Dec. 15, 1925. 1,565,984

H. B. BROCKENBROUGH

PLASTER BOARD DRYING APPARATUS

Filed July 7, 1922 4 Sheets-Sheet 1

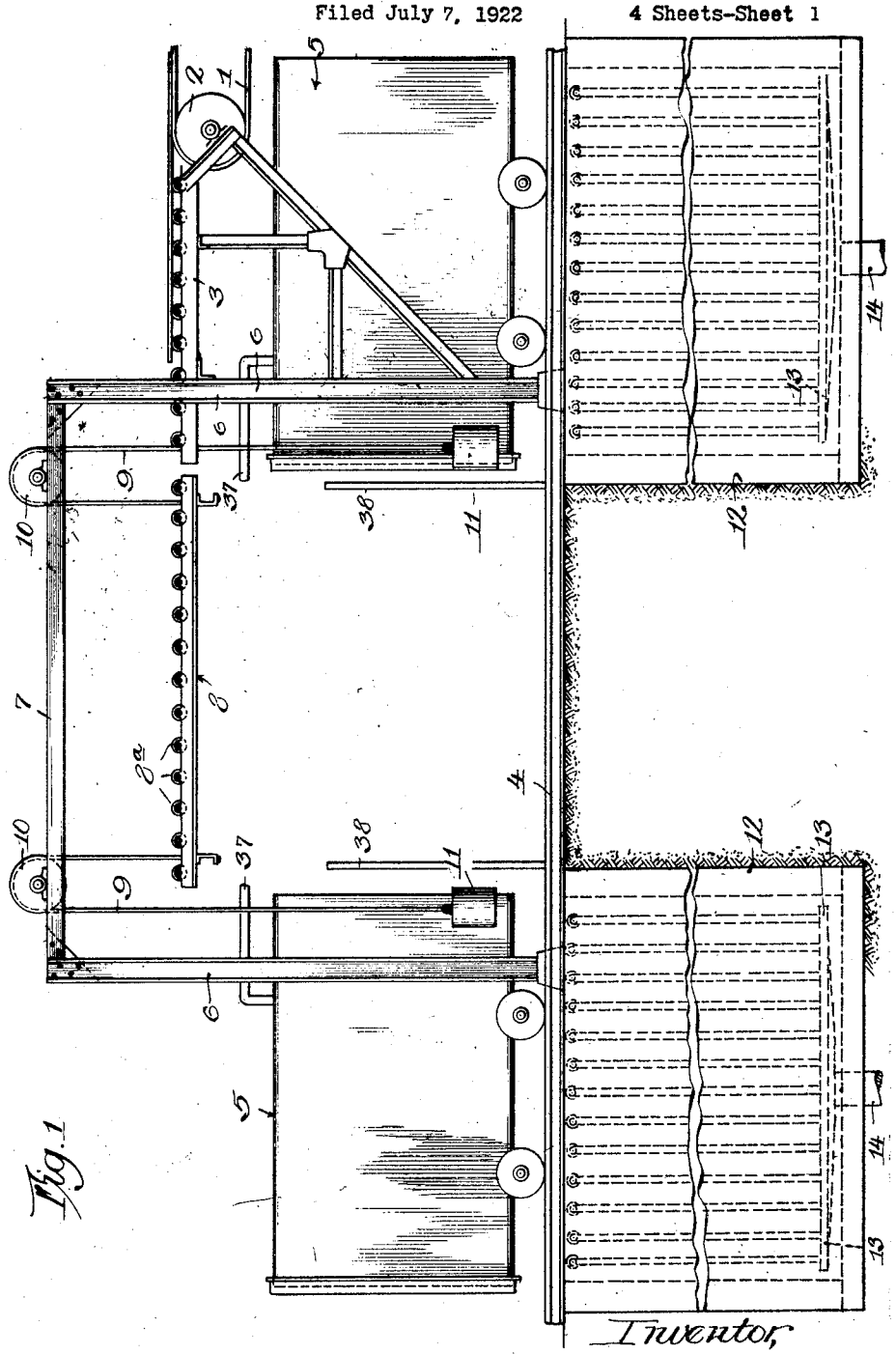


Fig. 1

