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SKIN DRYING APPARATUS

2 Sheets-Sheet 1

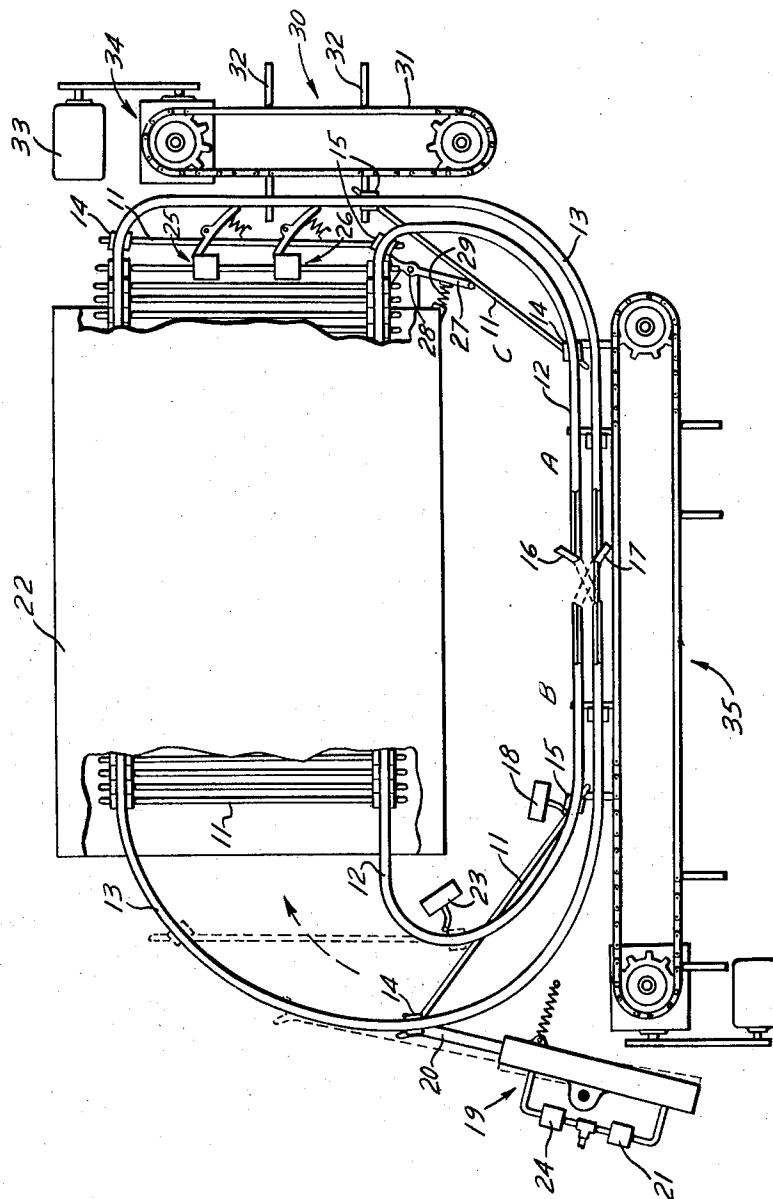


FIG. 1

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2 Sheets-Sheet 2

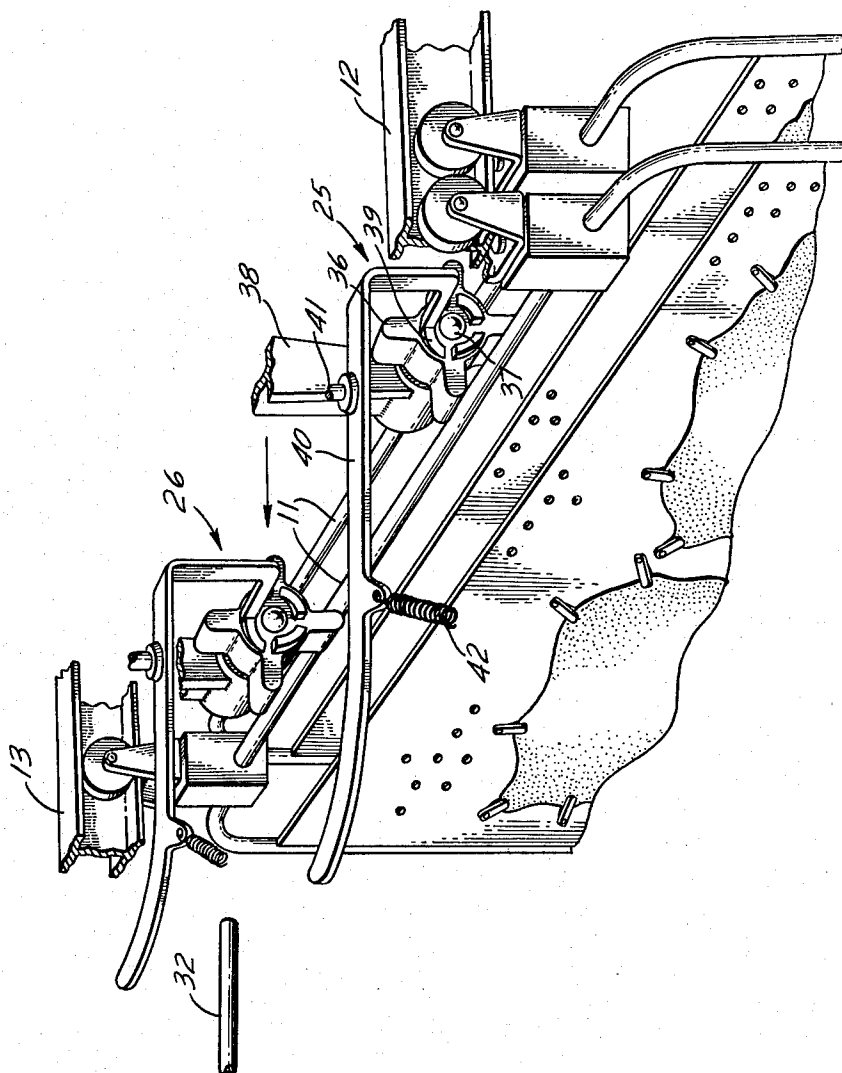


FIG. 2

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SKIN DRYING APPARATUS

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4 Claims. (Cl. 104—91)

The invention pertains generally to the drying of leather and in particular to improved apparatus for continuously accomplishing such drying.

In the art of making leather from skins it is necessary to stretch the skins before drying them. Three different methods of stretching skins for drying are commonly used; pasting; toggling; and tacking.

In the pasting process skins are cemented to flat solid drying boards and are then moved through an oven. After the attached skins have been dried completely the skins are stripped away from the drying board. While the pasting process is probably the most widely used, no apparatus that is completely satisfactory is now known for carrying out the process on a commercial scale. In the most advanced types of known apparatus the drying boards must be held in position (usually vertical) so that skins may be affixed thereto, moved, as by a conveyor, into a drying oven wherein drying is accomplished and then removed from the oven so that the dried skins may be removed. Since the time taken to dry the skins is longer than the time required to paste skins on drying boards or to strip skins from such boards it is necessary that provision be made to compensate for such difference. Compensation may be accomplished by using a relatively long oven so that the conveyor may be moved at a constant speed. That is, when a single conveyor is used, the length of the drying oven is so much longer than the length of the loading and unloading sections that each loaded drying board is kept