Oct. 23, 1956 H. SCHLOSSMACHER 2,767,717

APPARATUS FOR MOISTENING TOBACCO AND LIKE FIBROUS MATERIALS

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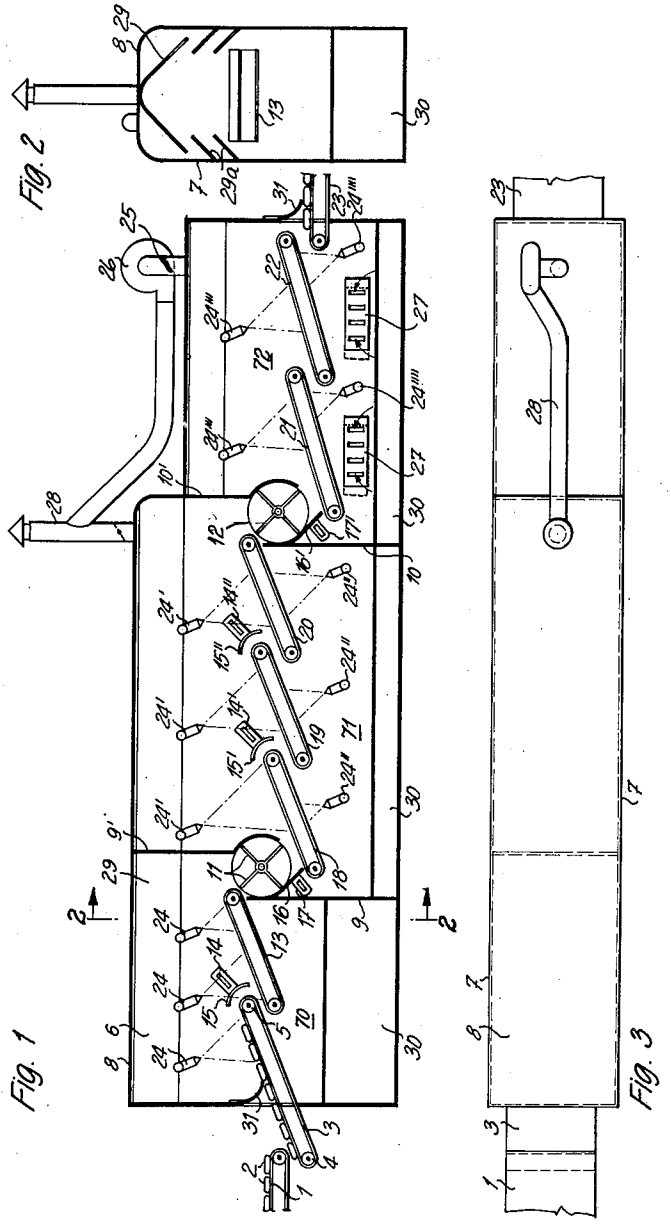