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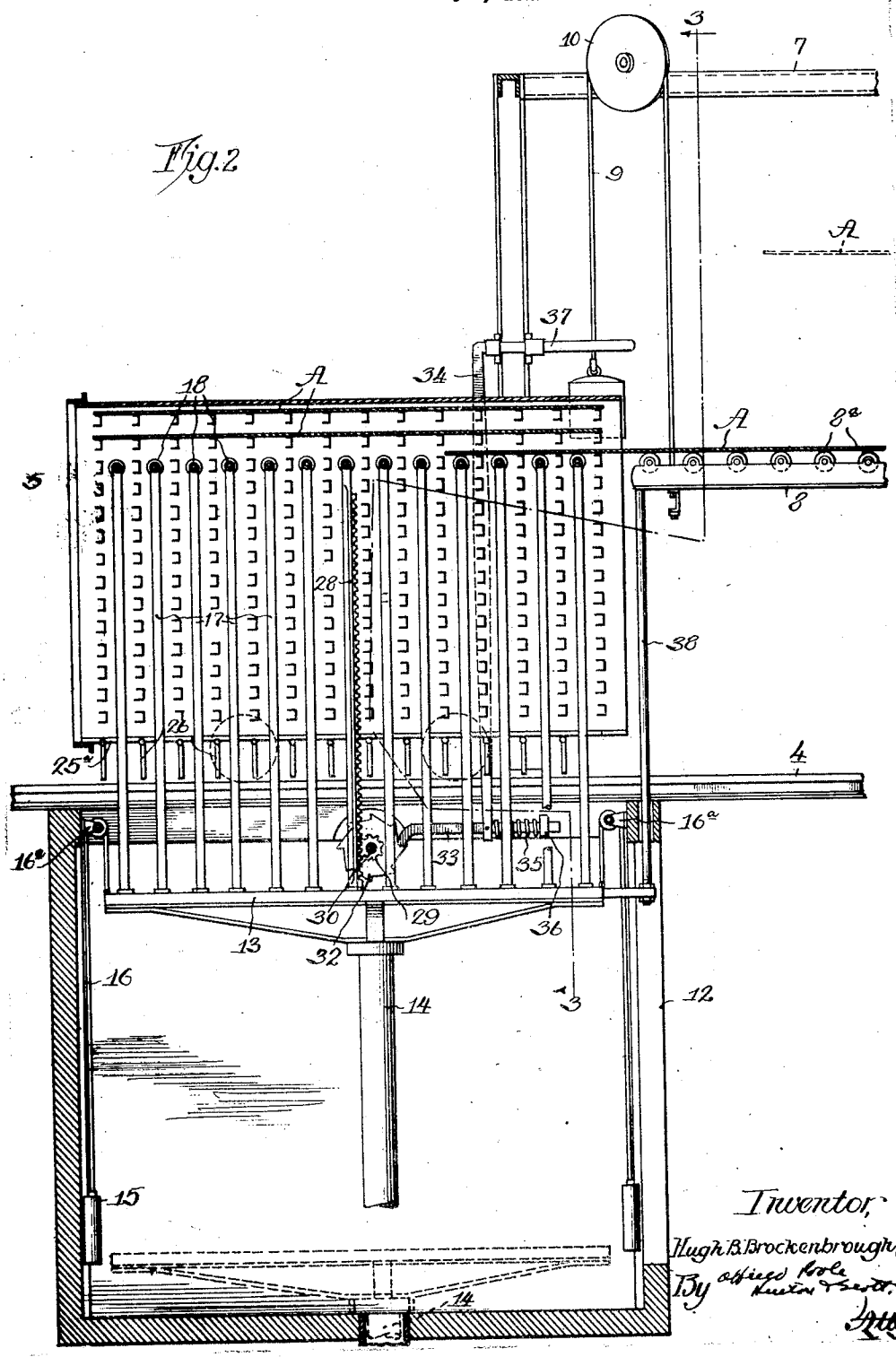
Dec. 15, 1925. 1,565,984

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PLASTER BOARD DRYING APPARATUS

