

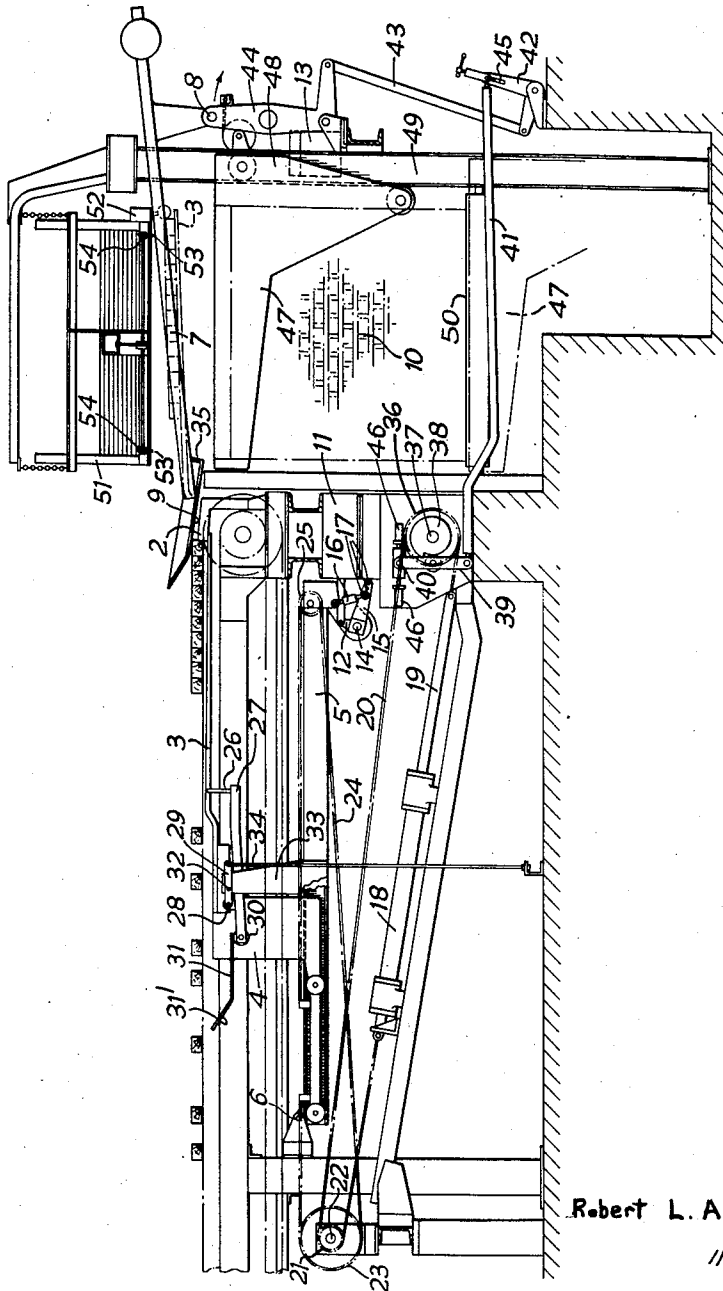
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TIMBER-STACKING APPARATUS AND THE LIKE

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TIMBER-STACKING APPARATUS AND THE LIKE

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1 Claim. (Cl. 214—6)

The present invention relates to an apparatus for placing a layer of articles with lateral spaces between adjacent articles.

The apparatus of the present invention finds its principal application in the stacking of timber, where it is desirable to lay planks or baulks in each layer of a stack or set so that there are lateral spaces between the individual planks or baulks to permit adequate ventilation of the stack.

The basic feature of the invention is the stripping of the individual planks or baulks from a horizontally movable support by means of a stop which moves in the same direction as the support but at a much reduced rate. As the planks or baulks are carried against the stop by the movable support, they are skidded across the support and forced over the edge of the support onto a stationary support but, since the stop is itself moving, the planks or baulks laid on the stationary support will be laterally spaced apart from each other. The ratio of the speed of the movable support to the speed of the stop in the operative direction will determine the ratio between the width of the articles and the width of the spacing between them.

In order to produce a set of timber for storage, the support which is stationary in the horizontal plane, descends vertically after placing each layer of planks on it by a distance approximately equal to the total thickness of the layer (including any spacer sticks that may be placed transversely between layers to provide an air space between the layers). Where spacer sticks are used, these may be dropped from magazines onto the top of a layer.

One construction of timber stacking apparatus made in accordance with the invention is shown in the accompanying drawing.

Lengths of timber to be stacked are carried on a conveyor 1, which comprises a number of parallel and unconnected chains, which carry the planks forward against a stop 2. The planks build up until there are sufficient to form a complete layer.