within the oven for a sufficient length of time to dry the skins. This expedient, of course, is wasteful of space and is to be avoided if possible. An alternative method of compensation is to have a low speed conveyor within the drying oven and a high speed conveyor outside the oven. However known apparatus of this type requires that the two conveyors must be stopped periodically in order that the drying boards may be transferred from one to the other. Stopping, of course, is highly undesirable. Further, the complexity of apparatus having two conveyors is obviously greater than that of apparatus having only one conveyor.

Although toggling and tacking apparatus differ from pasting apparatus in that the drying boards are different and are usually loaded and unloaded in a horizontal position, many other portions of both types of apparatus are otherwise quite similar to the pasting apparatus described hereinbefore. That is, after the drying boards are filled with skins they are moved into a drying oven so that the skins are dried. However, all known apparatus for carrying out either toggling or tacking are subject to the same deficiencies and shortcomings as previously outlined in connection with the discussion concerning apparatus for pasting.

Therefore, it is an object of the invention to provide apparatus for drying skins in which drying boards are automatically transferred to and from a moving conveyor;

It is another object of the invention to provide a sin-

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gle conveyor drying apparatus having portions thereof operating at different speeds;

Still another object of the invention is to provide conveyor apparatus for drying skins in which drying boards are maintained in a vertical position;

A still further object of the invention is to provide conveyor apparatus in which drying boards are continuously moved during the time in which loading and unloading is done.

