April 15, 1958 G. ÖHOLM 2,830,715

SHEET FEEDING DEVICE

Filed April 7, 1953 3 Sheets-Sheet 1

FIG. 1.

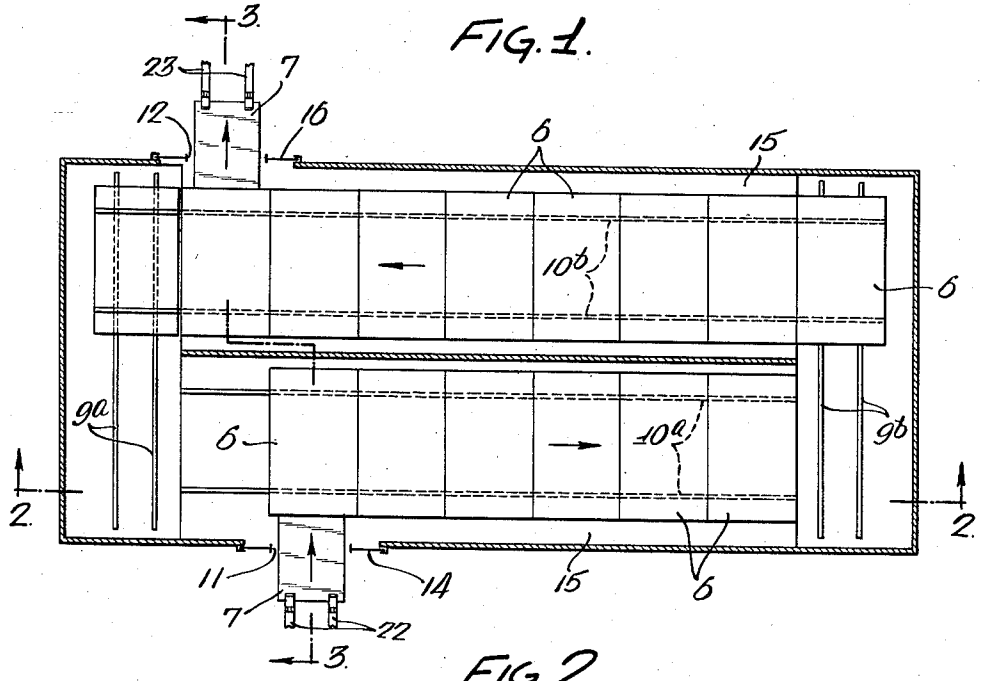


FIG. 2.

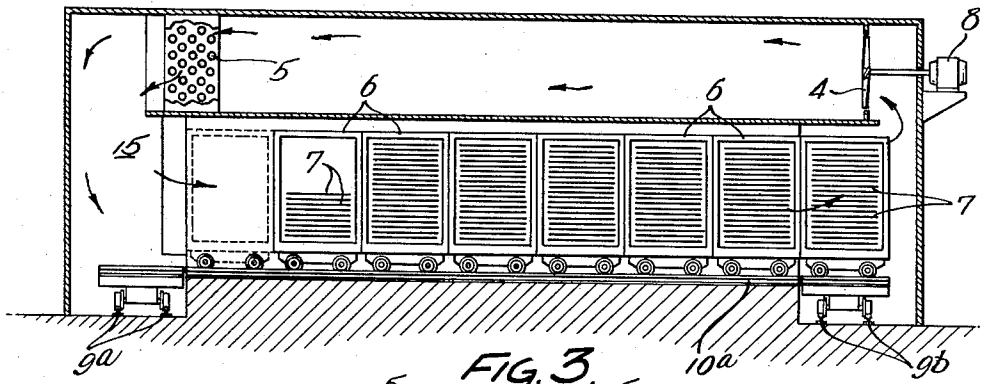
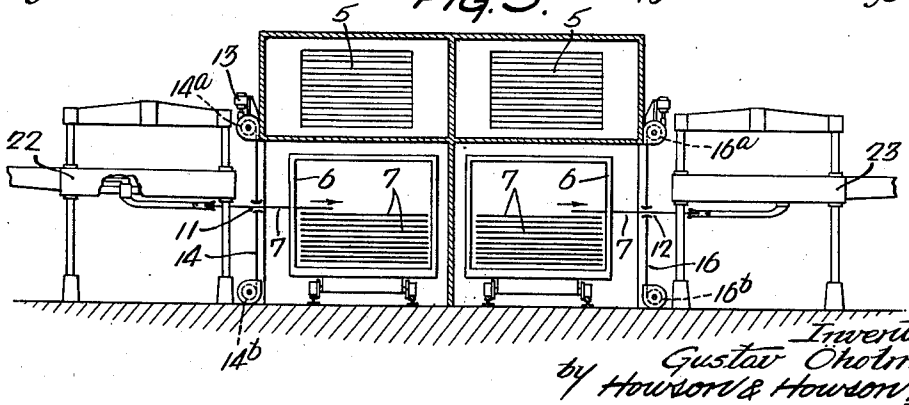


