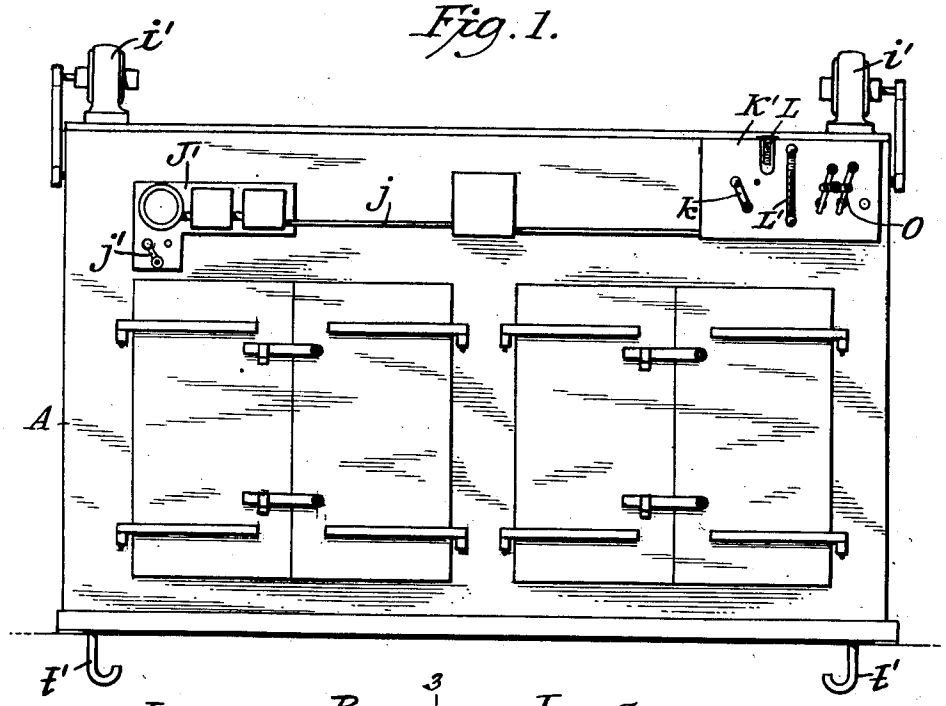
April 12, 1932. G. D. HARRIS 1,853,423

ART OF CASING TOBACCO

Filed Nov. 28, 1928 3 Sheets-Sheet 1

Fig. 1.