These and other objects of the invention are generally accomplished in a preferred embodiment of the invention by providing a drying oven having a pair of inclined overhead tracks running from the entrance end to the outlet end. Drying boards, each of which has skins attached to it either by pasting, toggling or tacking, are propelled sequentially into the oven on the tracks with such velocity as to move all the drying boards in the oven toward the outlet end. A brake assembly disposed adjacent the outlet end of the oven prevents the drying boards within the oven from moving out of the oven except as desired. The brake assembly preferably consists of a first and a second holding device, which operate alternatively. That is, the first holding device is ordinarily engaged with the board nearest the outlet end of the oven so as to hold all the drying boards. When the first holding device is momentarily released, the drying boards within the drying oven move toward the outlet end until the second holding device is locked by the movement of the drying boards. The first holding device is then in position to hold the second last drying board and, as a result, all the other drying boards in the oven are then held by the second holding device. When the second holding device is released, the drying board held by it moves out of the oven along the inclined tracks, the first holding device is actuated to hold the remaining drying boards in the oven. As each drying board is removed from the oven, a conveyor system moves the drying board to an unloading and a loading position wherein the dried skins which are removed from the board and other undried skins are attached. It will be appreciated that the equipment provided at each of these latter stations depends only on the type of process used. After the undried skins are attached to the drying board the loaded board is moved into the oven as previously described.

For a better understanding of the invention reference is made now to the drawing, in which

Fig. 1 is a partially schematic plan view of apparatus according to the invention; and,

Fig. 2 is a perspective view, partially cut away, showing the arrangement of a preferred double brake assembly.

Referring now to Fig. 1, the general assembly of the apparatus contemplated by the invention is shown. Drying boards 11 are rollably supported by supporting assemblies 14, 15 on a pair of overhead endless tracks 12, 13. As shown more clearly in Fig. 2, each of the endless tracks 12, 13 may have the cross-sectional shape of an I-beam and the supporting structure for the drying boards 11 may take the form of a roller assembly. In the apparatus shown in Fig. 1, the point marked A may be considered for purposes of explanation as the starting point. As each drying board 11 moves past the point A toward the point B, skins to be dried are attached to either side of each board. In the presently illustrated case the drying boards 11 are perforated sheets adapted to toggling, but either pasting or tacking may be utilized to the same end. As the drying board 11 moves along the supporting assembly 14 it strikes crossover 16 and is transferred from track 12 to track 13. The drying board 11 moves until the supporting assembly 15 strikes crossover 17 and is transferred from track 13 to track

12. It will be appreciated that the speed of movement of the drying board 11 may be adjusted so that during the time the drying board 11 moved from the point marked "A" to the point marked "B" skins may be attached to the drying boards in any desired manner. As soon as the skins are attached to the drying board 11 as at the point marked "B," the operators working on the apparatus may walk back to the vicinity of the point marked "C" and remove the dried skins from the next drying board 11 appearing there.

The drying board that has just been loaded continues moving past the point marked "B" until the supporting assembly 15 actuates a switch 18 at the time the supporting assembly 14 is in position at the end of a plunger in a pneumatic drive unit 19. At this time the drying board 11 and the pneumatic drive unit 19 are in the position shown by the solid lines. The switch 18 energizes momentarily a solenoid valve 21 allowing high pressure air to enter the pneumatic drive assembly 19 to drive the plunger 20 outwardly therefrom and propel the drying board 11 into a drying oven 22. When the drying board 11 reaches the position shown by the dotted lines, the supporting assembly 15 actuates a switch 23 that momentarily energizes a solenoid valve 24. When the solenoid valve 24 is energized, high pressure air enters the pneumatic drive unit 19 to force the plunger 20 back into its original position. It should be noted in connection with the description and drawing of the pneumatic drive unit 19 and its associated parts that the mounting means therefor and the various electrical and air lines have not been shown in their entirety in order to simplify the drawing since all such parts are well known.