FIG. 3.



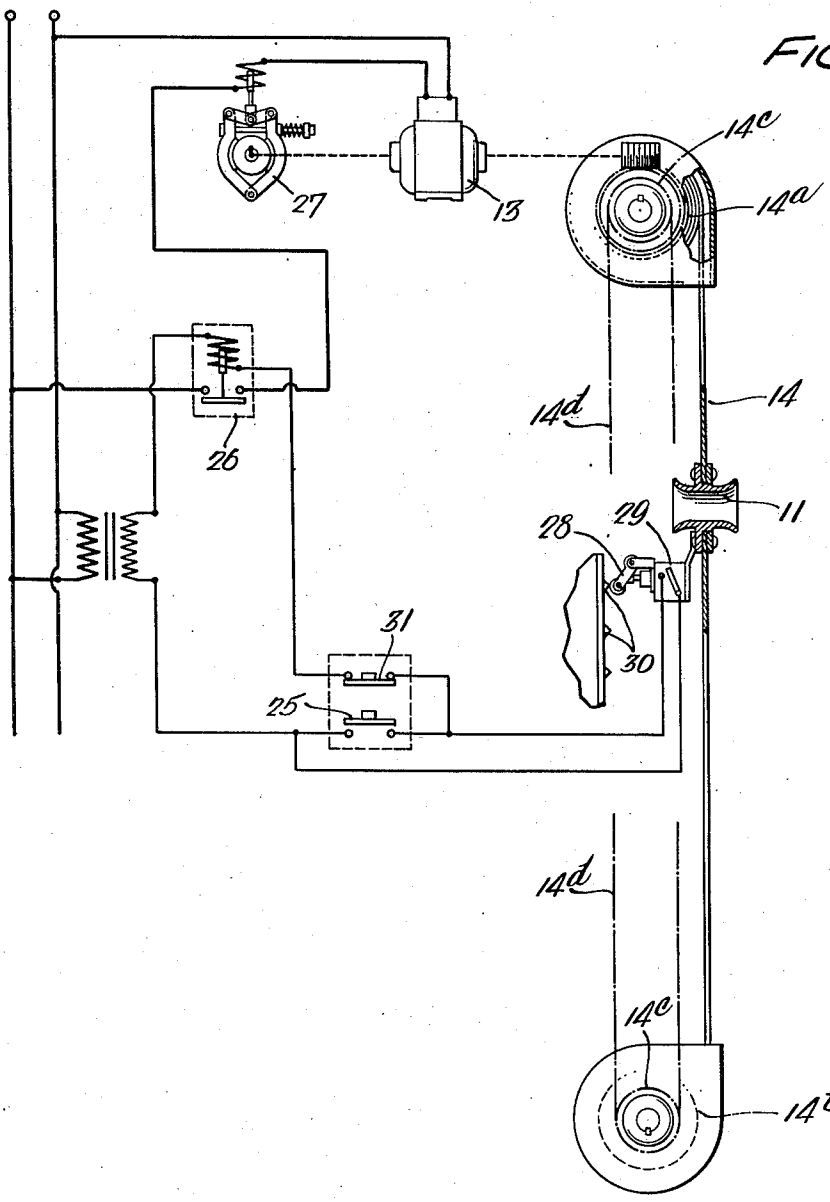
Inventor:
Gustav Öholm
by Howson & Howson Attys.