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Fig. 2



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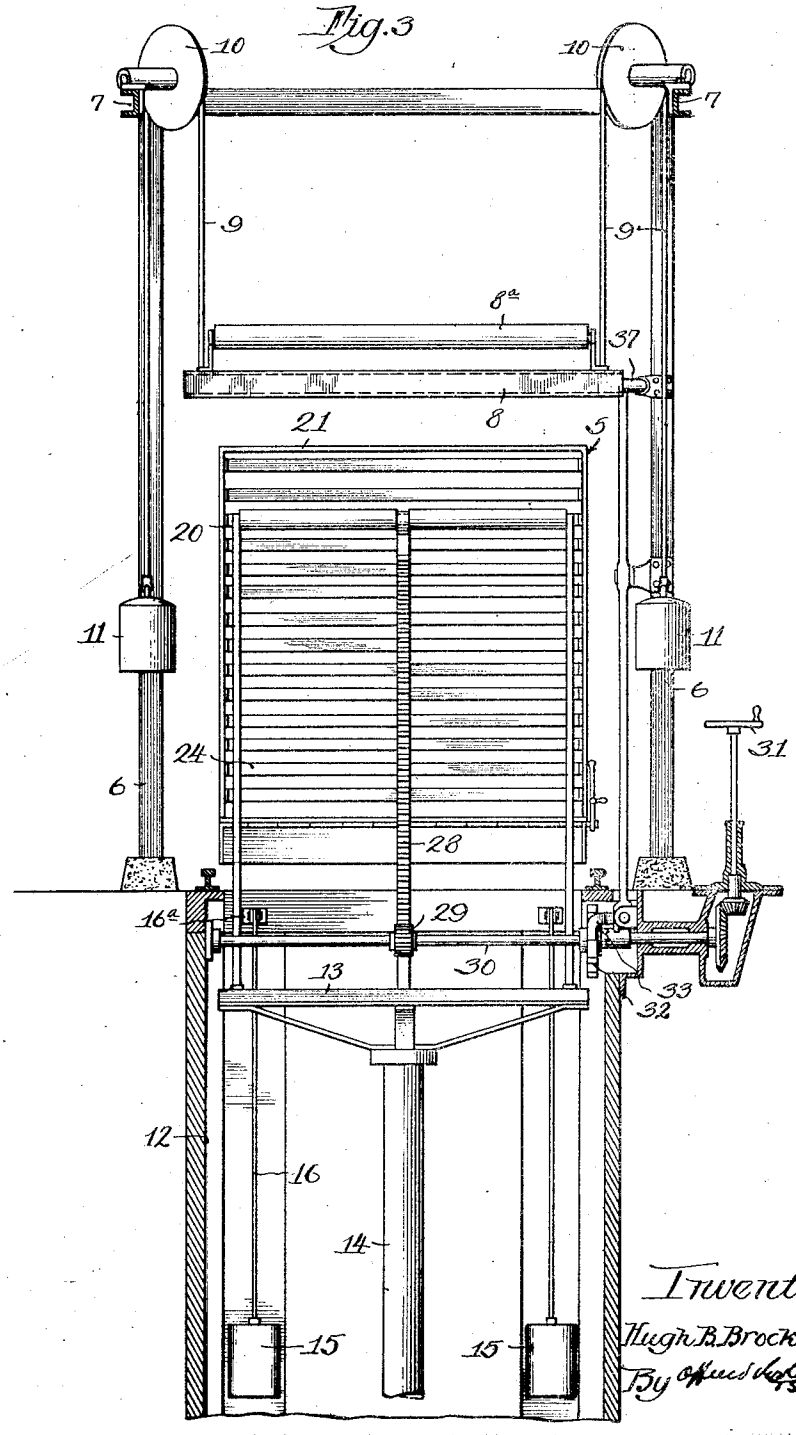
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PLASTER BOARD DRYING APPARATUS

Filed July 7, 1922 4 Sheets-Sheet 3

Fig. 3



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PLASTER BOARD DRYING APPARATUS

Filed July 7, 1922 4 Sheets-Sheet 4

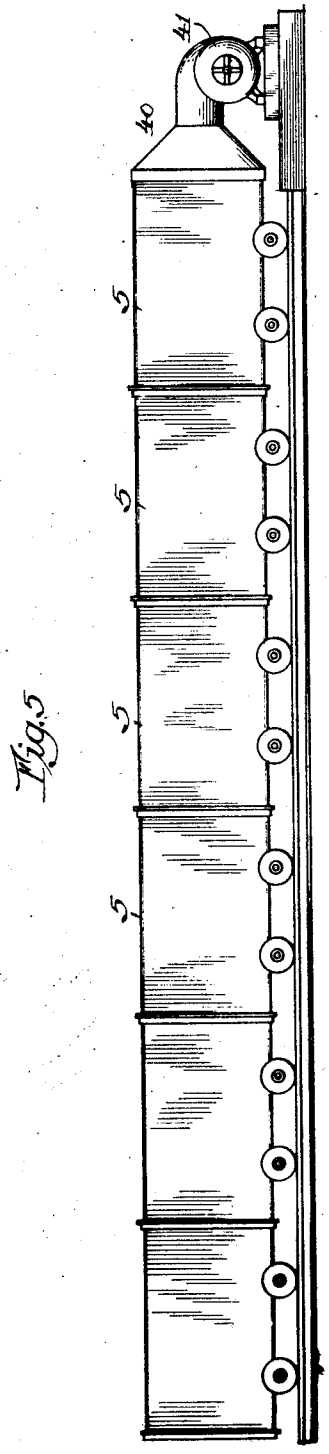
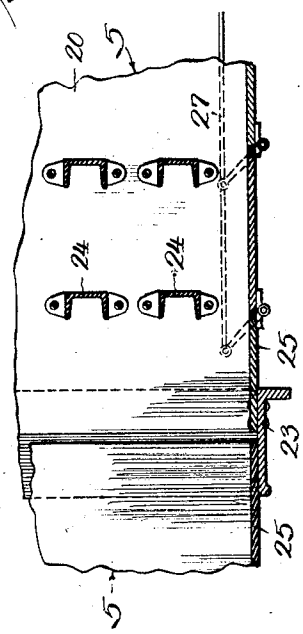


