ABSTRACT OF THE DISCLOSURE

Raw tobacco leaves are destalked to form a mixture of ribs and laminae, and the laminae are thereupon segregated from ribs and are converted into a stream which is conveyed through a conditioning zone wherein the laminae are agitated and are simultaneously subjected to a heating action. The moisture content of laminae is measured upstream and/or downstream of the conditioning zone and the heating action is adjusted when the result of measurement deviates from a predetermined value. The thus treated laminae are then stored in the form of bales or in containers.

The present invention relates to a method and apparatus for treating tobacco leaves. More particularly, the invention relates to a method and apparatus for conditioning tobacco leaves prior to storage for the purpose of fermentation.

It is well known to store tobacco leaves in tightly packed condition, either in the form of bales or in wooden containers. Prior to storage, the leaves must be dried to prevent mildewing. Such drying is carried out by conveying a relatively thick layer of tobacco leaves on a travelling sieve and by passing hot air through the travelling layer. Until recently, the leaves were dried prior to removal of ribs or veins. Therefore, and since the drying of a rib requires more time and heat than the drying of laminae (ribless tobacco leaves), presently known drying apparatus operate in two stages in the first of which the leaves are dried to such an extent that the moisture content of ribs is reduced to a desired value. In the next stage, the laminae (which were overdried in the first stage) are moistened so that their moisture content is increased to an optimum value. Such moistening of laminae is necessary because, if they were baled in a condition in which they emerge from the first stage of a conventional drying apparatus, they would disintegrate during baling.

In accordance with a more recent proposal, raw (green) tobacco leaves are stripped in a first step to separate the ribs from laminae, and the laminae are thereupon dried preparatory to bailing. Such proposal, too, has met with limited success because it is very difficult to convey stripped laminae in the form of a uniform layer so that hot air passing through a layer of varying thickness will find the path of least resistance and will penetrate through relatively thin zones of the layer with resultant over-drying of laminae in such zones while the moisture content of laminae in the thicker zones of the layer remains well above a desirable value. In other words, the drying operation is too effective in relatively thin zones which should be relieved of less moisture but is ineffective or insufficient in relatively thick zones which should be relieved of a greater quantity of moisture. In a bale, laminae whose moisture content is too high form pockets which breed fungi with the danger of damage to or total destruction of bales. Therefore, presently known drying or conditioning apparatus for stripped laminae also operate in two stages to first reduce the moisture content well below the desired moisture content and to thereupon moisten excessively dried batches to increase their moisture content prior to bailing.

Accordingly, it is an important object of the present invention to provide a novel method of treating tobacco leaves prior to bailing or storing in containers and to reduce the moisture content of tobacco leaves in such a way that a single treatment suffices to reduce the moisture content of a continuous tobacco layer to a desired value so that the leaves need not be moistened prior to storage.

Another object of the invention is to provide a novel method of drying or conditioning stripped tobacco leaf laminae.

A further object of the invention is to provide a novel conditioning apparatus for stripped tobacco leaf laminae and to construct and assemble the apparatus in such a way that a single passage of a stream of laminae there-through suffices to reduce their moisture content to a desired value without resorting to moistening.

An additional object of the invention is to provide a tobacco processing plant which embodies a conditioning apparatus of the just outlined characteristics.

A concomitant object of the invention is to provide a conditioning apparatus whose drying action can be regulated in a fully automatic way as a function of the characteristics of tobacco leaves prior to and/or after completion of the conditioning operation.

Briefly stated, one feature of the invention resides in the provision of a method of treating tobacco leaves. The method comprises the steps of destalked raw tobacco leaves to form a mixture of ribs and tobacco leaf laminae, separating such laminae from the ribs and conveying the thus separated laminae into a stream, conveying the stream lengthwise through an elongated conditioning zone, drying the laminae by subjecting successive increments of the stream in the conditioning zone to at least one heating action and simultaneously agitating the laminae so that each lamina of the stream is subjected to a thorough drying or roasting action resulting in a reduction of the moisture content, measuring the moisture content of successive increments of the stream upstream and/or downstream of the conditioning zone, adjusting the heating action in the conditioning zone when the result of such measurement deviates from a desired value, and storing the thus treated laminae, either by assembling them into bales or by packing them in containers. The moisture content of laminae is preferably reduced gradually by subjecting the laminae to an uninterrupted heating action which is maintained at least along the major part of the conditioning zone.