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SHEET FEEDING DEVICE

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FIG. 4.



Inventor:
Gustav Öholm
by Howson & Howson
Attys.

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SHEET FEEDING DEVICE

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FIG. 7.

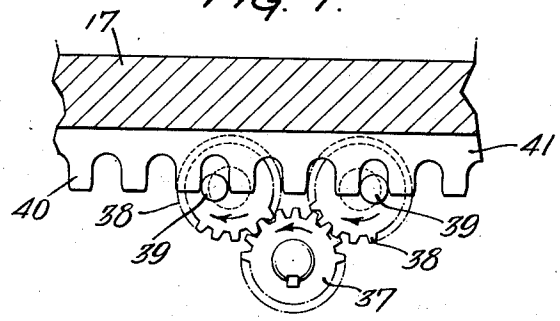


FIG. 5

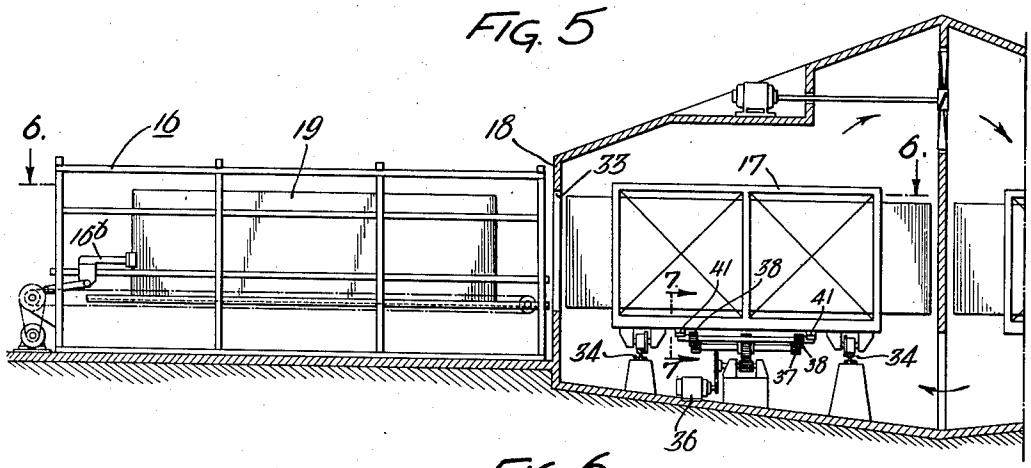
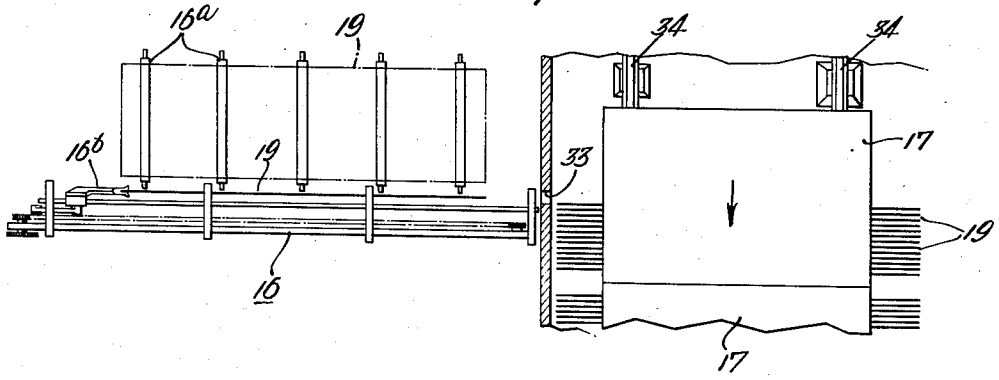


FIG. 6.