Fig. 5

Fig. 4



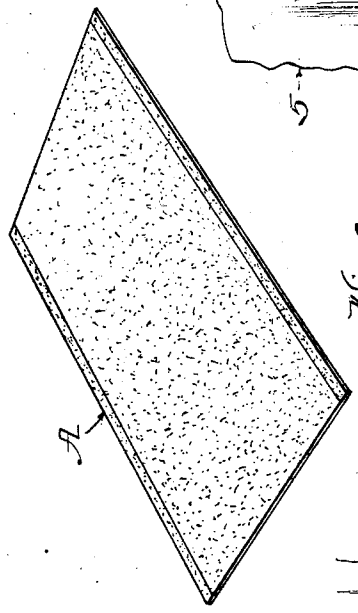


Fig. 6

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Patented Dec. 15, 1925. 1,565,984

UNITED STATES PATENT OFFICE.

HUGH B. BROCKENBROUGH, OF FORT DODGE, IOWA, ASSIGNOR TO PLYMOUTH GYPSUM COMPANY, OF FORT DODGE, IOWA, A CORPORATION OF IOWA.

PLASTER-BOARD-DRYING APPARATUS.

Application filed July 7, 1922. Serial No. 573,352.

To all whom it may concern:

Be it known that I, HUGH B. BROCKENBROUGH, a citizen of the United States, and a resident of Fort Dodge, in the county of Webster and State of Iowa, have invented certain new and useful Improvements in Plaster-Board-Drying Apparatus, of which the following is a specification.

This invention relates to improvements in plaster board drying apparatus, and more particularly to an apparatus forming that part of plaster board making machinery which receives the "green" board as it is delivered from the plaster board machine, and handles it preparatory to and during the drying process.

The object of the invention is to provide a new and novel construction for an apparatus of the character described whereby a distinct improvement in the method of drying board may be carried out with a view to promoting greater production, less wastage, and less manual labor.

Heretofore the practice has been to transport the sheets of plaster board from the delivery belt of the machine onto cars or overhead carriages, and wheel them into the drying kilns, all handling of the board being accomplished by manual labor, and owing to the moist condition of the product, the exercise of care and skill is required to avoid breakage, and consequent spoiling of the product.

In the method contemplated by the use of the apparatus about to be disclosed, the sheets of plaster board are delivered flatwise into open ended cars which, when loaded according to a definite plan or arrangement are connected end to end, forming a continuous closed duct or chamber through which heated air is blown.

With the foregoing résumé of the general procedure involved, the mechanism will now be described in connection with the accompanying drawings, in which

Fig. 1 is a general view of the delivery and loading apparatus as it appears in side elevation,

Fig. 2 is an enlarged detail view of a single car in the process of being loaded and showing the elevator and loading rack in detail,

Fig. 3 is a detail view in vertical section on line 3, 3 of Fig. 2, showing the various details of construction,

Fig. 4 is a fragmentary view of a car showing the construction of the bottom ends and supporting members,

Fig. 5 is a view showing the manner in which several cars are coupled together during the drying operation, and

Fig. 6 is a perspective view of a sheet of plaster board.