When the drying board 11 enters the oven 22, it is moving at an appreciable speed on the tracks 12, 13. The tracks 12, 13 are pitched from the inlet end of the oven to the outlet end thereof. The drying boards which are already in the oven are held stationary therein by a brake assembly 25 at the outlet end of the oven 22. The moving drying board 11, being propelled into the last stationary drying board, causes that board to move toward the adjacent board along the inclined portion of the tracks 12, 13. The force thus imparted is transmitted through the remaining boards in the oven so that the boards are closely packed in the oven 22. The drying board 11 nearest to the outlet end of the oven 22 is, as previously stated, held therein by brake assembly 25. Since this is so, all the drying boards within the oven are prevented from moving down the inclined tracks 12, 13. When it is desired to remove the last drying board 11 from the oven 22 as when the skins affixed thereto are dried, the brake assembly 25 is released and the weight of the remaining drying boards force the last drying board 11 downhill from the brake assembly 25. Similar brake assembly 26 then operates to hold the last drying board while the brake assembly 25 is moved into position to hold the next drying board behind the last drying board. The brake assembly 26 is then released to allow the last drying board to move out of the oven 22. The drying board shown in Fig. 2 just to the right of the brake assemblies 25, 26 indicates the manner in which drying boards as positioned after release by the brake assemblies in order that they may be moved into position for movement to the unloading station "C." This movement is accomplished by cooperation of the drying board 11 that precedes the drying board 11 to be moved with a spring-loaded lever 27. The lever 27 is pivoted on a pin 28 and is held by a spring 29. When the drying board which is being moved toward the unloading station "C" around the curve of the tracks 12, 13 is moved to its illustrated position, it bears against one end of lever 27 and forces the lever to rotate against the force of a spring 29. The free end of the lever 27 then is moved against the supporting assembly 15 to move the drying board 11 into posi-

tion for pickup by a conveyor 30, the spring 29 acting to return the lever 27 to position to pick up the next drying board 11 coming out of the oven 22.

Conveyor 30 consists of an endless chain conveyor 31 having outwardly projecting arms 32 attached thereto. The chain conveyor 31 is driven by an electric motor 33 through a drive unit 34. The projecting arms 32 serve to actuate the brake assemblies 25, 26 as will be described hereinafter and to move positioned drying boards 11 away from the oven 22. In connection with the latter function it should be noted that the conveyor system 35 which is shown to be independent of conveyor 30 accomplishes the end of moving drying boards, this system may be an extension of the conveyor system 30. In any event, as each drying board 11 approaches the station "C," the operators remove the dried skins from the drying board.

Turning now to Fig. 2, a novel brake assembly that permits movement of drying boards out of an oven onto a moving conveyor is shown in detail. Only the structure of brake assembly 25 will be described in detail, since the construction of the brake assembly 26 may be exactly the same as the brake assembly 25. Brake assembly 25 consists of a toothed holding element 36 rotatably mounted on a shaft 37, the shaft in turn being attached to standard 38. A ratchet 39 having the same number of teeth as the toothed holding element 36 may be affixed to the outer edge of the holding element as shown. A pawl 40 is pivotally mounted on a pin 41. The free end of pawl 40 is shaped and positioned so as to cooperate with the projecting arms 32 attached to the chain conveyor 31. A spring 42 is attached to the pawl 40 as shown, it being understood that the end of the spring which is shown as being free is actually attached to a fixed point (say on the track 12) so as to urge the pawl 40 into contact with the ratchet 39 except when the projecting arms 32 disengage the pawl 40.

When the pawl 40 is disengaged, the weight of the drying boards 11 force the boards against the toothed holding elements 36, causing the brake assembly 25 to rotate. The drying boards 11 also cause the brake assembly 26 to rotate. However, since the pawl in the brake assembly 26 is in operative (that is, holding) position, brake assembly 26 may rotate only until its pawl comes in contact with its ratchet. In the illustrated case brake assembly 26 slips about 90° at the most when brake assembly 25 is released. This movement of brake assembly 26 in turn allows the drying boards 11 to move just far enough so that the next toothed holding element 36 in brake element 25 after the toothed holding element 36 which had been holding the boards is moved into holding position. The projecting arm 32 next releases the pawl in brake assembly 26. The weight of the drying boards 11 then forces the toothed holding element of brake assembly 26 to move. At this time, however, the pawl 40 of brake assembly 25 comes into operation to prevent its associated toothed holding element 36 from rotating more than 90°. As a result of the cooperation between the two brake assemblies only one drying board 11 at a time is released from the oven 22. Further, the drying boards 11 that are to remain in the oven 22 are held at all times by either one of the brake assemblies so jamming cannot occur.