The agitating step may comprise lifting the lamina which pass through the conditioning zone from a lower level to a higher level and then showering the laminae from the higher level back to the lower level. Alternatively, or in addition to the just mentioned agitating step, the drying step may comprise subjecting the laminae to the heating action of a current of hot gaseous fluid which travels from the upstream end to the downstream end of the conditioning zone, and the conveying step then comprises introducing successive increments of the stream into the current of gaseous fluid so that the current entrains, advances and simultaneously agitates the lamina in the conditioning zone.

In addition to relying on measurements of moisture content of laminae upstream and/or downstream of the conditioning zone, the heating action of the lamina may be controlled by utilizing the results of further measurements carried out upstream of the conditioning zone for the purpose of determining whether or not the weight of successive increments of the stream deviates from a pre-
determined value. If the weight of an increment is excessive, the heating action is intensified during the passage of such increment through the conditioning chamber 2a.

The novel features which are considered as characteristic of the invention are set forth in particular in the appended claims. The improved tobacco processing plant itself, however, both as to its construction and its mode of operation, together with additional features and advantages thereof, will be best understood upon personal consideration of the following detailed description of certain specific embodiments with reference to the accompanying drawings, in which:

FIG. 1 is a diagram showing the four basic apparatus of a tobacco processing plant which embodies the present invention.

FIG. 2 is a somewhat schematic side elevational view of a conditioning apparatus which can be utilized in the tobacco processing plant of FIG. 1, certain parts of the apparatus being broken away; and

FIG. 3 is a schematic view of a second conditioning apparatus.

Referring first to FIG. 1, there is shown a diagram illustrating the assemblies or apparatus of a tobacco processing plant. These assemblies include a feed 101, a stripping or destalking apparatus 102 which separates ribs or veins from leaf stock, and which comprises a pneumatic or otherwise constructed separator for segregating the ribs from leaf stock, a conditioning apparatus 103 which receives leaf stock from the stripping apparatus 102, and a baling apparatus 104 which receives leaf stock from the conditioning apparatus 103. Green tobacco leaves conveyed by the feed 101 are destalked in the apparatus 102 whose stripping unit discharges a mixture of ribs and leaf stock (hereinafter called laminae) to the separator for segregation into heavier particles (mainly ribs or veins and so-called birds' eyes) and lighter particles consisting of laminae. The conditioning apparatus 103 subjects the stream of laminae to a roasting or heating action so that the moisture content of the thus conditioned stream of laminae is reduced to a predetermined optimum value. Such laminae are then introduced into the baling apparatus 104 and are tightly packed into bales or stored in containers in which they remain for a period of time required to cure the stored material.

The exact construction of the stripping apparatus 102 and baling apparatus 104 forms no part of my present invention. The separator of the stripping apparatus 102 can be of the type as disclosed in U.S. Patent No. 3,010,576 to Harte et al.

FIG. 2 illustrates certain details of the feed 101 and of the conditioning apparatus 103. The feed comprises the parts 12, 14, 7, 8, 34 and 36 serving to convey a stream 3 of laminae lengthwise and through an elongated conditioning zone 1 accommodating a rotary drier 2 which resembles a cylinder or drum and whose axis is inclined downwardly, as seen in the direction of feed. The conditioning apparatus 103 further comprises heating means including two adjustable heating units 10, 10a and two control units 38, 39 each of which regulates the heating or roasting action of one of the heating units. The exact construction of the control units 38, 39 is preferably identical or analogous to that of the control units disclosed in the Patent No. 3,757,488 of Hans Koch et al., filed Nov. 17, 1964, and assigned to the same assignee. Therefore, the drawings of my present invention show only such details of the two control units which are necessary for full understanding of the invention. The exact construction of the control units 38 and 39 per se forms no part of this invention.

A drier 2 is mounted on guide rolls 6a carried by stationary brackets 4, 6 and is provided with a ring gear 9 meshing with a pinion 5 driven by the output shaft of a variable speed transmission 8. This transmission is driven by an electric motor 7. The motor 7 and the transmission 8 can be said to form part of the feed 101 for the stream 3 because, by being inclined downwardly, the revolving drier 2 causes successively admitted increments or unit lengths of the stream 3 to advance through its conditioning chamber 2a.