For the purpose of more clearly understanding the function of the apparatus, it may be explained that a plaster board machine consists in part of an endless conveyor belt which transports the freshly made board from the head end where the board is made, by a continuous process consisting of feeding wet stucco between sheets of paper which are passed through rolls to reduce the product to a sheet of uniform thickness (Fig. 6). During its travel along the slowly moving belt the stucco has an opportunity to "set" and as it nears the delivery end is cut into suitable lengths of say ten feet. In Fig. 1, the delivery end of the belt 1 of the plaster board machine is shown, being supported upon a roller 2. Just beyond the end of the belt and in the plane of the top surface thereof is an overhead track 3 consisting of a multitude of transverse rollers along which the cut boards are pushed or advanced as they leave the belt 1. This track 3 may be of any desired length although it usually spans a comparatively short distance to the loading apparatus, which will first be described in such a way as to give the relative location of the main parts.

Mounted on a track 4 on the ground level are cars 5, 5 uncoupled and spaced apart on opposite sides of an upright frame consisting of vertical posts 6 and cross beams 7 erected over the track and extending above the cars. This frame supports an elevator 8 suspended from cables 9 running over sheaves 10 at the top of the frame and carrying counter weights 11 at the free ends. The elevator is a platform made up of rollers 8^a similar to the transporting track 3 and in its elevated position forms a continuation thereof just beyond its outer end. The ele-

vator is adapted to move upwardly and downwardly between the adjacent ends of the cars 5, 5, the counterweights being so adjusted that the weight of a single board upon the elevator will carry it downwardly, and when removed the elevator will travel upwardly to its starting position in the plane of the track 3.

Beneath the portions of the tracks 4 upon which the cars stand when being loaded are pits 12, 12 in which are mounted vertically moving platforms 13, 13 supported beneath upon a plunger rod 14 acting as a guide. Counterweights 15 and cables 16 traveling over sheaves 16ª support the platforms so that they may be readily elevated or depressed by means and in a manner hereinafter to be described. Erected upon the platforms are a multitude of vertical uprights 17 arranged in pairs spaced apart along the sides of the platforms, each pair of uprights supporting between their upper ends a roller 18, all lying in the same horizontal plane with open spaces therebetween. The purpose of the platforms 16 and their rollers 18 will presently be made clear.

It is evident from the foregoing that the cars 5, 5 and the platforms 13 beneath are duplications of each other, merely arranged on opposite sides of the elevator 8. This can be readily explained as being desirable for a practical reason, namely, that the boards are delivered continuously from the machine and therefore provision is made for continuous loading or delivery onto the cars, which are loaded alternately, so that each car as it is loaded may be removed and an empty car brought up in position for loading.

Referring now to the construction of the cars 5, 5, the same are not unlike open-ended box cars, although preferably of metal construction throughout. The side and top walls 20 and 21 are of sheet metal. The ends of the cars have considerable over-hang and the end edges treated in any suitable manner, such as by overlapping or telescopic flanges 23 (Fig. 4) so that when two cars are coupled together the ends will be sealed. The interior of each car is divided vertically through the entire available height by shelves or tiers spaced apart one above the other, a distance of say two inches, so that a length of board can rest on each tier with ample air space between. These tiers are constructed of cross bars 24 in the form of channel bars turned on edge and spaced apart a distance of say four inches in a horizontal direction. The individual bars 24 of each tier are further alined vertically so that open vertical spaces extend between the vertical rows of bars the full height of the car (Fig. 2). The bottom wall 25 of the car is of what may be termed open construction, having transverse slots 25ª directly beneath each vertical space between the bars 24. These slots extend the full width of the car or at least the full available width, which is slightly greater than the width of the plaster board. Hinged along the longer edge of each slot is a downwardly dropping door 26. These doors extending throughout the entire length of the car are preferably connected to a single operating rod 27 (Fig. 4) extending along the side of the car and operated at one end so that all doors may be opened and closed simultaneously.

The operation of the apparatus so far as it involves the parts thus far described, will now be explained. It has already been mentioned that the boards are delivered onto the overhead rack 3, being advanced by the boards immediately behind. Each board is thus delivered from the track 3 onto the elevator 8, the weight of the board overcoming the counterweights and the elevator descends.