Fig. 1

Fig. 2

Fig. 3

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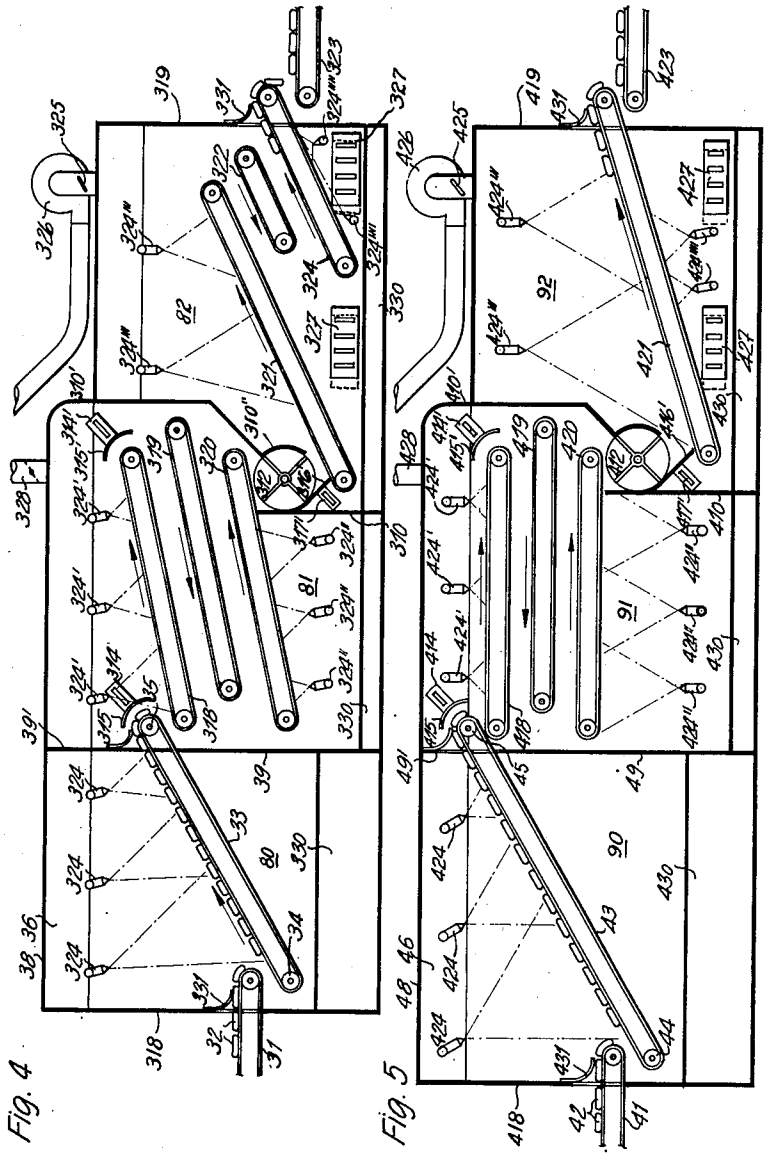


Fig. 4

Fig. 5

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APPARATUS FOR MOISTENING TOBACCO AND LIKE FIBROUS MATERIALS

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4 Claims. (Cl. 131—136)

The invention relates to a device for continuously moistening tobacco and other substances.

At the present time higher output requirements are called for in the moistening of tobacco and other goods so that the previous equipment is no longer sufficient. Heretofore the following damping devices were known in practice.

Heretofore Oriental types of tobacco were moistened in wire baskets, that is the components of a tobacco mixture were filled selectively into wire baskets in the manner of the different types in the bales and then taken into the initial damping space. This space is normally divided into eight chambers of which each chamber has different conditions. Each five baskets were stacked one over the other in a travelling frame. According to the type of the leaf, that is whether it relates to a lean leaf or to a rich leaf, which needs either more moisture or more heat in order to remain supple, the travelling frames with the baskets were inserted into the appropriate chamber and left there until finished. This process requires up to 48 hours and more. With this apparatus there is the disadvantage, besides the long treatment period, that the tobacco leaves which must be withdrawn dry from the bales for moistening in the baskets, would naturally be damaged and much breakage and wastage resulted.

In this connection a moistening process and apparatus is known in which the wire baskets with the tobacco are inserted at a lower point of a so-called damping tower and after traversing the moistening zones are again withdrawn at another point. The loss of tobacco also occurs on removal from the bales.

A further method is concerned with moistening the whole bales. In this case the tobacco leaves are no longer withdrawn from the bales but the upper and lower sides of the wrapping are removed; thereby the moistening time can be considerably reduced and moreover a uniform moistening throughout of the tobacco is permitted. The moisture in this case is introduced as a rule from above, is drawn through the bales and then led away. In certain apparatus for treating tobacco in baskets, the baskets are placed in containers generally open at the top, and provided with a large removable cover below which the moisture can be sprayed in through nozzles. To these containers also lateral slide doors can be fitted by which other substances can be applied to the containers. In such containers the tobacco is inserted into baskets and moistened at about 50° C. and about 90% relative humidity. The disadvantage of this method is that the moistening time for one batch may vary between 8 to 12 hours according to the type of filling.