The heating unit 10 comprises coils which extend along the full length of the conditioning chamber 2a and can be heated by circulating steam or other suitable heating fluid. The coils of the heating unit 10 rotate with the drier 2 so that they act not only on the laminae but also agitate the laminae during travel through the conditioning chamber 2a. The coils of the heating unit 10 receive steam from a distributor or header 28 which is connected with a supply pipe 24 containing a steam valve 26 constituting the adjusting means for the heating unit 10 and forming part of the second control unit 39. This control unit comprises a dielectric moisture detector including a vibrating trough 35 of the type disclosed for example, in the copending application Ser. No. 192,834 of Eisenwein which is assigned to the same assignee. The purpose of this detector is to measure the moisture content of successive increments of the steam 3 after the laminae leave the conditioning chamber 2a, i.e., outside of the drier 2, and to bring about adjustment of the valve 26 (to admit a greater or lesser quantity of steam through the supply pipe 24) when the measured result deviates from a predetermined value. The operative connection between the valve 26 and the dielectric detector including the trough 35 is indicated by a phantom line 46. This connection preferably comprises a transducer which can convert impulses transmitted by the moisture detector into suitable signals, one or more signal amplifiers and a servomotor which can change the position of the valve 26 in response to amplified signals. The control unit 39 also comprises a rated value selecting device (not shown) which is connected to a junction in the operative connection 46 and which can be adjusted by hand so that it furnishes signals adapted to cancel signals generated by the moisture detector when the moisture content of laminae passing through the trough 35 is satisfactory so that the valve 26 need not change its position.

The operation of the control unit 39 is based on the premise that the moisture content of the stream 3 does not fluctuate from increment to increment, i.e., that changes in the moisture content of the stream are gradual. When the result of measurement carried out by the detector including the trough 35 differs from a predetermined optimum moisture content, the valve 26 is adjusted automatically to compensate for deviations from the optimum moisture content. The trough 35 is sufficiently close to the outlet of the drier 2 to insure that the valve 26 is adjusted with a minimum of delay so that the action of the heating unit 10 is adjusted in good time to prevent overdrying or insufficient drying of increments following the increment whose measurement was utilized to adjust the valve 26.

The parts of the feed 101 include a conveyor belt 12 which receives the stream 3 from the separator of the stripping apparatus 102 and cooperates with a weighing device 12a constituting one of three detectors in the control unit 38. The weighing device 12a weighs successive increments of the stream 3 and sends impulses which are utilized to adjust the position of a valve 18 constituting the adjusting means for the heating unit 10a, and also forming part of the control unit 38. The provision of the weighing device 12a is a safety measure because the stream 3 is preferably fed at a nearly constant rate. The operative connection between the weighing device 12a and a junction 36a of the control unit 38 is shown at 40.

The discharge end of the conveyor belt 12 shows the laminae into a vibrating trough 35 which forms part of a dielectric moisture detector in the control unit 38. This moisture detector measures the moisture content of successive increments of the stream 3 prior to entry of such increments into the conditioning chamber 2a. An opera-
tive connection 42 transmits signals generated by the moisture detector including the trough 13 to the junction 38a which is connected with the valve 10a. The lower region of the trough 13 enters through an inclined chute 14 of the feed 101 and enter the upstream end of the conditioning chamber 2a to be subjected to two heating actions, namely, to the indirect heating action of steam circulating in the coils of the heating unit 10 and to direct heating action of hot air discharged by the heating unit 10a. The latter comprises a blower 20 which is provided with a supply pipe 22a discharging into the upstream end of the conditioning chamber 2a. The suction side of the blower 20 is connected with a suction pipe 22a whose intake accommodates an electric resistance heater 16. The valve 18 of the control unit 38 is installed in the pipe 22a downstream of the heater 16 and can admit relatively cool atmospheric air so that such air mixes with the current of air which has been heated by the heater 16. The supply conduit 22 accommodates a further detector 21 which measures the temperature of air entering the conditioning chamber 2a and can transmit signals to the junction 38a through an operative connection 44. The junction 38a is further connected with a rated value selecting device (not shown) which can be adjusted by hand and furnishes a signal indicating a desired moisture content of tobacco laminae in the stream 3 prior to entry of laminae into the drier 2. When the integrated signal furnished to the junction 38a by the three detectors (12a, 13, 21) of the control unit 38 deviates from the signal furnished by the rated value selecting device, the valve 18 is adjusted to admit more or less atmospheric air and to thus reduce or intensify the action of the heating unit 10a.

