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METHOD FOR CURING GREEN TOBACCO

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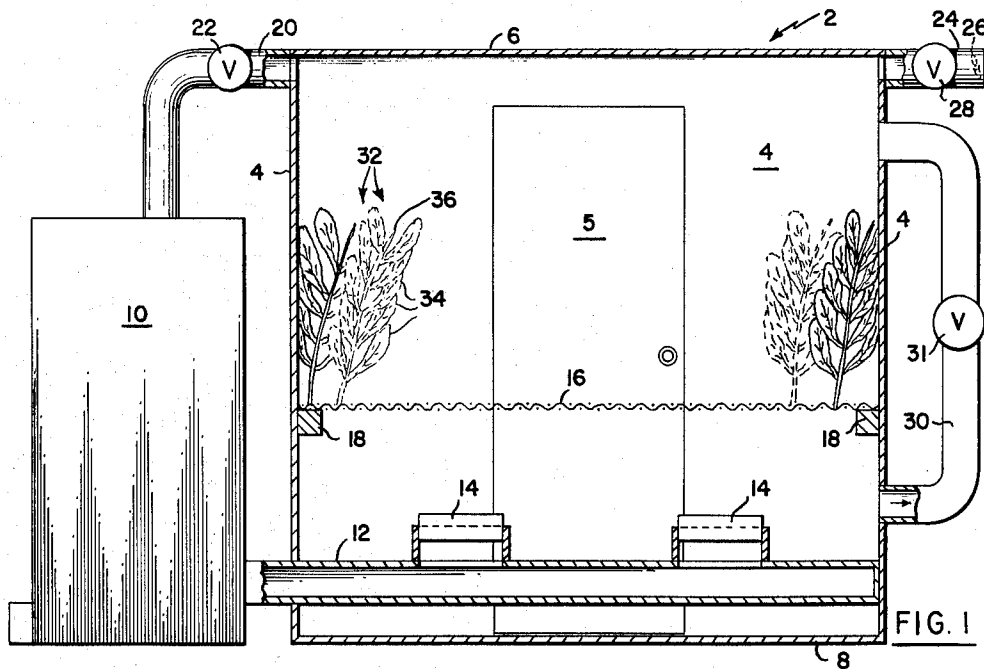


FIG. 1

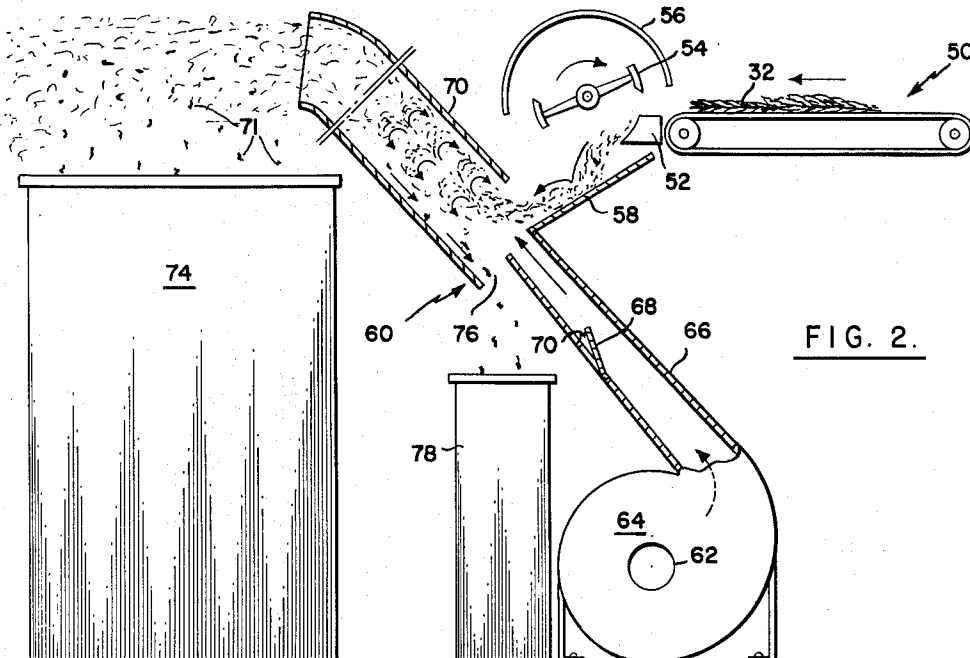


FIG. 2.

