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(71) Applicant: **AMF INCORPORATED, 777 Westchester Avenue, White Plains New York 10604 (US)**

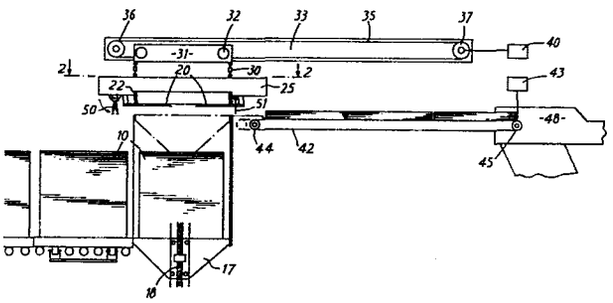
(72) Inventor: **Garrett, John Austin, Hay Green St. Anne's Close Goodworth Clatford, Andover Hampshire (GB)**

(74) Representative: **Matthews, Graham Farrah et al, MATTHEWS HADDAN & CO Haddan House 33 Elmfield Road, Bromley Kent BR1 1SU (GB)**

(54) Apparatus for slicing and feeding tobacco.

(57) An apparatus is provided for slicing and feeding tobacco comprising a horizontal trolley track (33), a trolley (31) movable along the trolley track, a slicing device including horizontally movable slicing blades (20), said slicing device being suspended from said trolley (31), a vertically movable tobacco platform (17) below the slicing blades to carry a block of tobacco leaves (10), and a horizontal conveyor belt (42) adapted to convey tobacco slices away from the slicing region. The slicing device is adapted to cut successive slices of tobacco from said block and convey them to a position over the conveyor belt and to release them on to the conveyor belt.

By these means the tobacco can be sliced without the necessity of tilting and a continuous flow of tobacco slices is provided.



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TITLE: APPARATUS FOR SLICING AND FEEDING TOBACCO.

This invention concerns the continuous slicing and feeding of slices of tobacco leaves from a block of leaves in the form of cases, bales or hogsheads of tobacco, and in particular the dry slicing and feeding from hogsheads or cases.

The traditional process consists in pre-conditioning the bulk tobacco by a penetrative condensation process by moisture saturated air to prevent leaf damage, then opening the bulk (i.e., separating the tightly packed leaves) by feed means and finally passing the leaf through a rotating conditioning cylinder to open the 'pads' of leaf not opened by the feed means and to add permanent moisture by water sprays.

Three more recent processes have sought to combine the pre-conditioning and opening process into one machine.

The above mentioned processes are described in more detail in the introduction to UK Patent Application No. 8101201, filed 15th January 1981, and PCT/GB.81/00272, filed 16th December 1981, which was concerned with a machine to combine the pre-conditioning, opening and moistening process.

A further process is known as the Japanese process in which the bulk tobacco is divided into approximately

4" thick slices by inserting wedge shaped blades between the natural strata and feeding the slices directly into the conditioning cylinder without recourse to pre-conditioning or auto feeds. In this process the hogsheads or cases (hereinafter only hogsheads are referred to) after removal from their containers are fed on pallets with strata horizontal and axes vertical along a storage conveyor to a slicing machine. Each hogshead in turn is pushed off its pallet into a 'hod' like structure which tips the hogshead through approximately 75°. The hod or tipper comprises a conveyor wall and moving base which feed the hogsheads up the slope parallel with its axis to a slicing position where forks part off a slice. Two low level forks engage the hogshead first, followed by two wedge shaped forks from above which separate the slice and allow it to slide down to the first reservoir conveyor. The hogshead is moved in increments of approximately 4" to remove successive slices. A 'kicker' moves the forks forward to assist separation and a restraining plate ensures that slices slide rather than tip into the reservoir conveyor. When the last slice has been removed, the tipper returns and collects the next hogshead. A succession of reservoir conveyors feed the slices to the conditioning cylinder and ensure that a continuity of slices is available to the conditioning cylinder during the

period when the tipper is collecting the next hogshead. The tobacco slices are automatically transferred from one reservoir to the next as soon as there is a space, to form a queue of slices all lying at an angle of about 15° to the horizontal. The queue is maintained by detecting arms above each reservoir conveyor, which detect whether tobacco is present, and if not that conveyor and all preceding conveyors are run in order to fill the gap. When tobacco is detected, the band is stopped if tobacco is detected on the succeeding conveyor. When the first reservoir conveyor is empty, it runs and initiates the slicing process. The last reservoir conveyor preceding the vibrating conveyor and conditioning cylinder is mounted on scales so that the slice can be weighed and a weight signal produced. This weight signal and a preset desired flow rate are used to compute a time interval for feeding slices. When this time has elapsed, the slice is fed to the casing and conditioning cylinder so as to maintain an intermittent but accurate mean flow rate by weight. The slices are fed via a vibrating conveyor into the casing and conditioning cylinder, where they are conditioned by saturated air, opened and casing or water added. The cylinder is heated by a steam jacket to prevent excessive condensation within the cylinder, causing soggy portions of tobacco, and the ends enclosed as far as possible to maintain a high