Inventor:
Gustav Öholm
by Howson & Howson
Attys.

United States Patent Office 2,830,715
Patented Apr. 15, 1958

2,830,715

SHEET FEEDING DEVICE

Gustav Öholm, Bromma, Stockholm, Sweden, assignor to AB Svenska Flaktfabriken, Stockholm, Sweden

Application April 7, 1953, Serial No. 347,267
Claims priority, application Sweden April 10, 1952
3 Claims. (Cl. 214—18)

The present invention relates to feeding, transporting and discharging of sheet-like materials, preferably sheets manufactured of fibrous materials such as defibrated wood, peat or the like, intended to be treated several together in a closed chamber. Such sheets are often placed on trucks for instance by the hardening and the moistening. The trucks are then pushed into a treatment chamber for heating and moistening purpose. In order to have the space of each chamber as small as possible the trucks are so constructed that a very great number of sheets can be supported by each truck. The sheets have often the following dimensions: length 18'; width 4'; thickness ⅛ inch. There are two different types of trucks. In one of these types of trucks the sheets are loaded vertically upright and the sheets are pushed in grooves of an earlier known performance. The grooves guide the sheets at the bottom and at the top. Such grooves are usually disposed at a distance of about 20 mm. from each other. Thus the sheets will be evenly spaced with an intermediate distance of about 20 mm. A truck having a width of 2 m. can thus be loaded with 100 sheets. In the other type of trucks the sheets are horizontally disposed. As earlier known the sheets can be stacked in pairs. The sheets can be supported by means of metal wires which are stretched on different heights of the truck. This will make it possible to stack the sheets over each other with as small space between each other as possible. Owing to the need of space for the fastening means which are necessary for the wires the vertical partitioning can however not be carried out by so small distances as in the previous mentioned case where the sheets are fed in a vertical position and standing upright. For horizontally fed sheets it is necessary to extend the partitioning resulting in about 40 mm. intermediate distances. A truck having a loading height of 2 m. can thus carry 50 stories over each other and by stacking the sheets in pairs in a known manner such a truck can also carry 100 sheets. By methods for feeding and discharging of sheets as earlier carried out the feeding and discharging of the trucks have been performed outside the treatment chamber. The trucks have thus been pushed into the pulled out from the treatment chamber through the front doors of said chamber.

The main object of the invention is to eliminate disadvantages of different kinds involved in the above mentioned methods of the prior art. A serious drawback of known methods is that the temperature and the relative humidity of the medium are changed every time the front doors are opened. The process in the treatment chamber is thus influenced. A further object of the invention is to prevent the entrance of fresh air when opening the doors as this otherwise would result in uncontrollable mixtures of fresh air and treating medium. Such mixtures could easily cause ignition when coming in contact with the warm sheets. This risk will increase considerably when the treatment chamber has more than one truck with sheets.

The method of the invention is mainly characterized by the fact that every sheet or sheets in pairs are each fed into and pulled out from the chamber through openings in the wall of the chamber which openings correspond to the thickness and the width of the sheet (sheets in pairs), said sheet or sheets in pairs being transported within the treatment chamber in a known manner.

A device in accordance with the invention for performing the above mentioned method consists of a closed chamber having feeding and discharging openings and transporting means disposed in the interior of the chamber, said means intended to transport a number of sheets (sheets in pairs) between the feeding and discharging openings. The device is further characterized by that the feeding and discharging openings consist of narrow slots corresponding to the thickness and width of each sheet (sheets in pairs) and that the sheets (sheets in pairs) are fed and discharged through the mentioned slots by gripping means of an earlier known type.