The downstream end of the conditioning chamber 2a is sealed by a suction hood 28 which accommodates the header 28 and is connected to a suction fan 32. This fan evacuates from the chamber 2a vapors developing on heating of the stream 3 and withdraws spent heating medium which is admitted by the supply pipe 22.

The feed 101 also includes an inclined chute 34 which receives conditioned laminae from the chamber 2a and supplies such material into the aforementioned trough 35 of the moisture detector in the control unit 39. The trough 35 delivers the stream 3 to a conveyor belt 36 which advances the laminae to the baling apparatus 104. The transmission of signals generated by the detectors 12a, 13, 21 to the control unit 38 is preferably delayed so that the action of hot air discharged by the supply pipe 22 changes when the increment whose measurement has caused adjustment of the valve 18 actually enters the jet of hot air in the inlet of the drier 2. The operation of the conditioning apparatus shown in FIG. 2 is as follows:

The separator of the stripping apparatus 102 exchanges a continuous stream 3 of laminae which are delivered to the belt 12 whereby the detector 12a weighs each successive increment of the stream 3 and sends an impulse which indicates whether or not the weight deviates from a pre-selected average value. The dielectric moisture detector including the trough 13 determines the moisture content of successive increments (in percent) and sends impulses through the connection 42. The material of the stream 3 then passes through the chute 14 and enters the conditioning chamber 2a. The laminae entering the upstream end of the chamber 2a are immediately contacted by the current of hot air issuing from the supply pipe 22 so that the conditioning action of hot air begins even before the laminae reach the orbiting coils of the heating unit 10. The current of air issuing from the supply pipe 22 expels moisture from and simultaneously loosens and agitates the stream 3.

On descending into the lower part of the conditioning chamber 2a, the laminae of the stream 3 are entrained by the coils of the heating unit 10 whereby such coils exchange heat with and simultaneously perform a further loosening and agitating action upon the laminae of the stream 3. When a lamina reaches the upper part of the chamber 2a, it drops by gravity back to the lower level in the top region of the drier as indicated by the arrow 41 and is thereupon again entrained by a set of coils to rise to an upper level. This brings about further agitation and loosening of the stream 3, and it was found that laminae descending from the upper part into the lower part of the chamber 2a form showers of loose particles which are intimately contacted with hot air issued from the supply pipe 22 so that, at least in the upstream section of the conditioning chamber, each successive increment of the stream 3 is heated by the units 10 and 10a to bring about a controlled and highly satisfactory heating action which is completed during travel through the downstream section of the conditioning chamber. The drier 2 is long enough to allow for repeated mechanical agitation of successive increments by the coils of the heating unit 10.

The thus treated material is evacuated through the chute 34 and advances through the trough 35, along the upper stringer of the belt 36, and into the baling apparatus 104.

The action of the heating unit 10a is regulated by the control unit 38 in response to determination of characteristics of the stream 3 prior to entry into the drier 2 and also in dependency on impulses transmitted by the detector 21 in the supply pipe 22. The results of measurement carried out by the weighting device 12a and in the trough 13 are compared with a rated value and the valve 18 is adjusted, when necessary, to insure that the unit 10a carries out an optimum heating action. The results of measurements carried out upon the stream 3 prior to entry of laminae into the conditioning chamber 2a are multiplied by a correction factor and are converted into signals. The sum of such signals is then compared with the signal produced by the aforementioned rated value selecting device. In other words, the temperature of hot air discharged by the supply conduit 22 is a function of the weight and moisture content of successive increments of the stream 3 advancing toward the chute 14.

The control unit 39 regulates the action of the heating unit 10 by causing its valve 25 to admit steam in accordance with the results of measurements in the trough 35. The coils of the heating unit 10 exchange heat with the wall of the revolving drier 2 so that the laminae are heated by contact with such coils and also by contact with the internal surface of the drier.

FIG. 3 illustrates a modified conditioning apparatus wherein the stream 232 of laminae discharged by the separator of the stripping apparatus is treated in an elongated conditioning zone 201. The cylindrical drier 2 of FIG. 2 is replaced by a drier in the form of a stationary vertical duct 202 whose conditioning chamber 202a receives the stream 232 through a chute 265 forming part of a modified feed. This feed also includes an air lock, here shown as a rotary cell wheel 204, which supplies laminae to the chute 205 and receives such laminae from the discharge end of a conveyor belt 203.