Means, such as a limit switch or a photoelectric cell, are employed for detecting the presence of sufficient planks to form a layer and these means are then utilised to initiate the cycle of operations of the machine.

The first step is that support fingers 3 rise and lift the planks off the conveyor 1, and over the stop 2. The fingers 3 extend forwardly from a wheeled carriage 4 which is movable along a guideway formed by a pair of support beams 5, pivoted at 6 to the main framework of the machine. The raising of the leading end of the beams 5 raises the fingers 3 in relation to the stop 2 and also lifts the stripping stop 35 which is secured to the end of a lever 7 pivoted at 8. The support fingers 3 are thus enabled to skid the boards forward under the inclined surface 9 of the stripping stop 35, which surface is kept inclined because it is fixed to lever 7, and the fingers 3 are then moved forward until the edge of the layer of planks supported by the fingers 3 reaches a position above the edge of the set of planks indicated at 10, the fingers 3 then lowering the planks to a position in which the fingers

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are just clear of the top of the set. The stripping stop 35 and lever 7 have then moved with the planks but over a smaller distance, as described below, so that stripping stop 35 is now behind the last plank.

The mechanism for producing the vertical movement of the fingers 3 consists of a horizontally acting hydraulic ram 11 acting on an arm 12 to turn a shaft 14 to which crank arms 15 are secured. The arms 15 are connected to the support beams 5 by means of links 16 of adjustable length. The links 16 may be connected to the arms 15 by bolts entering one of a series of spaced holes indicated at 17. The different anchorages of the links 16 and the adjustable lengths of these links permits the lift imparted to the fingers 3 to be adjusted in accordance with the thickness of the timber to be stacked.

The movement of the carriage 4 and fingers 3 along the support beam 5 is controlled by a hydraulic traversing ram 18. The two ends of the rod 19 of the ram 18 are connected by an endless chain 20, which passes round a sprocket 21 secured to a shaft 22. A second sprocket 23 is also secured to the shaft 22 and a second chain 24 passes around this sprocket and around a sprocket 25 at the leading end of the beams 5. The two ends of the chain 24 are secured to the carriage 4 so that the movement of the rod 19 is transmitted to the carriage 4.

The operation of the hydraulic rams 11 and 18 is controlled by solenoid-operated valves acting in response to limit switches at appropriate moments in the operating cycle of the machine described later. Thus the initiation of the movement of the traversing ram 18 to move the carriage 4 forwardly is effected by closing of a limit switch as the ram 11 completes its lifting movement.

A stop mechanism is provided to prevent excess planks from being carried onto the fingers 3. This mechanism comes into operation as soon as the beams 5 start to rise and consists of stop fingers 26 attached to the leading end of a lever 27 pivotally connected at 28 to a lever 29 and having a roller 30 engaging under a track member 31 carried by the carriage 4.

The lever 29 is pivotally connected at 32 to a support member 33 carried by the beam 5 and its front end is anchored by a tie rod 34. As the beam 5 is rocked upwardly about its pivot 6, the lever 29 is rocked clockwise about its pivot 32 by reason of its connection to the tie rod 34 and this in turn raises the stop fingers 26 at a greater rate than the fingers 3. The stop fingers 26 remain erected as the carriage 4 moves forward until the roller 30 comes onto the inclined portion 31' of the track member 31. The stop fingers 26 then drop and planks are permitted to move forward to commence forming the next layer of planks for stacking.

The stripping of the planks from the fingers 3 is effected by means of a movable abutment stop 35 consisting of a number of spaced fingers carried by the lever 7.

The stop 35 moves backwards and forwards in synchronism with the carriage 4, but at a reduced rate and over a smaller distance. The endwise movement of the stop 35 is also derived from the traversing ram 18. The chain 20 passes round a sprocket 36 secured to a shaft 37 on which a cam 38 is mounted. The cam 38 completes rather less than one complete revolution during the complete travel of the rod 19.

The cam 38 acts on a lever 39 pivoted at 40 and the movement of the lever 39 is transmitted through link 41, bell crank lever 42, link 43 and bell crank 44 to the lever 7, which is pivotally connected to it at 8.

The movement imparted to the stop 5 by this linkage system can be varied by moving the connection between the link 41 and the bell crank 42 lengthwise in a slot 45 formed in the bell crank.

A counterweight (not shown) is provided in this link-

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age system to hold the roller on the lever 39 in contact with the cam 38.

It will be appreciated that as the carriage 4 and fingers 3 move forward from the position shown in the drawing, the stop 35 will also move forward and at the end of the forward movement, it will drop behind the rear edge of the planks on the fingers 3.