The above apparatus and devices are not suitable for moistening the heavy Virginia and Burley tobaccos especially with regard to the moistening of the generally strong ribs. Moreover these tobaccos are compressed tightly in barrels and cannot be moistened directly in the containers. On emptying the barrels damage then occurs to the leaves with the loss of tobacco associated

therewith. For these cases, a moistening in vacuum has often been used. In this case the tobacco compressed in the barrel is moistened with the application of a suitable vacuum and with the introduction of wet steam right to the inside. After removal of the tobacco from the vacuum vessel this must however be cooled down in a so-called cool-off drum (moistening drum) and again moistened. Nevertheless in this case the temperature of the tobacco always remains still too high since much moisture is lost through dilution in the time up to the further treatment by cooling-off in the drum. The treatment of the tobacco in the moistening drum has the disadvantage that the tobacco is subjected to more or less great stresses on travelling through the drum. Thereby the disadvantage is also produced that the tobacco cannot be arranged to leave the drum by simple direct means, a disadvantage which is particularly noticeable in the case of bundled tobacco if it must then be opened out.

It is also known to suspend tobacco hands and bundles from hooks located on a conveyor belt or on several conveyor belts in order to feed the tobacco continuously through several treatment stages. In this case the suspended tobacco hands are rotated back and forth and in travel are swept upwardly or downwardly with conditioned air. In this process the tobacco hands must be hung in place individually and at the end must be removed individually or from cross bars otherwise they bend and in some cases break.

In another known process the bundles of tobacco leaves are stuck on the ends of pegs moved continuously on chains in bowl-shaped wire frames through a moistening air space and also are shaken to ensure better moistening throughout. In this case the bundles are subjected to changes in position and are brought repeatedly from an upright to a suspended position. The moistening air is distributed by nozzles towards the bundles. In this process the bundles are sent several times through a chamber provided for this purpose so that a lengthy period is necessary. Moreover there is always only a single treatment step in operation at one time.

It should be mentioned finally that two continuous processes are known for the treatment of tobacco by the single chamber system in which either the tobacco bundles are fed into successive sifter boxes and treated with processing media or in the other case the tobacco bundles are laid in the cells of a cell wheel with numerous cells and thereby are treated outwardly from the inside of the cell wheel with steam. These two processes use, as stated, in each case a single space for the processing and in the first case the tobacco is treated with liquids or bitter-forming substances which are later removed, while in the second case the apparatus is used solely for initial moistening and softening. A separation into various treatment stages is not here present.

These disadvantages set out above are avoided by the invention in which the material to be moistened is initially moistened on passage through a covered space in successive separated chambers, is moistened while warm or steamed and is finally cooled, in which preferably sprayed water is used for initial moistening, preferably wet steam and water is used for the warm moistening or steaming and for cooling preferably water and/or conditioned air is used; thereby the result is obtained that in a short time a substantial moistening and damping through of the tobacco is obtained. The material to be treated is conveyed on conveyor belts through the covered space, wherein cell wheels are arranged between the individual spaces which separate the chambers one from the other. Thereby the result is obtained that a uniform change of the treatment temperature from one chamber to the other is avoided and a sudden action on the tobacco obtained which thereby retains its moisture for a longer time. In the

cell wheels the tobacco is also turned at the same time. The conveyor belts incline upwardly and are thus arranged in cascade in order that on the one hand the tobacco is also turned at the end of each conveyor belt and on the other hand also so as to provide a larger moistening surface. A further advantage is that the speed of the conveyor belts and of the cell wheels can be selectively chosen so that in each case an intensified treatment of the tobacco material is possible. If a higher output is to be produced several belts can be arranged one beside the other.

The apparatus is shown on the drawing on the basis of constructional examples in which:

Fig. 1 is a side sectional view,

Fig. 2 is a section of one constructional example, taken on line **2—2** of Figure 1,

Fig. 3 is a plan from above, and

Figs. 4 and 5 are side sectional views of two further examples.

