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(54) A TOBACCO-CUTTING MACHINE

(71) We, HAUNI-WERKE KÖRBER & CO K.G., a German company of Kampchaussee 12–22, 2050 Hamburg 80, Germany (Federal Republic) do hereby declare the invention for which we pray that a Patent may be granted to us, and the method by which it is to be performed to be particularly described in and by the following statement:

This invention relates to a tobacco-cutting machine.

It is known to provide a tobacco-cutting machine comprising upper and lower conveyors defining an elongated tobacco condensing channel diminishing in height towards an outlet thereof at which a mouthpiece is located. The machine includes a supply chute or duct defining a tobacco delivery passage having a lower end behind the upper conveyor and above a portion of the lower conveyor so as to communicate with the tobacco condensing channel.

The term " tobacco " is intended to mean both leaf material as well as rib material. The tobacco is normally introduced from above into the supply chute of the tobacco cutter, in which it forms a store moving downwards and is then conveyed substantially horizontally to the mouthpiece. This is normally taken care of by conveying means constructed as conveyor belts or conveyor chains, which compress the tobacco to an increasing extent as it moves forwards, to form a so-called cake. This tobacco cake passes through the mouthpiece and is cut into strips in transverse direction. In order that a uniform and clean cut of the tobacco is always obtained, a constant compression force must always be exerted on the entire mass of the tobacco cake, which in turn pre-supposes a constant height of the tobacco supplied to the mouthpiece on the lower conveying means. It has been shown that despite all previously known measures, such as the movable walls of the supply chute, it has not been possible to preclude the formation of a cavity due to interruptions in the tobacco stream and irregular compression of the tobacco cake as a result of varying orientation of the tobacco leaves. The result of this was uncut pieces of leaf torn out of the tobacco cake by the cutting blades. A particularly critical area in this respect is the deflection area in which the tobacco is transferred from the essentially vertical supply chute at an angle of approximately 90° to the substantially horizontal compressing chains. In this area, the outer tobacco leaves must cover a greater distance than the inner tobacco leaves, in which case they may rotate and assume a disadvantageous inclined position with respect to the mouthpiece.

It is an object of the present invention to obviate or mitigate the aforesaid disadvantages.

According to the present invention there is provided a tobacco-cutting machine comprising upper and lower conveyors defining an elongated tobacco condensing channel diminishing in height towards an outlet thereof, said lower conveyor including a portion extending rearwardly beyond said upper conveyor, a tobacco feeding and agitating duct defining a tobacco delivering passage having a lower end behind said upper conveyor above said portion of said lower conveyor and communicating with said channel, said duct comprising a plurality of walls including mobile first and second walls bounding different portions of said passage, said second wall extending downwardly to the general level of said portion of said lower conveyor, and means for oscillating said mobile walls to alternately increase and reduce the volume of the tobacco delivering passage, said oscillating means being adapted to oscillate the second wall at a higher frequency than the first wall.

In use of the machine according to the invention the tobacco mass located in the critical deflection area is subjected to increased oscillation due to which the friction between the leaves is reduced and interruption of the tobacco stream is prevented. Cavities which may have been produced in the upper region of the supply chute or duct collapse and the individual tobacco leaves retain their horizontal orientation.

Preferably, the two walls form the rear side of said duct and the first wall is arranged

above the second wall. In this way, a particularly simple coordination of the oscillating frequencies of both walls is possible as regards the stroke movement of one wall exerted on the tobacco at the inlet side of the duct for the purpose of uniform downwards conveyance of the tobacco in the duct, on the one hand, and the oscillatory action on the tobacco in the deflection area for the purpose of orientation and precompression of the tobacco leaves on the other hand.

Advantageously, a pivot axis for the second wall is located in the vicinity of the free lower end of the first wall which is mounted for oscillation about a pivot axis located in the vicinity of an inlet of the duct. In such a case it is particularly useful if the second wall is pivotally connected to the first wall, the oscillations of the two walls thus being superimposed. Thus, the tobacco is subjected to a movement assisting its downwards conveyance to the region of the deflection area and is additionally subjected in this area to further oscillatory movement.

The oscillating means for the second wall may be attached to the first wall.

In a modification, the two walls are located opposite each other, the second wall forming the rear side of said duct and pivoted at its upper end and the first wall forming the front side of said duct and pivoted at its lower end.

The invention will now be further described by way of example only with reference to the accompanying drawings, in which:

Figure 1 shows diagrammatically the construction of a tobacco cutter according to the invention; and

Figure 2 shows a modified embodiment of the tobacco cutter.

The drawing shows a tobacco cutter of the "KT" type of Hauni-Werke, Hamburg, Bergedorf.