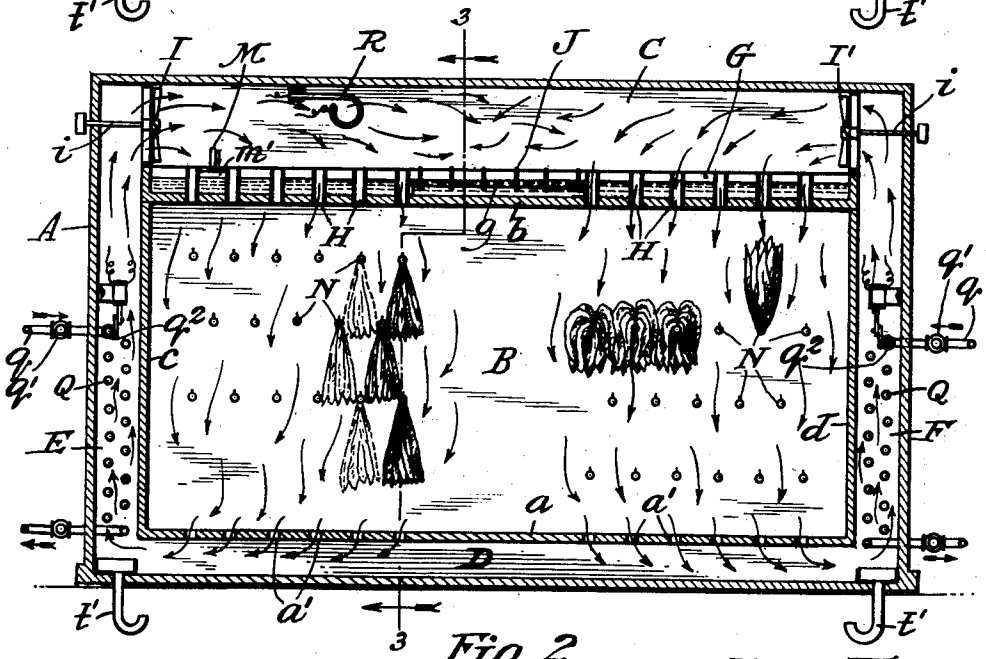


Fig. 2.

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ART OF CASING TOBACCO

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Fig. 4.

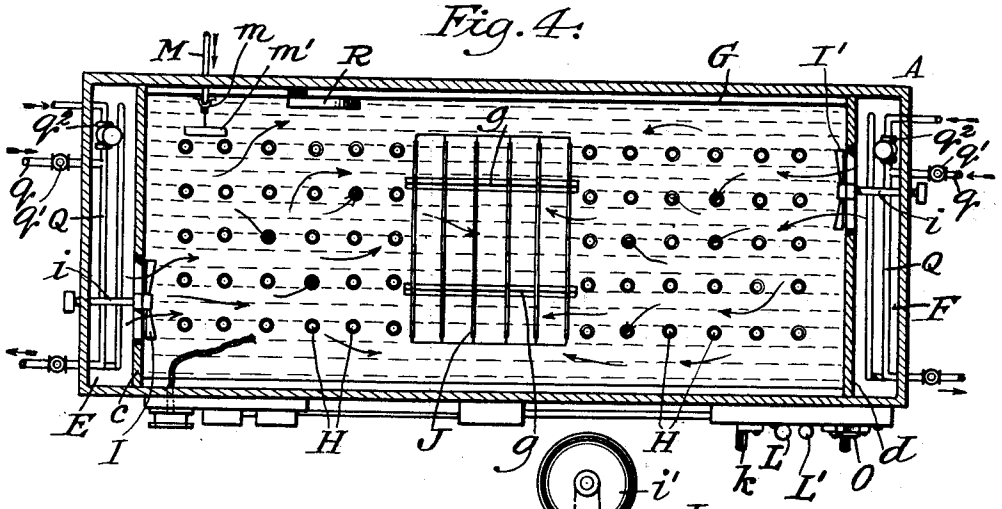
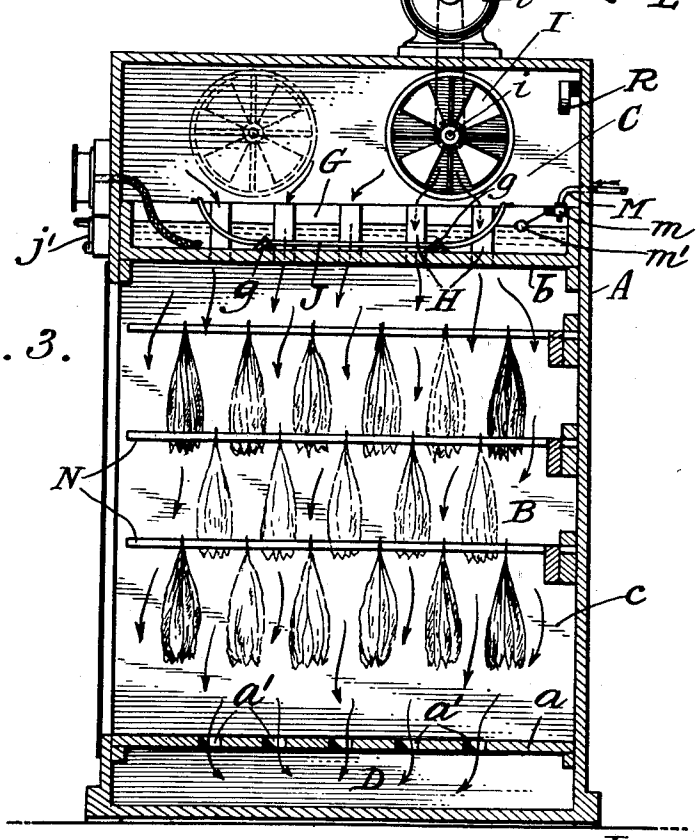


Fig. 3.