The tobacco hands or bundles **2** are supplied on a conveyor belt **1** to the left of Fig. 1 for example preferably with the stem ends all lying on the same side and are fed to a conveyor belt **3**. The conveyor belt **3**, as well as the other belts incorporated in the moistening apparatus, can advantageously be wire gauze belts. The endless conveyor belt **3** runs over the rollers **4, 5** in which the roller **5** lies within the space of the apparatus and somewhat higher than the roller **4**. The apparatus **6** consists of an elongated housing and has the form of a tunnel. It consists of two side walls **7**, see Fig. 2, and a cover **8**. On the inlet side the apparatus is closed except for the inlet opening for the conveyor belt **3** and also at the outlet end except for the outlet opening for the conveyor belt **23**. Also here only a small opening is left for the outgoing conveyor belt. The tunnel is divided into three divisions or spaces **70, 71** and **72** by partition walls **9, 9'** and **10, 10'**. The walls **9, 9'**, form a pair of offset wall members extending upwardly and downwardly from the floor and top wall of the housing and with their adjacent ends in spaced overlapping relation. A cell wheel **11** is provided between the walls **9** and **9'**, which has four division walls, and between the walls **10** and **10'** there is provided a second cell wheel **12** of like type. The tobacco rolls **2** or bundles are transferred within the apparatus **8** from the belt **3** to a second conveyor belt **13** which likewise rises towards the delivery end. The lowest end of the conveyor belt **13** extends below the conveyor belt **3**. At the end of the conveyor belt **3** positioned obliquely above the roller **5** is a guide strip **15** adjustable in a slot **14**, which transfers the tobacco bundles safely onto the conveyor belt **13**. The tobacco bundles are fed forward on the conveyor belt **13** to the cell wheel **11** which preferably rotates continuously. A guide **16** lies below the cell wheel **11**, which is adjustable in a slot **17**. The guide **16** has to transfer the tobacco bundles coming from the cell wheel safely onto the associated conveyor belt **18** thence from this to the conveyor belt **19** and so to the conveyor belt **20**. These conveyor belts are preferably inclined and arranged in cascade. Also here guide strips **15', 15''** adjustable by slots **14', 14''** are arranged at the reversal points of the belts **18** and **19**. The conveyor belt **20** delivers the tobacco bundles to the second cell wheel **12** which, as already stated, lies between the walls **10** and **10'**. Also this cell wheel rotates preferably continuously and has an adjustable guide **16'** below it. The guide **16'** is supported adjustably by a slotted plate **17'**. The tobacco hands pass from the cell wheel **12** or from the guide **16'** to a further conveyor belt **21**, thence to a second belt **22** and finally leave the apparatus on the belt **23**.

The conveyor belts and the cell wheels are driven in known manner, their speeds can however be varied singly, in groups or altogether by known mechanical or electrical control devices, not shown, for example by means of an infinitely variable gear. For moistening the travelling tobacco hands there is provided in the space **70** to the left

of the drawing of Fig. 1, preferably above the conveyor belts **3** and **13**, pivotal or adjustable nozzles **24** through which water is sprayed into the so-called preliminary moistening space. The temperature of the moistening medium must be so held that the tobacco reaches the temperature of about 25° C. in the initial moistening space so that a relative humidity of about 85% is obtained. In the following treatment space **71** the tobacco is heated and moistened; being warmed so that it absorbs the moisture more rapidly and easily. Above and below the conveyor belts **18, 19** and **20** similar nozzles **24', 24''** are provided to those in the initial moistening space from which water or steam or wet steam is sprayed in. In this case the temperatures of these media are held at such a value that the tobacco reaches the temperature of about 60° C. and a relative humidity of 85 to 90%.