With its features known per se, this tobacco cutter consists of a supply chute or duct 1, which is filled with tobacco, in this case in the form of leaf material 2, from a storage source which is not shown. The substantially vertical supply chute 1 is constructed to taper downwards in the manner of a funnel and at its lower end passes into a substantially horizontal tobacco condensing channel or conveying section 3. The conveying section 3 is limited by conveying means in the form of an upper compressing chain 4 and a lower compressing chain 6, which are constructed to converge in the feed direction and can be driven by a drive 7. With respect to the upper compressing chain 4, the lower compressing chain 6 is extended rearwards such that it closes-off the supply chute 1 at its lower end. The upper compressing chain 4 is pivotally mounted in a bearing 8, and a pressure generator 11 acts on one of its rollers 9. The compressing chain 4 is driven by way of gears 12, 13, 14 and a chain drive 16 by the drive 7 together with the compressing chain 6. Adjoining the compressing chains 4 and 6 is a mouthpiece 19 consisting of an upper part 17 and a lower part 18, the upper part 17 of which mouthpiece is associated with the compressing chain 4 and able to move up and down with the latter and the lower part 18 of which is arranged in a rigid manner and forms the counter cutter for cutters 21, which are located on the periphery of a cutter drum 22 in front of the mouthpiece 19. The cutter drum 22 is driven by a cutter motor 23.

A grinding wheel 24 which is dressed by a diamond 26, serves for grinding the cutters 21.

On its rear side, the supply chute 1 is defined by two movable walls 27 and 28, which are arranged one above the other, the upper wall 27 being attached to a shaft 29 arranged at the inlet side of the chute and being mounted to oscillate in the machine frame, whereas the lower wall 28 extending into the region of the compressing chain 6 is attached to a shaft 31, which is mounted to oscillate in a support 32 on the free end of the upper wall 27. Non-rotatably connected to the shaft 29 is a lever 33 which is connected by way of a connecting rod 34 to an eccentric drive 36. This eccentric drive can either have its own drive or may be driven by one of the drive motors 7 or 23. The position of the walls 27 and 28 shown in full line represents the rear end position and the position shown in dot-dash lines represents the front end position of the oscillating walls 27 and 28. Non-rotatably connected to the shaft 31 of the lower wall 28 is a lever 37, which is connected by way of a connecting rod 38 to a separately driven eccentric drive 39, which is attached to a support 41 on the upper wall 27.

The oscillating movement of the upper wall 27 brought about by the eccentric drive 36 is relatively slow and has a long stroke, whereas the oscillation of the lower wall 28 brought about by the eccentric drive 39 is shorter and quicker than that of the upper wall. This oscillation of the lower wall 28 is thus superimposed on the oscillating movement of the upper wall 27, since the lower wall 28 likewise carries out the oscillating movement having a relatively long stroke together with the upper wall 27. The position of the lower wall 28 shown in full and dashed line represents the rear end positions and the positions shown in dot-dash line represent the front end positions of the oscillating wall 28 at the end positions of the wall 27.

The front side of the supply chute 1 is likewise limited by a moving wall 42, which is attached to a shaft 43 and is mounted to oscillate in the machine frame such that its freely oscillating end is directed towards the chute inlet of the supply chute 1. Non-rotatably mounted on the shaft 43 of the wall

42 is a lever 44, which is likewise connected by way of a connecting rod 46 to the eccentric drive 36. The eccentric drive 36 comprises two pins 47 and 48 offset with respect to each other by 180°, to which the connecting rods 34 and 46 are attached, so that the two opposing walls 27 and 42 are set in oscillation in opposite directions. The position of the wall 42 shown in full line represents the rear end position and the position shown in dot-dash line represents the front end position of the wall 42.

The method of operation of the tobacco-cutter illustrated is as follows:

The cut material in the form of tobacco leaves 2 introduced into the supply chute 1 from a source which is not shown is conveyed continuously downwards in the direction of the horizontal conveying section 3, in which case the opposed in and out movements or oscillations of the opposing walls 27 and 42 prevent the premature formation of a bridge in the tobacco mass. As soon as the tobacco reaches the deflection area in the region of the oscillating lower wall 28, the friction between the tobacco leaves is reduced by this vibratory effect and interruption of the tobacco stream is prevented, in which case cavities which possibly still exist collapse, so that preliminary compression of the mass of tobacco takes place in this region, with simultaneous substantially horizontal orientation of the tobacco leaves for the remainder of the conveying section and for the compression operation as far as the mouthpiece 19. In the case of a tobacco cake formed in this way, it has been found that the respective compressed height of the tobacco in the supply chute 1 has no marked effect on the mouthpiece height of the mouthpiece 19, with the result that the pressure exerted by the pressure generator 11 on the tobacco cake by the upper compressing chain 4 could be reduced by half without varying the quality of the cut material in a disadvantageous manner.

This constant mouthpiece height with a simultaneously lower compressing force, which leads to a substantial relief of pressure of the compressing chains, could also be maintained in the case of poor and irregular supply to the supply chute 1.

In the variation according to Figure 2, parts which correspond to those of Figure 1 are provided with the same reference numerals increased by 100 and are not described again in detail.