The lower end of the duct 202 is connected with a supply pipe 222. The upper end of the duct 202 is connected with a vertical take-off pipe 207 by means of an elbow 206, and the discharge end of the pipe 207 is connected with an air extractor 208 discharging into a suction pipe 213 leading to the suction side of a fan 214. The laminae which are separated from the gaseous carrier in the extractor 208 descend into an air lock 209 which discharges into the vibrating trough 235 of a dielectric moisture detector. The trough 235 discharges the laminae onto the upper stringer of a conveyor belt 210 which feeds the laminae to the baling apparatus.

The pressure side of the fan 214 is connected with a conduit 215 discharging into a dust separator here shown as a cyclone 216. A further conduit 217 connects the outlet of the cyclone 216 with the supply pipe 222. This pipe 222 forms part of an adjustable heating unit 210a which cor-
The conditioning apparatus shown in FIG. 3 is somewhat different from the action of the apparatus which was described in connection with FIG. 2. The separator of the stripping apparatus 102 discharges laminae which form a stream 232 and are fed onto the belt 203 which discharges into the air lock 204. The latter feeds laminae into the chute 205 and the material leaving this chute enters the ascending current of hot air discharge by the supply pipe 222 of the heating unit 210a. The heater 250 heats the current of air leaving the conduit 217. The pressure generated by the fan 214 suffices to entrain the laminae upwardly and through the entire conditioning chamber 202a. The current of air issuing from the pipe 222 not only conveys and heats but also mixes and loosens the material of the stream 232, and such heating, mixing and loosening action is continued in the elbow 206 and pipe 207. The moisture content of successive increments of the stream 232 is reduced to a desired value when such increments enter the extractor 208 which directs the gaseous carrier into the suction pipe 213 and allows the solid fraction to descend into the air lock 209 and thence into the tough 235. The belt 210 then delivers the stream 232 into the baling apparatus.

If the moisture content determined during the passage of successive increments through the trough 235 deviates from the appropriate or desired value, the conditioning apparatus can operate properly without two distinct heating units and by utilizing a single control unit 239. This valve allows a greater or lesser quantity of cool air to enter via nipple 227 and to be admitted to hot air issuing from the supply pipe 222.

The conditioning apparatus of FIG. 3 can operate very rapidly and to compensate for all such fluctuations in the moisture content and/or average weight which are detected before the stream 3 enters the conditioning chamber 2a.

The conditioning apparatus of FIG. 3 is much simpler than that of FIG. 2. This apparatus can be utilized when the moisture content of successive increments discharged by the air lock 209 can fluctuate within a wider range and when the processing plant is required to treat relatively small amounts of tobacco per unit of time. If desired, the drier 202 can be heated by steam or electrically, and its heating action can be controlled by a second control unit whose detector or detectors determine the characteristics of successive increments in the stream 232 prior to admission of such increments into the conditioning chamber 202a.

What is claimed as new and desired to be protected by Letters Patent is:

1. A method of treating tobacco leaves, comprising the steps of distalaking raw tobacco leaves to form a mixture of ribs and ribless tobacco leaves; separating ribless tobacco leaves from ribs and converting the thus separated ribless tobacco leaves into a stream; conveying the stream lengthwise through a conditioning zone; drying ribless tobacco leaves by subjecting successive increments of the stream in said conditioning zone to at least one heating action by exchange of heat with a heating medium and simultaneously regulating the moisture content of the ribless tobacco leaves so as to permit passage of the heating medium therethrough; measuring the moisture content of successive increments of the stream; adjusting the heating action in said conditioning zone when the result of measurement deviates from a desired value; and storing the thus...
3,409,025 treated ribless tobacco leaves for a period of time sufficient to cure the ribless tobacco leaves.

3. A method as set forth in claim 1, wherein said drying step comprises gradually reducing the moisture content of ribless tobacco leaves by subjecting such leaves to an uninterrupted heating action which is maintained at least along the major part of said conditioning zone.

4. A method as set forth in claim 1, wherein said agitating step comprises lifting the ribless tobacco leaves from a lower level to a higher level and thereupon showering the thus lifted leaves back to the lower level.