In the third space **72**, the so-called cooling space, further nozzles **24'''** and **24''''** of the same kind as before are provided above and below the conveyor belts **21** and **22**. Thereby preferably water is sprayed in at a temperature which cools off the end product to 25° to 30° C. and also has a relative humidity of about 85%. Cooling is effected however for the most part by means of air. For this purpose, in the example shown there is provided above the apparatus a ventilator fan **26**, provided with an admission valve **25** and adjustable registers **27** forming air vents opening into the side walls **7** of the apparatus so that a constant air movement is obtained in the cooling space. The air can be led away by suitable outlet flues **28**.

In the upper part of the tunnel **6** there are provided in known manner, oppositely arranged inclined drip sheets **29** (see also Fig. 2), likewise fixed to the side wall, members **29a**, and in the lower part tanks **30** are provided for collecting the moisture. On the drawing the steam and water pipes have not been shown to ensure clarity.

In the embodiment shown two conveyor belts **3** and **13** are provided for the initial moistening space or chamber **70**, three conveyor belts **18, 19** and **20** for the main moistening space or chamber **71** in which warm moistening or steaming is effected, and in the cooling space or chamber **72** for example two conveyor belts **21** and **22** are provided. The inclined arrangement of the belts has the purpose on the one hand to effect the turning of the tobacco hands at the ends of the belts and on the other hand also to provide a greater receiving surface for the material to be moistened.

At the inlet and outlet ends of the apparatus leather flaps **31** or the like are disposed in order to provide outlet and inlet flaps in order that as little moisture or heat as possible can pass out from the inside to the outside. The walls are preferably formed by an insulating material.

In order that the temperatures, dampness and the speeds of the conveyor belts and of the cell wheels can be continuously observed and controlled suitable measuring appliances are incorporated.

The invention has been described heretofore on the basis of the constructional example according to Figs. 1 to 3 and it will now be shown how, on the basis of two further examples, this example can be modified without the scope of the invention being exceeded.

In the form of the invention shown in Figure 4, the apparatus includes a housing **36** having side walls as before connected by a top wall **38**. A conveyor **31** conveys tobacco bundles **32** through the end wall **318** in a suitable opening therein above which is arranged a flap **331**. An inclined conveyor **33** has one end arranged below the conveyor **31** to receive the tobacco bundles which are sprayed initially by means of spray pipes **324** arranged above the conveyor **33**.

The conveyor **33** is arranged above a partition wall **39** and a wall **39'** extends above the conveyor to form a chamber **80**. Disposed adjacent the upper end of the conveyor **33** is a guide **315** supported by a slotted plate

314 to permit the guide to be adjusted relative to the conveyor. The tobacco bundles or hands 32 are deposited upon a conveyor 318 of the endless type traveling in the direction indicated by the arrow and disposed above the endless conveyor 318 is a series of spray jets 324' for directing water or steam downwardly on the tobacco to further moisten and heat the same. Arranged below the conveyor 318 is a pair of superposed conveyors 319 and 320 which travel in the direction of the arrows and are slightly inclined. Beneath the endless conveyor 320 is a series of jets 324'' for directing steam or the like upwardly toward the underside of the conveyor 320. The conveyor 320 projects above a partition wall 320 and is disposed above the cell wheel 312. An upper partition wall 310' extends from the roof 38 to a point adjacent the cell wheel 312 where it terminates in a curved shield portion 310''. A vent 328 is provided in roof 38.

Thus, a chamber 81 is formed in which the tobacco is moistened and heated and is finally transferred by the cell wheel 312 to an inclined conveyor 321 in an adjacent chamber 82. The chamber 82 is also provided with spray pipes 324''' arranged above the conveyor 321, and endless conveyor belts 322 and 324 are provided for conveying the tobacco bundles through an end wall 319 partially closed by a flap 331 so that the tobacco bundles may be deposited on an endless conveyor belt 323 arranged externally of the housing 36. An additional set of spray jets 324'''' are arranged above the floor of the chamber 82 and beneath the endless conveyor belt 324. A ventilator fan 326 is connected to the chamber 82 by means of a suitable pipe connected to the fan intake and a control valve 325 is interposed to control the exhaust. Adjustable registers 327 form air vents for the admission of air.