saturated air temperature within the cylinder (typically 70° to 80°). Steam, water and casing sprays are directed into the cylinder from both ends. The vapour in the saturated air condenses on the tobacco and heats it, which renders it supple and prevents damage as it is tumbled in the cylinder. It also renders the leaf amenable to the absorption of permanent moisture from the water sprays.

A disadvantage of the Japanese process is that when the hogshead or case is tilted, there is a tendancy for it to de-laminate of its own accord, particularly at the end of a case, so that the size of slice is unpredictable. A further disadvantage is that the sliding of the slice on to the reservoir conveyor creates dust and the successive reservoir conveyors create a dusty saturation at each junction. Also feeding of slices into the cylinder at intervals creates a discontinuous flow which is inconsistent with the uniform addition of moisture or casing.

The objectives of this invention are to provide improved means which avoid tilting of the hogshead or case and provide a continuous flow of slices.

According to the present invention there is provided an apparatus for slicing and feeding tobacco comprising a horizontal trolley track, a trolley movable along the trolley track, a slicing device including horizontally movable slicing blades, said

slicing device being suspended from said trolley, a vertically movable tobacco platform below the slicing blades to carry a block of tobacco leaves, and a horizontal conveyor belt adapted to convey tobacco slices of tobacco away from the slicing region, said slicing device being adapted to cut successive slices of tobacco from said block and convey them to a position over the conveyor belt and to release them on to the conveyor belt.

The invention will be further described by way of example with reference to the accompanying diagrammatic drawings wherein :-

FIGURE 1 is an elevational view of a tobacco slicing and feeding apparatus made in accordance with the invention;

FIGURE 2 is a plan view thereof on the plane 2-2 on Figure 1; and

FIGURE 3 is a view similar to Figure 1 but taken in the direction marked X in Figure 2 showing one knife with its operating mechanism.

Blocks 10 of leaf tobacco from hogsheads or cases on pallets 11 are moved horizontally on rollers 12 and then moved at right angles to the first movement on rollers 13 into the position 10A. The blocks are then moved off their pallets by a pusher 16 on to a vertically movable platform 17 operated by a double screw and nut type jack 18. The platform is raised

in steps with the leaf strata horizontal into the plane of slicing blades 20. There are four blades 20 of 90° sector shape (quadrants). These blades are located at the underside of a short tube 22 which has a larger diameter than the tobacco block 10. The four blades can be moved radially from the outside of the tube to meet at the centre of the tube so as to cut slices from the block. Each blade is mounted by a block 23 and rollers set on a guide 25. The block 23 is connected to a piston rod 26 which has a piston 27 operated in a radially disposed cylinder 28. Fluid, e.g. air under pressure can be admitted to all four cylinders simultaneously to effect slicing.

The cylinders are suspended by weighing devices 30 from a trolley 31 which has wheels 32 running on a track 33. The trolley is attached to a chair 35 supported on sprockets 36, 37 one of which is driven by a reversible motor 40.

An endless conveyor belt 42 is arranged horizontally on wheels 44, 45 below the plane of the blades 20. The conveyor is driven by an electric motor 43. The conveyor belt 42 discharges into a vibrating conveyor 48 which feeds them to a tobacco conditioning cylinder.

In operation, the tobacco block enters the tube 22 by a pre-determined amount, typically 4 inches (9.16 cms) and the blades are operated to separate a

slice. The block is lowered slightly to clear the slice, which is traversed sideway on the blades 20 to be deposited onto the reservoir conveyor. The conveyor belt 42 stores slices and feeds them to the vibrating conveyor 48 which feeds the conditioning cylinder. The belt 42 is horizontal and level with the top of the sliced block and is large enough to store several adjacent slices.

The trolley rails 33 extend for the full length above the conveyor belt 42 and enable a slice to be deposited anywhere along the belt length. In operation, the trolley traverses and deposits a slice adjacent to the previous slice, forming a queue of slices and a nearly continuous feed to the conditioning cylinder.