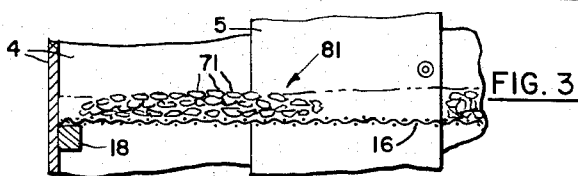


FIG. 3

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1

3,086,533

METHOD FOR CURING GREEN TOBACCO

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The invention relates to a method for curing green tobacco, that is, for removing moisture from the tobacco to the desired extent, developing the optimum color and the desired aroma, grain, taste, elasticity and general soundness for the type of tobacco being treated. The process in accordance with this invention is useful in curing those types of tobacco in which the stalk can be harvested with leaves still attached, for example those used for cigar filler and binder, burley and other similar varieties.

Contrary to the generally employed method of the prior art, the method of this invention is performed without stringing or spearing individual plants for inverted hanging on widely spaced support on racks, tiers and so forth during the curing. It will at once be appreciated that this vastly simplifies the tobacco harvesting problem since it is not necessary to expend the labor and care required for positioning the units of tobacco in elevated hanging structures, together with the costly later removal and stripping under unfavorable conditions. Further, physical damage is avoided by elimination of many highly skilled manual operations, weather damage or high temperature procedures and uniform, controllable environmental curing conditions are made practical to compensate for the varying rates of water removal and chemical change best suited for the curing of tobacco of different characteristics, as well as during the progress of the curing operation. In addition foreign matter such as earth and sand are removed.

The first step of the method of this invention comprises standing stalks of tobacco with wilted leaves still attached in a curing chamber with the plants leaning against each other. Tobacco leaves on the stalk become wilted about one hour after the stalk is harvested. For example, stalks will be positioned from 6 to 12 stalks per square foot of supporting area. As a practical matter, it is advantageous to place the bottom portions of the stalks on a horizontally positioned supporting screen. Conditioned air is directed at the butts, where the water tubes of the stalks are now cut and exposed. This air is caused to flow upwardly through the passages formed by the leaves, thus treating the greener upper leaves with attenuated air to avoid harsh dehydration on those immature leaves. Since it is desired to have the tobacco bend over in a curved shingled relationship as the curing proceeds, it is preferred to place the tobacco initially at an angle of from about 5° to 25°, advantageously 12° to 15°, from the vertical.

The conditioned air is introduced at a temperature within the range of from 65° to 125° F., preferably from about 75° F. to 100° F. This air will have a relative humidity of from about 30% to about 75%. In the initial, secondary and terminal stages of this curing, the relative humidity may be periodically elevated, in a cycling manner, up to 100% and lowered to the range of 30% to 75%. The rate of air flow through the bed will preferably be from about 10 to about 40 feet per minute and will be altered with the change in mass rigidity and curvature of the leaves as the curing proceeds. It is permissible and desirable to interrupt the flow of conditioned air periodically to establish recurring periods of moisture diffusion and equalization throughout the mass and as a self heating phase for example, of six to eighteen hours.

This curing step is not only accomplished with great economy and convenience, but further with superior cur-

2

ing results. Unexpectedly, a very high degree of uniformity in the curing rate of the tobacco leaves is achieved. This apparently results in part from the fact that the younger leaves, on the upper portion of the stalks, which are greener and which require more curing are subjected to greater heating and consequent yellowing due to the folding over of these leaves at the top of the stalk, to form a more compact mass. It will be noted that the butts of the stalks remain in the positions where originally placed. Thus selective temperature rise occurs due to the restricted air flow and evaporation in the more closely compacted portions of the mass as the folding over proceeds. Similarly, the heat generated within the tobacco itself by chemical conversions and respiration is retained in the degree desired in the basic yellowing or maturing action, in contrast to the more open areas surrounding the butts or lower zone of the tobacco mass. The tobacco product is thus made more uniform since the portions of the mass having the high concentration of relatively raw and unassimilated plant foods are urged selectively toward the desired ripeness.