Water collection tanks 330 are formed beneath the chambers 80, 81 and 82 and an adjustable guide plate 315' is supported by means of a slotted adjusting plate 314' similar to the guide plate 315. The plate 315' is arranged at the opposite end of the endless conveyor belt 318.

In the form of the invention shown in Figure 5, the casing 46 is similar to that shown in Figures 1 to 4 inclusive and includes side walls (not shown) connected by a top wall 48. An endless conveyor 41 is provided for conveying tobacco bundles 42 through the end wall 418 of the housing where they pass beneath a flap 431 and are deposited on an inclined endless conveyor belt 43. Vertical partition walls 49 and 49' are arranged with their adjacent edges spaced a slight distance to form an opening for the upper end of the conveyor 43 so that the bundles can be conveyed therethrough. Spray nozzles 424 are arranged above the conveyor 43 for spraying water or moisture thereon. A water collection chamber 430 is formed in the bottom of the moistening chamber 90. The tobacco then passes to a chamber 91 and is deposited on superposed endless conveyor belts 418, 419 and 420, and as before, guide plates 415 and 415' are supported by slotted supporting plates 414 and 414' to assist in guiding the tobacco around the ends of the conveyors 43 and 418 respectively. Spray pipes 424' are mounted above and below the endless conveyors to admit steam and moisture and additionally heat the tobacco during the travel through the chamber 91. A vent 428 is arranged in the roof 48 similar to the vent 328 in the roof 38 shown in Figure 4.

Partition walls 410 and 410' are arranged in spaced overlapping relation and arranged between the ends is a cell wheel 412 upon which the tobacco is deposited from the endless conveyor belt 420. The tobacco is deposited on an inclined endless conveyor belt 421 arranged in the chamber 92 and is then conveyed to an opening in the end wall 419 which is partially closed by a flap 431 and is deposited upon an external endless conveyor 423. Spray jets 424''' and 424'''' are arranged above and below the conveyor 421 and a ventilator fan 426 is provided in the roof of the chamber 92 and is provided with

a valve 425. Adjustable registers 427 form air vents for the chamber 92, and in order to guide the tobacco from the cell wheel 412 to the conveyor 421, a guide plate 416' is arranged below the wheel and is supported by a slotted plate 417'.

All of the endless conveyor belts in Figure 4 can be supported by rollers 34 and 35 at each end thereof shown in Figure 4, and similarly, all of the endless belts and conveyors shown in Figure 5 can be supported by rollers 44 and 45 at the opposite ends thereof as shown in Figure 5.

What I claim is:

1. Apparatus for continuous moistening of tobacco, comprising a tunnel-like substantially closed housing, said housing having an inlet and outlet arranged in substantially the same horizontal plane at each end of said housing, two transverse partitions in said housing dividing said housing into a first, a second, and a third chamber counted from one end of said housing to the other, endless conveyor belts in said chambers, a plurality of spray nozzles for water in said first chamber, a plurality of spray nozzles for steam in said second chamber, a plurality of spray nozzles for cooling water in said third chamber, and means associated with said third chamber for passing cooling air through said third chamber, said means including ventilator means and adjustable cooling air registers, the transverse partition between the second and third chambers being formed of a pair of offset wall members extending upwardly and downwardly from the floor and top wall respectively of said housing with their adjacent ends in spaced overlapping relation, and a cell wheel arranged between said spaced overlapping ends of said wall members and mounted to rotate on a horizontal axis so that tobacco can be transferred from one of the conveyor belts in the second chamber to one of the conveyor belts in the third chamber and so that it may pass through the outlet without substantial steam escaping from the second chamber into the third chamber, and the cell wheel being arranged in substantially the same horizontal plane as the inlet and outlet of said housing.