The various operations can be controlled by an assembly of operating and control means of well known type and arranged so that the slices are weighed and the weights are stored in an electronic store which is used to adjust the belt speed of the conveyor belt 42 as the slices are discharged, so as to maintain a constant input feed rate. When the last slice has been removed, the platform returns to the low level to collect the next tobacco block. During this period, the belt 42 is depleted of slices and a lengthening gap appears on the belt. The gap is filled from the new supply. The number of slices on the conveyor belt 42

is determined by the time it takes to discharge them, which must exceed the time taken by the platform to descend and collect another block of tobacco.

When the last slice is removed from the block, the blades are in contact with the platform, but it is inevitable that some leaf is left on the platform 17. The platform is, therefore, lowered level with the reservoir conveyor, before the slice is traversed, and a brush 50 mounted on the slicing device is pivoted into position to wipe the platform remnants onto the conveyor belt 42. A tobacco sensor 51 in the slicing unit detects that the block has been fed the correct distance into the slicing device. Provided tobacco is detected by the slicing device, it will automatically remove a slice and traverse above the conveyor belt 42. The sensor 51 is a vertical spring loaded arm pivotted from the slicing unit which precedes the unit and detects the presence of slices on the conveyor belt 42, enabling the slicer device to deposit the latest slice adjacent to the previous slice.

The trolley 31 is drawn along the rails by the chain 35 driven by a synchronous motor fed with a fixed frequency to give a fast trolley speed typically of 40 feet per minute (12.19m per minute).

The band 42 is also driven by a synchronous motor from a variable frequency inverter to give a belt speed dependant on the weight of the slice being fed,

typically a mean 12 feet per minute (3.66m per minute).

As soon as the sensor detects a slice, the chain drive motor is switched to the reservoir band drive motor frequency, so that the slicer device follows the conveyor belt 42.

If the trolley has travelled a minimum distance determined by a switch positioned so that the slicer unit is fully over the reservoir band, it deposits a slice by withdrawing the blades from below the slice and then reverses at the fixed fast speed to collect the next slice. The slices are weighed by the weighing devices 30 and the speed of the belt 42 is adjusted to maintain a pre-set feed rate as that slice is discharged. To allow for the distance to be travelled by the slice before the speed is adjusted, electric pulse generators are driven from the chain and band drive shafts - e.g., toothed wheels and photo cells to give say 5 pulses/inch of travel. The slices are weighed after the hogshead has been lowered and before the slices are traversed. The weights are stored consecutively in a series of electronic stores. The number of stores must be equal to or greater than the number of slices on the reservoir conveyor plus one for the slice in the slicer unit. Associated with each store is a counter. As each slice is weighed, the weight is fed to the next store and the associated counter is reset. As the trolley is traversed,

pulses are fed to the counter from the chain drive pulse generator. After depositing the slice, pulses are fed from the band drive pulse generator in place of the chain drive. When the counter reaches a pre-set number corresponding to the arrival of the slice at the discharge position, the weight in the store is read and a band drive motor frequency computed to give a desired feed rate. That store is then available for loading with a new weight when required.

It is clear that for cases, the slicer tube would be rectangular and that adjacent slices on the reservoir conveyor would produce a continuous flow into the conditioning cylinder.

In a simplified version, where the interval between slices exceeds the time taken from the platform to descend and fetch a new hogshead, then the reservoir need only hold one slice. This arises if the slices are thick or the feed rate low. The reservoir band can be a minimum of one slice long, but is preferably two slices long. In which case the trolley has a fixed travel to the first position above the reservoir, where it waits until the slice has cleared the first position detected by a sensor arm or belt travel. The slicing unit then deposits the next slice. Under these circumstances a pulse generator is only required on the belt shaft and not on the trolley chain drive shaft.

Alternatively, the reservoir can be mounted on scales so that the slice is weighed on the belt rather than the slicer. If the belt is one slice long the slice is weighed and the speed computed immediately after deposition.

If the belt is longer, up to a maximum of two slices widths, the slice is weighed and speed computed as the previous slice clears the belt and before the next one is deposited. The position of the slices being determined by non contact tobacco sensor or belt travel.

Weighing the slice on the reservoir conveyor just prior to starting to discharge it, means that the weight does not have to be stored, but is used immediately to compute and change the belt speed.