It will be noted that the mass rests mainly on the large butt end of the stalks, particularly during the earlier portion of this step of the curing, when the weight is highest, since the initial angle of placement approaches the vertical. As the leaves contract, the angle to the horizontal lessens in accordance with that contraction to maintain the desired self compensating mass. The buoyant air flow upward, together with the internal shifting as the stalks and leaves recline will provide a beneficial environment for the individual leaves, in contrast to the former widely separated hanging which not only requires enormous and expensive structures but permits large volumes of uncertain air and/or moisture to course through the opening spaces as the shrinkage proceeds. Thus a favorable microclimate surrounds each leaf, as opposed to the damaging wind currents which cause inferior curing and even mechanical damage in the present system. It will be further observed that only a fraction of the weight of the stalks is communicated to the leaves which is insufficient to cause tissue damage through pressure and excess trapping of the moisture and/or heat released as the curing progresses.

Further, the retention of the leaves on the stalks in essentially the same orientation as when growing during curing apparently results in a beneficial redistribution of moisture and food materials, so as to promote uniformity in the drying and curing functions. In this connection the force of gravity due to the disposition of the tobacco tends to balance capillary action. Correspondingly, the growth of upper leaves and suckers observed when stalks are hung in inverted position is impeded and thus the flow of plant food materials is not expedited from the always lighter lower leaves on the stalk. It will be noted that this form of placement of the leaves with the tips and relatively greener leaves upward is the same pattern under which the leaf grows and consequently the reversal of moisture and plant food translocation is facilitated. The balanced moisture condition is of importance to uniform curing since the important stoma which are responsive to moisture are caused to close in the more openly packed zones and remain open in the upper portions, thus providing effective avenues of passage for both moisture and the gases resulting from the curing chemistry.

In the first step the tobacco will be subjected to the conditioned air for a period of from about 4 to 10 days. During this period about 30% to about 60% of the initial green weight of the leaves will be dissipated and the leaves will have turned an appreciable yellow color, about 50% of the yellow character achieved before browning.

In the second stage of this process the stalks and leaves are cut, the leaves being cut across their widths into

sections of, for example, 2 to 5 inches in length along the leaf stem. The cut stalk portions and foreign matter such as earth and sand are then eliminated. The cut leaf portions are subjected to further curing by being formed into a bed of, for example, 4 to 12 inches thick on a screen and having conditioned air passed through the leaf portions at a rate of from about 10 to about 40 feet per minute, the conditioned air having the properties described above in connection with the first mentioned step.

It will be noted that the stem portions of the leaves will lose their residual moisture in a rapid manner following this cutting, since the cell system has now arrived at or passed the point of death and correspondingly the flux of water is expedited toward the cut ends of these stem sections for ready evaporation. This second step is carried out until the tobacco leaves have lost additional weight equal to about 5% to about 50% of original green weight, a period normally of from five days to eight days.

The final step is the packing of the tobacco in chambers, boxes or bins having an arrangement for the natural flow of air upward through the tobacco. A simple bin with a screened bottom raised off the floor is adequate. Ambient air is satisfactory so long as the temperature is in the range of from 60° to 95° F. In this final operation the tobacco will be packed loosely to a depth of about 3 to about 6 feet and the remaining moisture will be equalized through the mass and will provide the fermenting condition required for natural heat generation to further the aging or mellowing of the leaf. The second step can be eliminated on rare occasions to the fully cured state well known to the art, for example when the tobacco is quite mature (yellow) when harvested, permitting the tobacco to complete its yellowing, browning and final moisture equalization accomplished in the above discussed final step.