It will be understood that some of the known components of drying apparatus have been omitted from the drawing and the specifications for simplicity. Thus, the necessary heating means, conduits and control system have not been shown in connection with the oven 22. Further, the invention has been illustrated (as shown particularly in Fig. 2) as using the toggling method of stretching the skins. It is apparent however that either pasting or tacking could be used, it being necessary only to provide the required accessories at the loading and unloading stations to accomplish either pasting or tacking rather than toggling. In view of the foregoing it is felt that the invention

should be limited only by the spirit and scope of the appended claims.

What is claimed is:

1. A brake assembly for removing a single one of a plurality of drying boards supported in parallel relationship on inclined tracks within a drying oven comprising in combination a first toothed holding element rotatably supported in engagement with the single one to be removed of the plurality of drying boards, a first ratchet integrally attached to the first holding element and a first pawl engaged in the ratchet whereby the first ratchet, first holding element and the drying boards are held in position; a second toothed holding element similar to the first toothed holding element, a second ratchet integrally attached to the second ratchet; the second toothed holding element being disposed on the downhill side of the first toothed holding element and spaced therefrom a distance greater than the thickness of a single one of the drying boards, but less than twice the thickness thereof, means for releasing the first pawl momentarily to cause the drying boards to roll along the inclined tracks to engage the second pawl with the second ratchet and to cause the second holding element then to hold all the drying boards in position and then releasing the second pawl momentarily to cause the last drying board in the oven to pass beyond the second holding element and to cause the first holding element to hold all the drying boards then remaining in position.

2. In drying apparatus for skins having a pair of inclined tracks sequentially supporting a plurality of drying boards in parallel relationship within an oven, a brake assembly comprising in combination a first and a second toothed holding element, sequentially disposed in the direction of travel of the drying boards, the distance between the first and the second holding element being greater than the thickness of a single one of the drying boards, but less than twice the thickness thereof, each of the holding elements having a ratchet integrally attached thereto, and a pawl cooperating therewith, means for rotatably supporting the second holding element in engagement with the drying board nearest the outlet end of the oven, and for momentarily releasing the pawl engaged with the ratchet associated with the first holding element and later releasing the pawl engaged with the ratchet associated with the second holding element.

3. Drying apparatus for skins in which vertical drying boards are moved at varying speeds along a closed conveyor comprising a drying oven, a pair of tracks, means for movably supporting said drying boards on said tracks, said tracks being partially disposed within said oven, said tracks being spaced and tilted within said oven, means for holding said drying boards within said oven and for periodically removing the last one of said drying boards from the said oven, the last named means including a brake assembly having a first and a second holding element sequentially disposed adjacent the outlet end of the oven and synchronizing means actuating the holding ele-

ments alternately whereby all the drying boards are first held within the oven and then all but the drying board to be removed are held within the oven, continuously moving driving means adjacent said tracks without said oven, means for moving said last one of said drying boards into contact with said driving means and means for removing said drying boards sequentially from contact with said driving means and propelling said drying boards into said oven.

4. Drying apparatus for skins comprising a plurality of drying boards, means for supporting said drying boards in a vertical position, said means consisting of a pair of overhead tracks, rollers mounted on said drying boards and cooperating between said tracks and said drying boards, a drying oven, said tracks being disposed partially within said oven and partially without said oven, said tracks being tilted downwardly within said oven from the inlet end thereof to the outlet end thereof, the spacing between said tracks being greater within said oven than without said oven and said boards being parallel to each other within said oven and substantially end-to-end without said oven, means for moving said boards along the portion of said overhead tracks without said oven at a constant speed and for propelling said drying boards sequentially into said oven, a double brake assembly disposed adjacent the outlet end of said oven to permit removal therefrom of only the drying board adjacent the outlet end of said oven, said double brake assembly consisting of a first and a second holding element sequentially disposed in the direction of travel of said drying boards, the distance between said first and said second holding element being greater than the thickness of a single one of said drying boards but less than twice the thickness thereof, synchronizing means actuating said holding elements alternately whereby all the drying boards are first held within the oven by the second holding element and then the drying boards less the drying board adjacent the outlet end are held by the first holding element, the synchronizing means being actuated by the drying board nearest the outlet of the oven, and gravity actuated means for moving said last named drying board into contact with said means for continuously moving said drying boards without said oven.

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