CLAIMS:

1. Apparatus for slicing and feeding tobacco comprising a horizontal trolley track (33), a trolley (31) movable along the trolley track, a slicing device including horizontally movable slicing blades (20), said slicing device being suspended from said trolley (31), a vertically movable tobacco platform (17) below the slicing blades to carry a block of tobacco leaves (10), and a horizontal conveyor belt (42) adapted to convey tobacco slices away from the slicing region, said slicing device being adapted to cut successive slices of tobacco from said block and convey them to a position over the conveyor belt and to release them on to the conveyor belt.

2. Apparatus as claimed in Claim 1, wherein means for suspending the slicing device includes weighing means (30).

3. Apparatus as claimed in Claim 1 or 2, wherein the conveyor is long enough to carry a plurality of slices.

4. Apparatus as claimed in Claim 1, 2 or 3, wherein the slicing blades (20) are four quadrants movable towards and away from the central axis of the said platform by fluid pressure cylinders (28).

5. Apparatus as claimed in any of the preceding claims wherein a brush (50) is carried by the slicing device adapted for brushing off loose tobacco from said platform.

6. Apparatus as claimed in any of the preceding claims wherein the slicing device carries a sensor (51) for detecting the presence of slices on the conveyor belt.

7. Apparatus as claimed in any one of the preceding claims, wherein the platform is raised by a jack (18) which is operated in steps as each successive slice is cut.