In contrast to the movable wall 42 at the front side of the tobacco cutter according to Figure 1, which may be omitted if desired, the movable wall 127 on the front side of the supply chute 101 of the tobacco-cutter according to Figure 2 has the function of the wall 27 according to Figure 1. This wall 127 carries out oscillating movements having a relatively long stroke in order to be able to supply the tobacco in a troublefree manner to the deflection area. The function of the wall 28 according to Figure 1, which oscillates more quickly, is taken over in the embodiment according to Figure 2 by the wall 128, which in this case defines the entire rear side of the storage chute and is attached to the shaft 131 and mounted to oscillate in the machine frame. In this case, the eccentric drive 139 is likewise fixed to the machine frame and imparts relatively rapid short oscillatory movements to the wall 128, the effect of which on the tobacco is the same as in the aforedescribed embodiment.

The advantage achieved with the invention consists in that the tobacco-cutter comes into contact at right-angles with the tobacco leaves arranged uniformly in the tobacco cake and with the plane of the leaf arranged horizontally. In this way, no uncut pieces of leaf are torn out of the tobacco cake. In addition when the tobacco cutter is started up, any initial loss usually occurring is substantially less.

WHAT WE CLAIM IS:

1. A tobacco-cutting machine comprising upper and lower conveyors defining an elongated tobacco condensing channel diminishing in height towards an outlet thereof, said lower conveyor including a portion extending rearwardly beyond said upper conveyor, a tobacco feeding and agitating duct defining a tobacco delivering passage having a lower end behind said upper conveyor above said portion of said lower conveyor and communicating with said channel, said duct comprising a plurality of walls including mobile first and second walls bounding different portions of said passage, said second wall extending downwardly to the general level of said portion of said lower conveyor, and means for oscillating said mobile walls to alternately increase and reduce the volume of the tobacco delivering passage, said oscillating means being adapted to oscillate the second wall at a higher frequency than the first wall.

2. A machine as claimed in Claim 1, wherein the two walls form the rear side of said duct and the first wall is arranged above the second wall.

3. A machine as claimed in Claim 2, wherein a pivot axis for the second wall is located in the vicinity of the free lower end of the first wall which is mounted for oscillation about a pivot axis located in the vicinity of an inlet of the duct.

4. A machine as claimed in Claim 2 or 3, wherein the second wall is pivotally connected to the first wall, the oscillations of the two walls being superimposed.

5. A machine as claimed in any one of Claims 2to 4, wherein the oscillating means

for the second wall is attached to the first wall.

6. A machine as claimed in Claim 1, wherein the two walls are located opposite each other, the second wall forming the rear side of said duct and pivoted at its upper end and the first wall forming the front side of said duct and pivoted at its lower end.

7. A tobacco-cutting machine substantially as herein described with reference to and as illustrated in Figure 1 or Figure 2 of the accompanying drawings.

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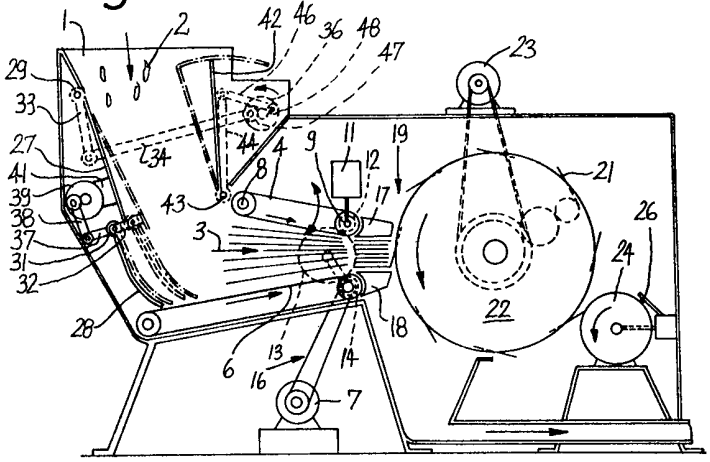
1578878 COMPLETE SPECIFICATION

1 SHEET *This drawing is a reproduction of the Original on a reduced scale*

Fig.1



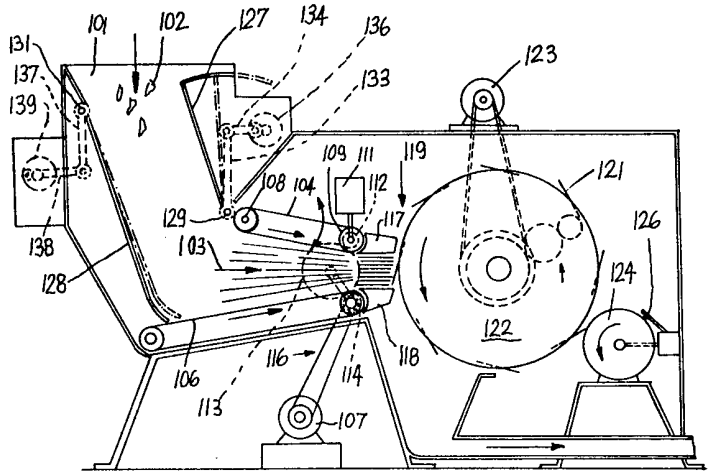


Fig.2