The above described method can obviously be carried out in a wide variety of equipment so long as the above described conditions are met. It will be possible to carry out the claimed method in certain areas by employing relatively simple equipment installed simply in a curing shed appropriately partitioned and employing only relatively inexpensive blowers. Where the required conditions cannot be maintained, air conditioning apparatus will be required. Since the employment of the latter apparatus gives the greatest control, typical installation suitable for carrying out the method of this invention is described below and will be made clear from a reading of the following description read in conjunction with the drawings in which:

FIGURE 1 shows a suitable curing chamber apparatus partially broken away; and

FIGURE 2 is a schematic view partially broken away of a suitable cutting device.

FIGURE 3 is a fragmentary view of the structure of FIGURE 1 showing the employment of the structure of FIGURE 1 for treating cut tobacco leaves.

Referring to FIGURE 1, a curing chamber 2 has side walls 4, one of which is provided with an access door 5, top and 6 and a floor 8. Air conditioning apparatus 10 supplies suitably conditioned air through a series of conduits 12 (only one of which is shown) each of which is provided with registers 14 for discharging the air upwardly. A horizontal screen 16 supported on member 18 is employed for supporting the tobacco. A return duct 20 communicating with the upper part of chamber 2 and controlled by a valve 22 recirculates air back to air conditioning apparatus 10. An exhaust duct 24 has mounted therein a blower 26 and is provided with a control valve 28 for exhausting air to the atmosphere. Conduit 30 having a valve 31 provides for an exhaust of air from below screen 16 to the upper portion of chamber 2 when desired and particularly when the curing has substantially advanced and it is desired to circulate more conditioned air generally than can be passed upwardly through the tobacco

leaves due to their progressive nestling, thus reducing the air passages between the leaves. The air entering the upper portion of chamber 2 can be exhausted to the atmosphere through duct 24 or returned to conditioning apparatus 10.

As illustrated in FIGURE 1, the tobacco 32 having leaves 34 on stalks 36 is supported directly on the screen at angle. The showing of FIGURE 1 is typical of the commencement of the first curing step. As described above, as the curing proceeds the stalks tend to lean at more of an angle to the vertical.

Suitable apparatus for carrying out the cutting of the stalks and leaves in the second step of the claimed process is disclosed. A conveyor 50 carries tobacco 32 disposed lengthwise of the conveyor and feeds it to a position above a fixed cutter member 52 which is adapted to cooperate with a rotary cutter 54 to cut the stalks and leaves. The severed portions drop onto a plate 58 by which they are conveyed to an air separator 60.

Air separator 60 is provided with air at proper velocity from a blower 64 having an air inlet opening 62 from which it moves upwardly through a conduit 66, past spring biased door 68, biased by a compression spring 70. As the air moves upwardly, it hits the cut portions 71, which are the portions of the tobacco leaves which it is desired to retain. The upper end of separator conduit 70 discharges the desired leaf portions into a container 74 in which they are carried to be discharged onto a screen 16 of a chamber identical with chamber 2. Excessively light material will be blown across the top of container 74 and hence rejected.

The undesirable scrap including the portions of stalk, earth, sand and any other relatively heavy foreign matter which is too heavy to be carried upwardly by the stream of air drops downwardly through opening 76 in a container 78.

The spring biased door 68 will be kept closed by the force of the air when air separator 60 is being operated. When the flow of air is cut off, spring 70 is strong enough to open door 68 providing for the discharge through the open door of any matter which should drop back into conduit 66.

The second step of the claimed method can be carried out in the apparatus of FIGURE 1, the bed 81 of the separated out tobacco leaf portions being formed on screen 16. Similarly, the final step in the method can be carried out in the apparatus of FIGURE 1 normally with the conditioning apparatus 10 inactivated, valves 22 and 31 closed and valve 28 open. For the final step a bin having its bottom in the form of a screen is adequate if air can circulate naturally up through the screen.

What is claimed is:

1. The steps in the method of curing tobacco which comprises standing up on a foraminous support harvested stalks of green tobacco with the leaves secured to the stalks, the stalks being at a slight angle to the vertical, passing conditioned air at a temperature of from about 65° F. to about 125° F. upwardly through the tobacco stalks until from about 30% to about 60% of the initial green weight of the leaves is lost, cutting the leaves into a plurality of sections and severing the leaves from the stalk and subjecting the sections of the leaves to conditioned air having a temperature within the range of from about 65° F. to about 125° F. until the leaves have lost additional weight equal to from about 5% to about 50% of original green weight of the leaves.