5. A method as set forth in claim 1, wherein said heating medium is a hot fluid and wherein such fluid is utilized to agitate the ribless tobacco leaves in said zone.

6. A method as set forth in claim 1, wherein the moisture content is measured downstream of said conditioning zone.

7. A method as set forth in claim 6, further comprising the step of measuring the moisture content of successive increments of said stream upstream of said conditioning zone and adjusting the heating action when the result of such measurement upstream of said zone deviates from a predetermined value.

8. A method as set forth in claim 1, further comprising the step of collecting incremental measurements of the stream conditioned as described and adjusting the heating action of the adjacent increments when the result of such measurement upstream of said zone deviates from a predetermined value.

9. A method of treating tobacco leaves, comprising the steps of detasking raw tobacco leaves to form a mixture of ribs and tobacco leaf laminae; separating such laminae from the ribs and converting the thus separated laminae into a stream; conveying the stream lengthwise through a conditioning zone; drying the laminae by subjecting successive increments of the stream in said zone to two separate heating actions the first of which is effective at least in the upward section of said zone and the second of which is effective at least in the downstream section of said zone and simultaneously agitating the laminae; measuring the moisture content of successive increments of said stream upstream and downstream of said zone; adjusting said first heating action when the result of one of said measurements deviates from a first predetermined value and adjusting said second heating action when the result of the other measurement deviates from a second predetermined value; and storing the thus treated laminae.

10. A method as set forth in claim 1, wherein said heating medium is a current of hot gaseous fluid travelling from the upstream end to the downstream end of said conditioning zone, said conveying step comprising introducing successive increments of said stream into said current so that the current entrains and advances the ribless tobacco leaves through said conditioning zone.

11. In a plant for treatment tobacco leaves, the combination of a stripping apparatus including means for detasking raw tobacco leaves to form a mixture of ribs and ribless tobacco leaves and means for separating ribless tobacco leaves from ribs; a feed for converting the thus separated ribless tobacco leaves into a stream and for advancing the stream lengthwise; a conditioning apparatus comprising a drier defining an adjacent conditioning chamber through which the stream is conveyed by said feed, heating means including at least one adjustable heating unit for heating and for simultaneously agitating the ribless tobacco leaves during transport through said conditioning chamber by said feed, and control means including detector means for measuring the moisture content of successive increments of said stream outside of said chamber and adjusting means for adjusting said heating unit in accordance with the result of such measurement; and means for packing and storing the thus conditioned ribless tobacco leaves for a time period sufficient to cure the thus stored ribless tobacco leaves.

12. A combination as set forth in claim 11, wherein said drier comprises a rotary cylinder having an inlet at one end and an outlet at the other end thereof, said drying unit comprising heated agitating members provided in said chamber and arranged to rotate with said dryer and to thereby agitate the ribless tobacco leaves in said conditioning chamber.

13. A combination as set forth in claim 12, wherein said heating means further comprises a second heating unit including means for discharging a current of hot gas into said chamber so that such gas expels moisture from and simultaneously agitates the ribless tobacco leaves during passage through said dryer.

14. A combination as set forth in claim 11, wherein said drier comprises an elongated duct and said heating unit comprises means for discharging one end of said duct a current of hot gas which entrains the ribless tobacco leaves through said chamber and simultaneously agitates the ribless tobacco leaves during their passage through said duct.

15. A combination as set forth in claim 11, wherein said detector means is arranged to measure the moisture content of successive increments of said stream after such increments leave said conditioning chamber.

16. A combination as set forth in claim 11, wherein said heating means comprises two independently adjustable heating units and wherein said control means comprises two detector means for respectively measuring the moisture content of successive increments upstream and downstream of said conditioning chamber and two adjusting means each of which is arranged to adjust one of said heating units when the result of measurements carried out by one of said detector means deviates from a predetermined value.

17. A combination as set forth in claim 16, wherein said control means further comprises additional detector means for measuring the weight of successive increments of said stream upstream of said conditioning chamber and an operative connection between one of said adjusting means and said additional detector means for adjusting the respective heating unit when the weight of an increment deviates from a predetermined weight.

18. A combination as set forth in claim 11, wherein said heating unit comprises means for agitating the ribless tobacco leaves during their passage through said conditioning chamber.

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