Let it be assumed that the left hand car is being loaded (Fig. 2) and the elevator is carrying a single board A downwardly to be loaded onto the third tier from the top, the two upper tiers having already been loaded. Before the loading of the car is commenced, however, the following operations are carried on. The car is brought to rest over the pit 12 so that the slots 25ª in the bottom wall 25 are directly over each pair of uprights 17 and rollers 18 carried by the platform 13. By means of a vertical rack 28 extending upwardly from the platform exterior of the car and a rock pinion 29 mounted on a shaft 30 operated by a hand wheel 31 from the side of the car, the platform is elevated so that the rollers pass upwardly through the bottom of the car and the open spaces above, and brought to rest just above the plane of the topmost tier or shelf. Inasmuch as the platform 13 is made heavier than the counterweights 15 means are employed for holding the platform in elevated position, namely, a ratchet wheel 32 mounted on the shaft 30 and a pawl or trip member 33 which holds the platform in elevated position until released by trip mechanism so arranged that with each downward and upward travel of the elevator, the trip member 33 releases the ratchet wheel, permitting the platform to drop downwardly to the next tier, that is, a distance of two inches.

The trip mechanism consists of a vertical lever 34 pivoted intermediate its ends upon the adjacent upright 6 of the elevator supporting frame, its lower end being pivotally connected to the trip member 33. The trip member is a horizontally sliding bar engaging the teeth of the ratchet wheel at its forward end. At the rear end of the trip member is a compression spring 35 bearing at its forward end against the end of the lever 34

and at its rear end against a fixed bearing 36 in which the trip member slides, said spring acting to hold the trip member in engagement with the ratchet wheel 32. To the upper end of the lever 34 is pivotally connected another endwise sliding bar 37, extending into the path of the adjacent end of the elevator. As the elevator ascends to loading position the edge of the elevator strikes against the end of the contact bar 37 as it passes, operating the lever 34 to release the trip member 33 from the ratchet wheel, thus permittting the platform 13 to drop one-half the distance to the tier below. As the elevator again descends with a board thereon, the tripping is repeated, and the ratchet wheel allows the platform to descend the remaining distance, bringing it to rest in its proper position to receive the board shown in Fig. 2. Additional means, however, must be provided for bringing the elevator to rest opposite each tier on its downward travel. This is accomplished by means of a stop member 38 consisting of a vertical upright mounted upon the platform 13 and extending upwardly in the path of the elevator, the upper end of the stop member terminating a short distance below the level of the rollers 18. Manifestly as the platform descends to successive tier levels, the stop member descends the same distance, so that when the elevator strikes it, the same comes to rest with the board in alinement with the rollers 18.

Thus the boards are successively delivered to the tiers, and a slight forward movement carries them onto the rollers 18 and throughout the length of the car, said rollers being elevated just above the supporting members 24 so that as the platform is dropped by the tripping operation, which immediately follows, the boards are deposited upon the supporting members.

After one of the cars is filled, the one on the opposite side is loaded in the same manner, the platform 13 being then dropped into the pit 12 below, and the doors 26 of the loaded car are closed, and the same switched onto another track so that an empty car may be brought up and prepared for loading.

Now, assuming that a considerable number of loaded cars have been assembled on the same track, they are then coupled together with their open ends telescoped together, thereby forming a continuous chamber from one end of the cars to the other. Thus coupled and assembled, the cars are then wheeled up to a large funnel-shaped hood 40 which fits against the open end of the foremost car. Connected with this hood is a blower 41 adapted to draw heated air from a suitable source of supply, and force it through the entire length of the train of coupled cars, whereby the moisture is removed in the same manner as in a drying kiln. When dried the boards are unloaded and made ready for shipment.

It is to be observed that by using the apparatus herein disclosed, the handling of the board in its green state is not only done without lifting or turning them on edge, but they are delivered from the machine onto the elevator and from the elevator into the cars in a flatwise position, thereby eliminating all strains which would tend to crack the stucco or break the moist paper coverings.

The advantage, therefore, of the method carried on by the apparatus, is a material decrease the amount of board that is spoiled and therefore wasted, as well as the elimination of all handling of the board by hand, other than that required in guiding the same to and from the elevator, and pushing them into the cars.

The details of construction may be variously modified without departing from the spirit of the invention, and therefore I do not wish to be limited except in so far as the invention is specifically set forth in the appended claims.

I claim:

1. In an apparatus of the character described, the combination of an elevator, means for delivering boards onto said elevator, means permitting said elevator to descend by the weight of a board delivered thereon, a tier of board supporting members located adjacent the path of said elevator, and means for bringing said elevator to rest in unloading positions opposite successive supporting members of said tier.

2. In an apparatus of the character described, the combination of a counter-balanced elevator, tiers of supporting elements adjacent the path of said elevator, means for delivering boards successively onto said elevator whereby the same descends under the weight thereof, and trip operated stop mechanism acting to bring said elevator to rest in unloading position opposite successive board-receiving members from top to bottom of said tier.