2. The method of curing tobacco which comprises standing up on a foraminous support harvested stalks of green tobacco with the leaves secured to the stalks, the stalks being at a slight angle to the vertical, passing conditioned air at a temperature of from about 65° F. to about 125° F. and having a relative humidity of from about 30% to about 75% upwardly through the tobacco stalks until from about 30% to about 60% of the initial green weight of the leaves is lost, cutting the leaves into

5

a plurality of sections and severing the leaves from the stalk and subjecting the sections of the leaves to conditioned air having a temperature within the range of from about 65° F. to about 125° F. and having a relative humidity of from about 30% to about 75% until the leaves have lost additional weight equal to from about 5% to about 50% of original green weight of the leaves.

3. The method of curing tobacco which comprises standing up on a foraminous support harvested stalks of green tobacco with the leaves secured to the stalks, the stalks being at a slight angle to the vertical, passing at the rate of from about 10 to about 40 feet per minute conditioned air at a temperature of from about 65° F. to about 125° F. upwardly through the tobacco stalks until from about 30% to about 60% of the initial green weight of the leaves is lost, cutting the leaves into a plurality of sections and subjecting the sections of the leaves to conditioned air having a temperature within the range of from about 65° F. to about 125° F. until the leaves have lost additional weight equal to from about 5% to about 50% of original green weight of the leaves.

4. The method of curing tobacco which comprises standing up on a foraminous support harvested stalks of green tobacco with the leaves secured to the stalks, the stalks being at a slight angle to the vertical, passing conditioned air at a temperature of from about 65° F. to about 125° F. upwardly through the tobacco stalks until from about 30% to about 60% of the initial green weight of the leaves is lost, cutting the leaves into a plurality of sections and curing the sections of leaves in a ventilated bin at ambient temperature.

5. The method of curing tobacco which comprises standing up on a foraminous support harvested stalks of green tobacco with the leaves secured to the stalks, the stalks being at a slight angle to the vertical, passing conditioned air at a temperature of from about 65° F. to about 125° F. and having a relative humidity of from about 30% to about 75% upwardly through the tobacco stalks until from about 30% to about 60% of the initial green weight of the leaves is lost, cutting the leaves into a plurality of sections and curing the sections of leaves in a ventilated bin at ambient temperature.

6. The method of curing tobacco which comprises standing up on a foraminous support harvested stalks of green tobacco with the leaves secured to the stalks, the stalks being at a slight angle to the vertical, passing at the rate of from about 10 to about 40 feet per minute conditioned air at a temperature of from about 65° F.

6

to about 125° F. upwardly through the tobacco stalks until from about 30% to about 60% of the initial green weight of the leaves is lost, cutting the leaves into a plurality of sections and curing the sections of leaves in a ventilated bin at ambient temperature.

7. The steps in the method of curing tobacco which comprises standing up on a foraminous support harvested stalks of green tobacco with the leaves secured to the stalks, the stalks being at a slight angle to the vertical, passing conditioned air at a temperature of from about 65° F. to about 125° F. upwardly through the tobacco stalks until from about 30% to about 60% of the initial green weight of the leaves is lost.

8. The steps in the method of curing tobacco which comprises standing up on a foraminous support harvested stalks of green tobacco with the leaves secured to the stalks, the stalks being at a slight angle to the vertical, passing conditioned air at a temperature of from about 65° F. to about 125° F. and having a relative humidity of from about 30% to about 75% upwardly through the tobacco stalks until from about 30% to about 60% of the initial green weight of the leaves is lost.

9. The steps in the method of curing tobacco which comprises standing up on a foraminous support harvested stalks of green tobacco with the leaves secured to the stalks, the stalks being at a slight angle to the vertical, passing at the rate of from about 10 to about 40 feet per minute conditioned air at a temperature of from about 65° F. to about 125° F. upwardly through the tobacco stalks until from about 30% to about 60% of the initial green weight of the leaves is lost.

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