2. Apparatus for continuous moistening of tobacco, comprising a tunnel-like substantially closed housing, said housing having an inlet and outlet arranged in substantially the same horizontal plane at each end of said housing, two transverse partitions in said housing dividing said housing into a first, a second, and a third chamber counted from one end of said housing to the other, endless conveyor belts in said first and third chambers, a plurality of endless conveyor belts in said second chamber so arranged as to cause each bundle of tobacco to be turned over when transferred from one of said last mentioned conveyor belts to another, a plurality of spray nozzles for steam in said second chamber, a plurality of spray nozzles for cooling water in said third chamber, and means associated with said third chamber for passing cooling air through said third chamber, said means including ventilator means and adjustable cooling air registers, the transverse partition between the second and third chambers being formed of a pair of offset wall members extending upwardly and downwardly from the floor and top wall respectively of said housing with their adjacent ends in spaced overlapping relation, and a cell wheel arranged between said spaced overlapping ends of said wall members and mounted to rotate on a horizontal axis so that tobacco can be transferred from one of the conveyor belts in the second chamber to one of the conveyor belts in the third chamber and so that it may pass through the outlet without substantial steam escaping from the second chamber into the third chamber, and the cell wheel being arranged in substantially the same horizontal plane as the inlet and outlet of said housing.

3. Apparatus for continuous moistening of tobacco, comprising a tunnel-like substantially closed housing, said housing having an inlet and outlet arranged in substantially the same horizontal plane at each end of said housing, two transverse partitions in said housing dividing

said housing into a first, a second, and a third chamber counted from one end of said housing to the other, a plurality of endless conveyor belts in each of said chambers so arranged as to cause each bundle of tobacco to be turned over when transferred from one of said conveyor belts to another within one and the same chamber, a plurality of spray nozzles for water in said first chamber, a plurality of spray nozzles for steam in said second chamber, a plurality of spray nozzles for cooling water in said third chamber, and means associated with said third chamber for passing cooling air through said third chamber, said means including ventilator means and adjustable cooling air registers, the transverse partition between the second and third chambers being formed of a pair of offset wall members extending upwardly and downwardly from the floor and top wall respectively of said housing with their adjacent ends in spaced overlapping relation, and a cell wheel arranged between said spaced overlapping ends of said wall members and mounted to rotate on a horizontal axis so that tobacco can be transferred from one of the conveyor belts in the second chamber to one of the conveyor belts in the third chamber and so that it may pass through the outlet without substantial steam escaping from the second chamber into the third chamber, and the cell wheel being arranged in substantially the same horizontal plane as the inlet and outlet of said housing.

4. Apparatus for continuous moistening of tobacco, comprising a tunnel-like substantially closed housing, said housing having an inlet and outlet arranged in substantially the same horizontal plane at each end of said housing, two transverse partitions in said housing dividing said housing into a first, a second, and a third chamber counted from one end of said housing to the other, upwardly and forwardly inclined endless conveyor belts in said first and third chambers, a plurality of upwardly and forwardly inclined endless conveyor belts in said second chamber so arranged as to cause each bundle of tobacco to be turned over when transferred from one of said last mentioned

conveyor belts to another, a plurality of spray nozzles for water in said first chamber, a plurality of spray nozzles for steam in said second chamber, a plurality of spray nozzles for cooling water in said third chamber, and means associated with said third chamber for passing cooling air through said third chamber, said means including ventilator means and adjustable cooling air registers, the transverse partition between the second and third chambers being formed of a pair of offset wall members extending upwardly and downwardly from the floor and top wall respectively of said housing with their adjacent ends in spaced overlapping relation, and a cell wheel arranged between said spaced overlapping ends of said wall members and mounted to rotate on a horizontal axis so that tobacco can be transferred from one of the conveyor belts in the second chamber to one of the conveyor belts in the third chamber and so that it may pass through the outlet without substantial steam escaping from the second chamber into the third chamber, and the cell wheel being arranged in substantially the same horizontal plane as the inlet and outlet of said housing.

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