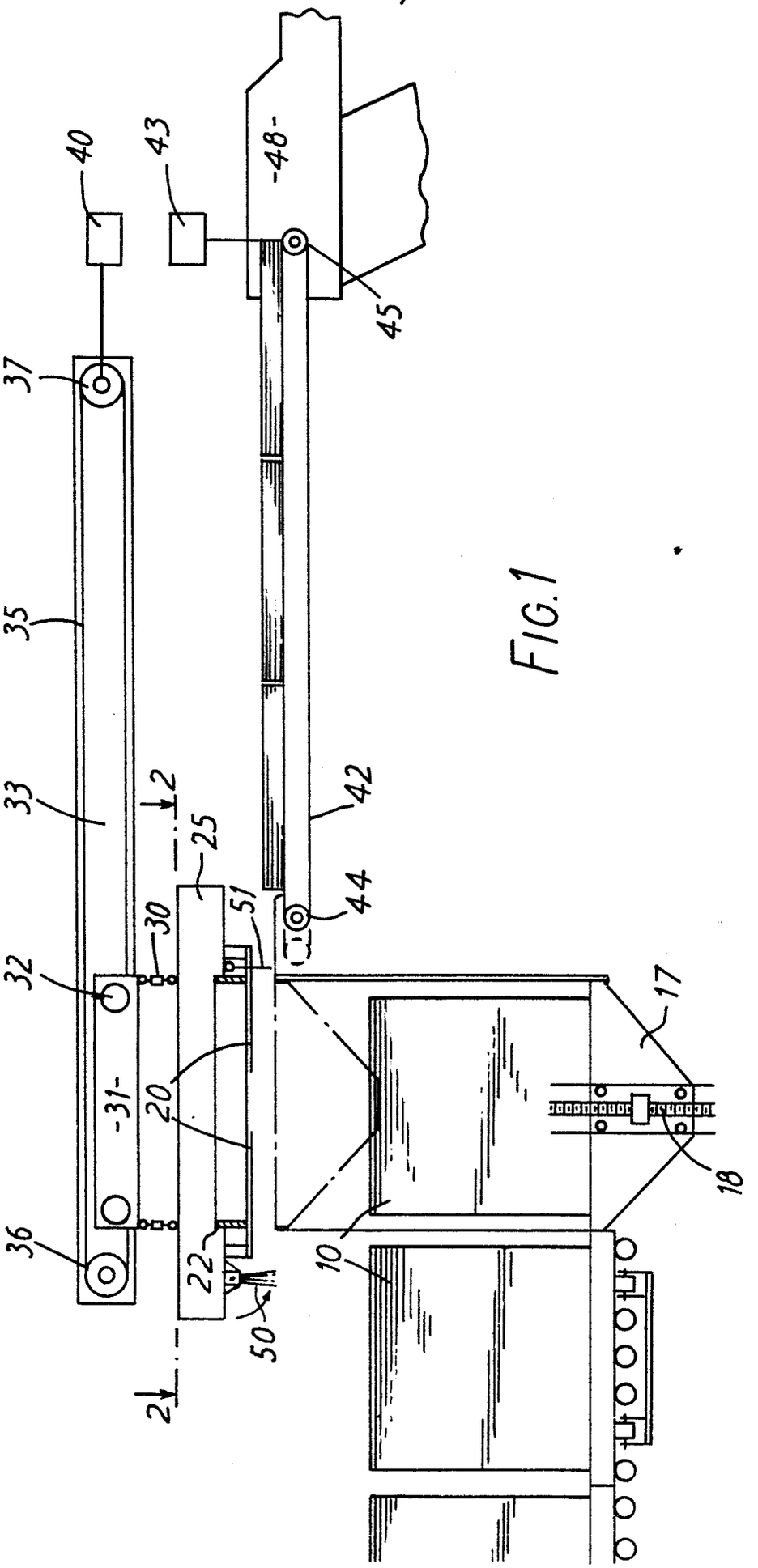

FIG.1

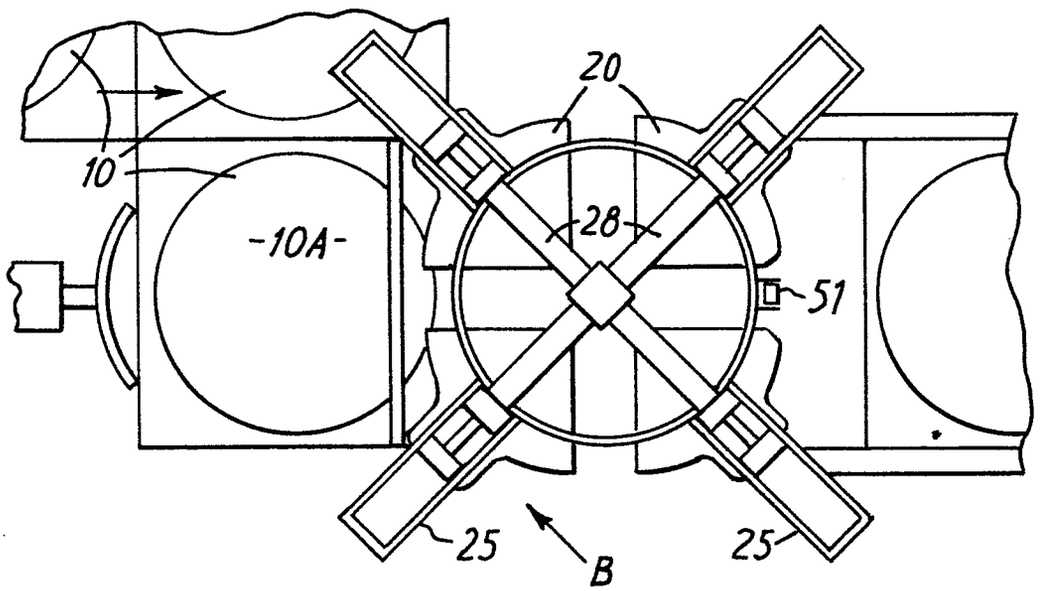

FIG.2

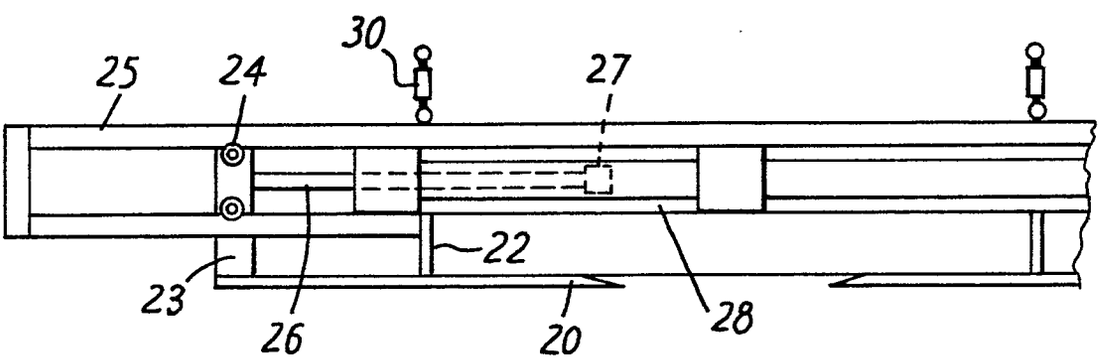

FIG.3

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EUROPEAN SEARCH REPORT

0095866
Application number

EP 83302865.7

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
A	DE - A1 - 2 731 360 (HAUNI-WERKE KÖRBER & CO KG) * Claim 1 * ----	1	A 24 B 7/12 A 24 B 7/14 A 24 B 3/07

TECHNICAL FIELDS SEARCHED (Int. Cl. ³)

A 24 B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
VIENNA	02-09-1983	WOLF

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
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P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
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