A modification of the device is characterized by that the feeding and/or discharging slots are stationary and that the transporting means, disposed in the chamber, for instance a truck, is arranged to be removed step by step when feeding or discharging every sheet (sheets in pairs).

Another modification of the device is characterized by that the feeding and/or discharging slots are disposed in a movable part of the wall of the chamber, said part of the wall being arranged to be removed step by step during the feeding or discharging of every sheet (sheets in pairs).

The invention will now be more fully described in connection with the accompanying drawings which show two adapted modifications of the device as examples for performing the method.

Fig. 1 is a plan sectional view of a dryer of the present invention for drying the sheets in a horizontal position;

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

Fig. 3 is a transverse sectional view of the dryer of Fig. 1, taken on line 3—3, Fig.1;

Fig. 4 is an enlarged schematic view of a portion of the movable wall and the means for moving the wall;

Fig. 5 is a fragmentary transverse sectional view of a dryer wherein the sheets are treated in a vertical position;

Fig. 6 is a sectional view taken on line 6—6, Fig. 5; and

Fig. 7 is an enlarged fragmentary sectional view of the intermittent drive for the truck, taken on line 7—7, Fig. 5.

In Figs. 1, 2 and 3 the sheets designated 7 are fed through the slot 11 and after treatment in the chamber 15 they are discharged through the slot 12. At the feeding opening there is a movable part 14 of the wall which part extends between upper and lower rolls 14*a* and 14*b*. This movable wall 14 contains the feed slot 11 and is flexible, having its opposite ends wound about the rolls 14*a* and 14*b*. The rolls 14*a* and 14*b* are adapted to be rotated intermittently, for example, by means of an electric motor 13 to advance the wall 14 one step after each sheet 7 is fed into the chamber 15 onto a truck 6, so that each sheet is fed in the proper position relative to the truck 6. The rolls 14*a* and 14*b* each have a sprocket 14*c* thereon interconnected by a chain drive 14*d* and are driven in unison. The corresponding part of the wall at the discharging opening is designated 16 and the rolls carrying this part of the wall are designated 16*a* and 16*b*. During the transport through the treatment chamber the sheets (sheets in pairs) are resting on the trucks 6 as shown. The trucks are in turn resting on the rails 10*a*, 9*b*, 10*b* and 9*a* during the passage through different parts of the treatment chamber. This chamber is provided with a number of fans 4 driven by means of an

electrical motor 8. The treatment chamber can also be provided with heating means or moistening means 5. Near the feeding and discharging ends of the treatment chamber and outside said chamber there are means, designated generally as 22 and 23, respectively, for the pushing and pulling out each sheet (sheets in pairs). These means may be provided with gripping means known per se.

As mentioned previously, the movable wall 14, containing the feed slot 11 is operable to be moved step by step as the sheets of material to be treated are deposited on the trucks so that successive sheets are fed into the chamber 15 at the proper height relative to the truck.

Fig. 4 illustrates one means for actuating the wall, it being understood that the means for moving the wall 16 containing the discharge slot 12 has substantially the same construction. With reference to Fig. 4, the motor 13 causes rotation of the upper roll 14*a* about which the upper end of the wall 14 passes. To move the slot 11 up one step, a start switch 25 is closed which energizes the solenoid of a relay 26, closing the relay and completing a circuit to a solenoid operated brake 27 which is connected to the shaft of the motor 13, releasing the brake. At the same time a circuit is completed to the motor 13 causing the wall 14 to be moved vertically. Upon movement of the wall 14, a switch arm 28 which holds a normally closed switch 29 open is removed from engagement with one of a series of switch actuating lugs 30 mounted for engagement by the arm 28. This causes the switch 29 to close, completing a holding circuit through a stop switch 31 to the relay 26. The switch 29 and switch arm 28 are carried by the movable wall portion 14 and after the wall 14 has moved vertically a predetermined distance, the switch arm engages another lug 30 opening the switch 29 thereby breaking the circuit to the relay 26 causing the motor 13 to stop operating and actuating the brake 27 to its locked position. The slot opening is then in position for the next sheet to be fed into the chamber 15 and the above operation may then be repeated.

