficient distance so that the curtains can be lowered between the cars to divide the drying chamber into a series of

35 compartments, but in between the curtains, where the compartment will hold two or more cars, the cars are brought close together by the screws so as to prevent the air currents passing through the space between

40 the cars and insuring the proper distribution of air through the material loaded on the cars. The circulation of air, in the present instance, is transverse. One set of fans moves the air in one direction and another

45 set moves it in the opposite direction. This arrangement of fans is common in certain types of drying chambers and, therefore, I have not described it in detail.

I claim:—

50 1. The combination in a drying apparatus, of a drying chamber; means for circulating air therein; a series of cars arranged to travel through the chamber; and a differential screw for moving the cars forward in the chamber.

55 2. The combination in drying apparatus, of a drying chamber; means for circulating air in the chamber; a track extending longitudinally through the chamber; a series of

60 cars arranged to travel on the track; a series of differential screws spaced apart and arranged to engage the cars; and means for driving the screws so that certain of the cars will be arranged close together, while others

65 will be separated.

3. The combination in a drying apparatus, of a drying chamber separated into compartments by movable curtains; a track on which the cars carrying the material to be dried travel; a series of differential

70 screws for driving the cars through the chamber, said differential screws being arranged in such relation to the position of the curtains that the cars will be spaced

75 apart at the curtains and will be arranged close together in the space between the curtains.

4. The combination in a drying apparatus, of a longitudinal drying chamber; means for circulating air transversely

80 through the chamber; a series of movable curtains arranged to divide the chamber into compartments, said compartments being of such a size as to receive two or more

85 cars; a track extending through the drying chamber; cars mounted on the track; pins on the cars; and a series of differential screws spaced apart and arranged to engage

90 the pins on the cars, the screws being located in such position in reference to the curtains that the cars will be spaced apart at the curtains so as to allow the curtains to be lowered to divide the chamber into compart-

95 ments and to allow the cars to move close together in the space between the curtains.

5. The combination in a drying apparatus, of a drying chamber for causing air currents to move transversely across the chamber; a series of curtains spaced apart

100 and arranged to divide the chamber into compartments of a size to contain two or more cars; a track extending through the drying chamber; a series of cars mounted

105 on the track; a longitudinal shaft extending the length of the drying chamber; a series of differential screws on the shaft; pins on the cars arranged to engage the screws; and means at one end of the drying chamber for driving the shaft so that when the cars are

110 moved forward they will be spaced apart at the curtains and will be close together between the curtains.

6. The combination in a drying apparatus, of a drying chamber; a series of curtains spaced apart and arranged to divide

115 the chamber into a series of compartments; means for circulating air in the several compartments; a track extending through the chamber; a series of cars mounted on the track; a longitudinal shaft having a series

120 of differential screws; a pin on each car arranged to engage the screws, the screws being located in such position that the cars will be spaced apart at the curtains, but will be close together between the curtains; a

125 transverse shaft; means for driving the shaft; and automatic means for stopping the motion of the shaft when the cars are moved a given distance.

7. The combination in a drying appa- 130

ratus, of a drying chamber; heating chambers at each side of the drying chamber; circulating fans for circulating air through the drying chamber and the heating chambers; a series of curtains separating the drying chamber into a series of compartments; a series of tracks extending throughout the length of the drying chamber; cars on each track; a shaft located in close proximity to each track, said shaft having differential screws thereon spaced apart and so located in reference to the curtains that when the cars are propelled by the screws and stopped, the cars will be spaced apart at the curtains so as to allow the curtains to be closed and will be arranged close together between the curtains so as to prevent currents of air passing in the space between the cars instead of passing through the material on the cars; means for turning the screws in unison; and means for automatically stopping the rotation of the screws when the cars are in proper position in respect to the curtains.

8. The combination in a drying apparatus, of a drying chamber; heating chambers at each side of the drying chamber; circulating fans for circulating air through the drying chamber and the heating chambers; a series of curtains separating the drying chamber into compartments; a series of tracks extending throughout the length of the drying chamber; a series of cars on each track; a shaft located in close proximity to each track, said shaft having differential screws thereon spaced apart and so located in reference to the curtains that when the cars are propelled by the screws and stopped, the cars will be spaced apart at the curtains so as to allow the curtains to be closed and will be arranged close together between the curtains so as to prevent currents of air passing in the space between the curtains instead of through the material on the cars; means for turning the screws in unison; means for automatically stopping the rotation of the screws when the cars are in proper position in respect to the curtains;

and means for throwing any one of the cars into or out of engagement with the power shaft.

9. The combination in a drying apparatus, of a drying chamber; a series of curtains dividing the chamber into compartments; a longitudinal track; a series of cars mounted on the track; a longitudinal shaft; means for driving the shaft; a series of differential screws mounted on the shaft; pins on the cars arranged to be engaged by the screws, said pins being pivotally mounted; and means for moving the pins to one side so as to clear the fixed mechanism carrying the shafts.

10. The combination in feeding means for traversing cars through a drying or steam apparatus, of a shaft having a differential screw thereon, the threads of the screw being a greater distance apart at one end thereof than at the other; and means on the car for engaging the screw, the screw being of such a length that it will engage two cars for a given distance so as to separate the cars and then will allow the rear car to move faster than the other, pushing the last mentioned car forward until engaged by another screw.

11. The combination in means for feeding cars through chambers, of a screw shaft, a transverse driving shaft geared to the screw shaft; clutch mechanism for throwing the screw shaft into engagement with the driving shaft; means driven by said driving shaft consisting of a notched disk; a shifter and a slide carrying the shifter and having a roller adapted to travel on the periphery of the disk and enter the notch therein; and a spring for retracting the slide so that after the screw is turned a given number of revolutions the notch will come opposite the pin on the shifter, allowing the shifter to move from the fast to the loose pulley and to stop the rotation of the screw at the proper point.

In witness whereof I affix my signature.

HERMANN BOGATY.