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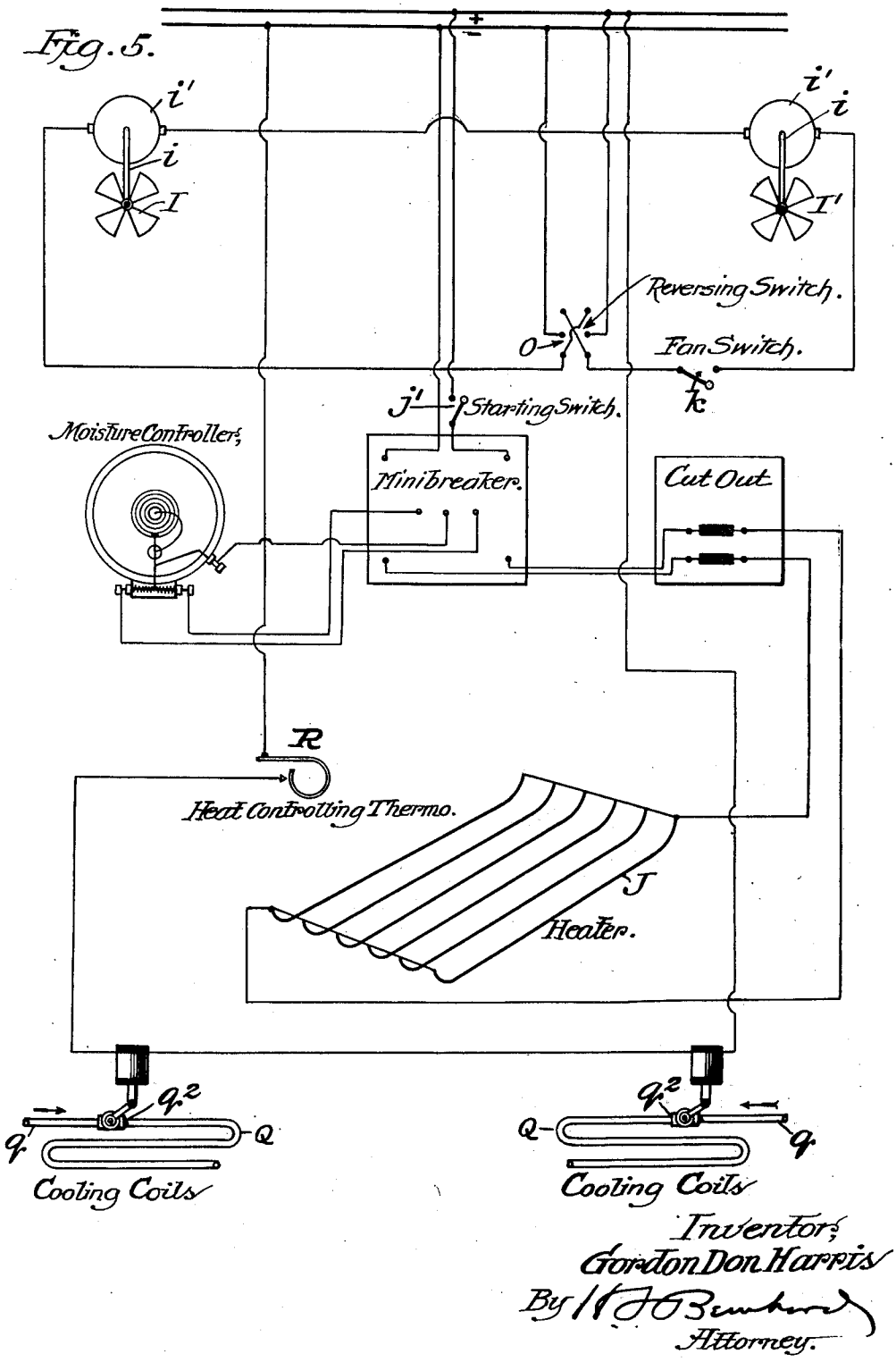
April 12, 1932. G. D. HARRIS 1,853,423