Figs. 5, 6 and 7 disclose a modified form of dryer wherein sheets to be treated are conveyed through the dryer in the vertical position and are fed into and removed from the dryer through elongated stationary vertical slots 33 in the side walls of the dryer. The sheets are conveyed through the dryer by trucks 17 mounted for movement on tracks 34.

In these figures the sheets (sheets in pairs) are shown in a vertical position during the transport on the trucks 17 through the treatment chamber. In front of the feeding end 18 there are means for lifting the sheets (sheets in pairs) up to a perpendicular position (90°). Said means are designated 16 and comprises pivotal arms 16*a* operable to raise the sheet to a vertical position from which it is pushed into the dryer through the slot 30 by means of a pusher member 16*b*

As set forth previously, the sheets are fed through the slot 33 onto the trucks 17, and the trucks are advanced intermittently past the slot so that the sheets are stacked uniformly on the trucks. Figs. 5 and 7 illustrate one means for advancing the trucks. The trucks are advanced by means of an intermittently operating motor 36 which causes intermittent rotation of a gear 37. The gear 37 engages a pair of gears 38, 38, each of which carries a crank shaft 39 engageable within teeth 40 of racks 41 carried by the truck 17. This construction causes a positive intermittent advance of the trucks 17.

When the truck 7, 17, has been filled with sheets it is moved along the rails 34 through the treatment chamber as in the dryer of Figs. 1 to 4, until it reaches a discharge slot at the opposite side of the dryer from the feed slot 33, where the sheets are removed from the trucks. The trucks are then advanced to a position in front of the feed opening and the procedure is repeated.

The invention has the following advantages:

The temperature and the humidity of the treatment medium of the chamber will not be influenced by the feeding and discharging of the transporting means (the trucks).

The feeding can be carried out uniformly and in sequence with the producing of the sheets of defibrated wood. The dependence of the attentiveness of employees in connection with the feeding and discharging of the trucks will now be of a less importance than hitherto.

The device in accordance with the invention can be diminished as the doors are eliminated as parts of the plant. Such doors take always a certain space and there must also be a space for handling of said doors.

The feeding and discharging openings for the sheets can be located on the place in the passage for the transporting means which is found to be the best one with respect to other arrangements in the factory.

Modifications of the different parts of the device can be made within the scope of the claims.

What I claim is:

1. Apparatus for treating sheet material comprising a closed chamber having side walls, means in said side walls defining a feed opening and a discharge opening, a conveying carriage within said chamber operable to receive a plurality of the sheets to be treated at the feed opening and convey the same to the discharge opening, the feed and discharge openings corresponding substantially to the width and thickness of the sheets, feed means adjacent the feed opening to feed the sheets one at a time through the feed opening to the conveying carriage and position the same on the conveying carriage in spaced parallel relation, discharge means adjacent the discharge opening to remove the sheet material from the conveying carriage through the discharge opening, and intermittent drive mechanism operable to cause relative movement between the feed opening and the conveying carriage to alter the position of the feed opening relative to the conveying carriage step by step and cause the sheet material to be positioned on the conveying carriage by the feed mechanism in the desired spaced parallel relation.

2. Apparatus according to claim 1 wherein said side wall has a movable portion containing said feed opening, and said drive mechanism is interconnected with said side wall movable portion to change the position of said feed opening step by step.

3. Apparatus according to claim 1 wherein said drive mechanism is interconnected with said conveying carriage to advance said conveying carriage step by step relative to said feed opening.

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