3. In an apparatus of the character described, the combination of a counter-balanced elevator adapted to assume a loading position when empty, means for delivering boards successively onto said elevator in loading position whereby said elevator descends under the weight thereof, tiers of horizontal supporting members in the path of said elevator, and means cooperating with said elevator for bringing the same to rest in successive unloading positions after each board is delivered thereon.

4. In an apparatus of the character described, the combination of a counterbalanced elevator normally assuming an elevated loading position, means for delivering boards onto said elevator in loading position whereby said elevator descends toward suc-

cessive unloading positions, and means for stopping the descent of said elevator at different unloading positions, and trip mechanism operated by said elevator and acting to shift said stopping means after each movement of said elevator to one of said unloading positions.

5. In an apparatus of the character described, the combination of a counterbalanced elevator, means for delivering boards successively onto said elevator at the upper end of its path of movement, a vertically movable stop member in the path of said elevator, and tripping means operated by said elevator and acting to permit said stop member to be shifted into successive unloading positions.

6. In an apparatus of the character described, the combination of an elevator, means for delivering boards successively onto said elevator in loading position, a receiving member adapted to be positioned adjacent the path of said elevator and comprising a tier of horizontal supporting members, means for bringing said elevator to rest in unloading positions opposite successive supporting members, and a vertically movable platform comprising horizontally arranged rollers adapted to be brought successively in the plane of said elevator in its several unloading positions.

7. In an apparatus of the character described, the combination of an elevator, means for delivering boards successively onto said elevator in loading position, a wheeled housing adapted to be positioned adjacent said elevator for loading and provided with tiers of horizontal supporting elements therein, a vertically movable platform comprising a horizontal row of rollers movable vertically within said housing and co-operating with said elevator for delivering the boards successively into said housing.

8. In an apparatus of the character described, the combination of an elevator, means for delivering boards successively onto said elevator at one end of the path of movement, a wheeled housing adapted to be positioned adjacent the path of said elevator for loading and provided with a tier of board-supporting members therein, a platform comprising rollers movable vertically in said housing, mechanism for controlling the movement of said platform whereby the same registers with successive tiers, and means for bringing said elevator to rest at the level of said rollers for unloading.

9. In an apparatus of the character described, the combination of an elevator, means for delivering boards successively to said elevator in loading position, means for counter-balancing said elevator whereby the same will descend by gravity under the weight of its load to unloading position, a wheeled housing positioned at the unloading position of said elevator, and means for stopping said elevator in successive unloading positions.

10. In an apparatus of the character described, the combination of an elevator, means for delivering boards successively to said elevator in loading position, means for counter-balancing said elevator whereby the same descends by gravity under the weight of each board to unloading position, a wheeled housing adapted to be loaded from said elevator, and comprising tiers of supporting members, and means for bringing said elevator to rest opposite successive tiers for unloading.

11. In an apparatus of the character described, the combination of an elevator, means for delivering boards successively to said elevator in loading position, a wheeled housing comprising tiers of horizontal supporting members, a horizontal roller track movable vertically within said housing and adapted to be successively brought to rest substantially in the place of said tiers, and trip mechanism operative in the movement of said elevator for controlling the movement of said roller track whereby the same registers with said elevator in successive positions for unloading onto said tiers.

12. In an apparatus of the character described, the combination of an elevator, means for delivering boards successively to said elevator in loading position, means for counter-balancing said elevator whereby it will descend by gravity under the weight of each board to unloading positions, a wheeled housing open at its end adjacent the path of said elevator and comprising tiers of supporting members, a platform movable vertically within said housing and comprising rollers forming a horizontal track adapted to be successively brought to rest substantially in the plane of said tiers, and mechanism operative in the movement of said elevator for controlling the movement of said platform whereby said track registers with said elevator in successive positions for unloading.

13. In an apparatus of the character described, the combination of an elevator, means for delivering boards successively to said elevator in loading position, means for counter-balancing said elevator whereby it will descend by gravity under the weight of each board to unloading positions and return to loading position when said board is removed, a wheeled housing open at its end and adapted to be loaded from said elevator in unloading positions and comprising tiers of supporting members, a vertical movable roller track within said housing for facilitating the delivery of the boards from said elevator into said housing, and means for

bringing said elevator to rest at the successive levels of said roller track.