As the carriage 4 starts its return movement, the planks will be carried against the retreating stop 35, which will again be moving more slowly than fingers 3, and will be stripped off the fingers 3 by reason of fingers 3 being moved out from beneath the blanks and laid at spaced intervals in the manner already described.

Since it may be desirable for the planks in one layer to be staggered in relation to the planks of adjacent layers, means are provided for controlling the start and finishing positions of the stop 35 without altering its stroke. This is effected by altering the position of the pivot 40 by means of layer stagger rams 46, the operation of which is tied in with the machine cycle by means of limit switches, actuated as the carriage 4 reaches its start position.

The layers of spaced planks are built up on a hoist platform comprising a number of spaced arms 47 carried by a trolley 48 movable up and down a vertical trackway 49. The arms 47 move from the full line position shown in the drawing to the chain line position. In the chain line position the arms 47 have passed down between driven rollers 50, which then support the set of timber built up on the arms and the rollers 50 can then be employed to move the set of timber laterally away from the machine.

The trolley 48 is supplied with lowering means which lower it by a distance equal to the thickness of a layer of planks after each layer is laid, so that the top surface of the set of planks being built up is always at the appropriate height to receive the next layer.

It is usually necessary to lay spacer sticks between each layer of planks in a set of timber and these spacer sticks are laid transversely with respect to the planks. The spacer sticks are laid at spaced intervals across the set from a number of parallel stick magazines 51. The sticks in each magazine 51 are arranged in a vertical pile and are released from the magazine by contact of the layer of planks supported on the fingers 3 with a limit switch 52 when the fingers 3 are in the position shown in chain lines, just before being lowered onto the top of the set 10. The sticks drop down between the fingers forming the stop 35. As the limit switch closes it opens a solenoid to withdraw latches 53 supporting all the sticks and it simultaneously closes solenoids 54 which exert a clamping action on the sides of the stick one from bottom, so that the bottom stick drops. As the switch 52 reopens, the latches 53 return to position and then the solenoids 54 open to drop the remainder of the sticks onto the latches.

It will be appreciated that the principal feature of the invention is the provision of a horizontally movable carrier for the planks and a movable stop which acts to strip the planks from the carrier and lay them at spaced intervals.

Although in the foregoing description only a single carriage 4 and lever 7 have been referred to, this is for convenience of description only and there are in fact a number of carriages with associated trackways arranged side-by-side across the width of the machine, the num-

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ber of which will be determined by the maximum length of the plank to be handled by the machine. Similarly there are a number of parallel levers 7.

It will be appreciated that other forms of carrier and movable stops than those shown in the drawing and described above are possible to produce the novel effect of the invention.

Thus in another construction envisaged the conveyor chains have vertical projections which push the planks forward on to a table.

In this construction the supporting fingers only move horizontally and in the retracted position lie in recesses in the table.

When enough planks to form one layer have gathered on the table the machine cycle is initiated. The fingers start to move forward and pivoted latch type stops carried by the fingers catch the edge of the last plank and push the layer of planks forwardly off the table on to the fingers as the fingers move forward.

In this construction the movable stop can also take the form of a number of pivoted latch members, which permits the planks to pass over the stop in the forward direction and it may be moving forward at the same time as the planks pass over it.

When the fingers reach their extreme position all the boards will have passed over the movable stop and a limit switch is closed to cause the fingers to start to move backwards and the movable stop also moves backwards towards its starting position while performing its stripping function on the planks supported on the fingers.

The stop which moves the layer in the forward direction being of the latch type can pass under any planks which have meantime gathered on the table. When the fingers reach their back position the moving stop also halts and both the fingers and the movable stop are ready for again starting the cycle as soon as a layer of planks has gathered.

The movable stop may be driven by a separate motor which starts and stops with the movement of the support fingers. The stop is driven from the motor through a variable reduction gear so that the spaces between the planks can be varied at will.

I claim:

In a timber stacking machine a device for laying a layer of planks with lateral spaces between individual planks, said device comprising in combination a plank support adapted to receive sufficient planks for said layer from a conveyor, a vertically movable stack support, means for moving said plank support forwardly carrying planks from a start position to a position over said stack support and for retracting said plank support from said position over the stack support to said start position, stripping stop means positioned to catch the planks on said plank support during its return movement and to strip the planks off said plank support and means, operative during the return movement of the plank support, for moving said stripping support in the same direction as the plank support and at a considerably lower speed.

References Cited in the file of this patent

UNITED STATES PATENTS

2,828,871	Bardsley et al. -----	Apr. 1, 1958
2,861,702	Mason -----	Nov. 25, 1958