14. In an apparatus of the character described, the combination of an elevator, means for delivering boards flatwise upon said elevator in loading position, means for counter-balancing said elevator whereby it will descend by gravity under the weight of each board to unloading position, a wheeled housing adapted to be loaded from said elevator and to support them in flatwise positions, a vertical movable roller track associated with the housing for delivering the boards from said elevator into final position, trip mechanism controlled by the movement of said elevator for lowering said roller track to successive loading positions, and means carried by said roller track for bringing said elevator to rest at the successive levels of said roller track.

15. In an apparatus of the character described, the combination of a housing adapted to receive boards for drying, and comprising tiers of horizontal supporting members, a roller track adapted to be moved vertically within said housing, means for delivering boards to said housing for loading onto successive tiers, and means for moving said roller track from one tier to the next, as each tier is successively loaded.

16. In an apparatus of the character described, the combination of a drying housing, comprising tiers of fixed supporting members spaced apart with vertical spaces therebetween, a platform beneath said housing and supporting a roller track adapted to travel within said vertical spaces of the housing and to be successively positioned in the plane of said tiers, means for delivering boards successively onto said track, and means for automatically lowering said track from one tier to the next as each is loaded.

17. In an apparatus of the character described, the combination of a drying housing having a receiving opening, and supporting members arranged in horizontal and vertical rows with vertical spaces therebetween, a platform mounted below said housing and comprising a roller track movable vertically between the vertical rows of supporting members, means for delivering boards opposite the level of the horizontal rows of supporting members, and means for intermittently lowering said platform to successive loading levels.

18. In an apparatus of the character described, the combination of a drying housing having a receiving opening and supporting members arranged in horizontal and vertical rows and forming tiers with vertical spaces therebetween, a platform mounted below said housing and comprising a roller track movable vertically within the vertical spaces between said supporting members, an elevator adapted to receive boards in its loading position, and to be lowered by gravity to unloading position opposite successive tiers, trip mechanism operated by the movement of said elevator for lowering said roller track in line with successive tiers, and a stop member mounted on said roller track for bringing said elevator to rest in horizontal alinement with said roller track in its several unloading positions.

19. In an apparatus of the character described, the combination of a drying housing having a receiving opening and supporting members arranged in horizontal and vertical rows and forming tiers with vertical spaces therebetween, a vertically movable platform below said housing and supporting a roller track, the several elements thereof projecting upwardly within the vertical spaces between said supporting members, an elevator adapted to receive boards in its loading position and to be lowered to unloading position opposite successive tiers, trip mechanism operated by the movement of said elevator for lowering said platform to the level of successive tiers, and a stop member mounted on said platform for bringing said elevator to rest in horizontal alinement with said roller track as it descends to successive levels.

20. In an apparatus of the character described, the combination of a car having tiers of supporting members spaced apart horizontally to form vertical spaces therebetween, a platform mounted beneath said car in loading position and comprising uprights supporting rollers therebetween, said car having openings in its bottom wall whereby said rollers may enter the vertical spaces between said supporting members, said rollers providing a track for the flatwise loading of boards upon said tiers.

21. In an apparatus of the character described, the combination of a car having tiers of supporting members spaced apart horizontally to form vertical spaces therebetween, a platform mounted beneath said car and comprising uprights supporting rollers therebetween, said car having openings in its bottom wall whereby said rollers may enter the vertical spaces between said supporting members, said rollers providing a track for facilitating the loading of boards upon said tiers.

22. In an apparatus of the character described, the combination of a car open at its end and having tiers of supporting members spaced apart horizontally to form vertical spaces therebetween and openings in the bottom wall in alinement with said vertical spaces, a pit formed beneath said car, a platform mounted in said pit and comprising pairs of uprights having rollers journalled between their upper ends, said platform being adapted to be elevated to carry said rollers upwardly into said vertical spaces

thereby forming a roller track co-operating with said supporting members for the delivery of boards onto said tiers.

23. In an apparatus of the character described, the combination of a car open at its end and having tiers of supporting members spaced apart horizontally to form vertical spaces therebetween and openings in the bottom wall in alinement with said vertical spaces, a pit formed beneath said car, a counter-balanced platform mounted in said pit and comprising pairs of uprights having rollers journalled between their upper ends, said platform being adapted to be elevated to carry said rollers upwardly into said vertical spaces thereby forming a roller track cooperating with said supporting members for delivering boards into said car, and doors hinged to the bottom wall openings of said car for closing the same when said rollers are removed after loading.

In witness whereof, I hereunto subscribe my name this 30 day of June, A. D., 1922.

HUGH B. BROCKENBROUGH.