ART OF CASING TOBACCO

Filed Nov. 28, 1928 3 Sheets-Sheet 3

Fig. 5.



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Patented Apr. 12, 1932 1,853,423

UNITED STATES PATENT OFFICE

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ART OF CASING TOBACCO

Application filed November 28, 1928. Serial No. 322,432.

This invention is a process of and apparatus for casing tobacco, but in a broad sense, the invention is useful for conditioning material and products other than tobacco, such as gloves in the course of their manufacture, as well as for humidifying other substances and products generally.

The invention will be described more particularly for conditioning tobacco while in the dry leaf condition, known in the trade as a "hand", and comprising a number of dried leaves assembled in a bundle or mass secured by tying in one way or another the stems of the assembled leaves, so as to leave free and unconfined all the dried leaves for substantially the length thereof. The conditioning of the tobacco in leaf form is prior to the operations known as "stripping".

According to my invention, the bunches or hands are permeated with moisture, each leaf being conditioned by moisture penetrating the stem and the petiole and diffused into the fibres of the blade thereof; in fact, the moisture penetrates into all parts of the individual leaves, changing the physical characteristics from a dry condition (wherein the tobacco when handled tends to break or crumble easily), to a pliable and flexible condition susceptible of handling without risk of fracture so desirable, or even necessary, in the subsequent manipulation by hand or machinery for conversion into a desired tobacco product. Leaf tobacco conditioned in accordance with my invention is of such a flexible character that it may without breaking or injury, be folded, compacted and compressed within the hand, and thereafter be smoothed out into a flat form, exhibiting no fractures or breaks and with the individual leaves complete and intact, a condition sought after in this art for many reasons, chiefly because of the capacity for economically working the leaves into products, such as cigars, or the like.

The product resulting from my mode of procedure is characterized by the permeation with moisture throughout all parts of the individual leaves, including the stem, the blade or lamina, and the petiole connecting the blade with the stem; such permeation with moisture being interiorly of the various leaf parts as distinguished from moisture upon the surfaces of the leaf, such surface moisture tending to discolor, or "spot" the leaf, resulting in leaves of decreased commercial value.

In the casing of wrapper tobacco by the ordinary method, the shaking incident to opening the hands, and the so called "whipping" or shaking to remove excess moisture after dipping, tends to fracture the leaves to reduce the yield. This invention renders unnecessary this method, and effects a great saving in wrapper tobacco, though it is useful with other types of tobacco. A larger per cent of light colored wrappers are produced by this method than any heretofore known to me, and moreover, as above stated, the tobacco is free from water stain effecting a further saving to the manufacturer.

Broadly stated, my invention in the process as well as apparatus consists in exposing dry tobacco in leaf form to the influence of air substantially saturated with moisture at varying desired operating temperatures.

My invention consists, further, in the steps (*a*) of exposing dry leaf tobacco to the action of air saturated with moisture at a desired operating temperature, and (*b*) changing the temperature of the saturated air, either by increasing such temperature or decreasing such temperature, while continuing the exposure of the leaf tobacco to operating air saturated with moisture, with the result that the tobacco cased within a treatment or products chamber may be brought out at substantially the same temperature as that of the room in which the apparatus is located, thereby eliminating the loss of moisture from the tobacco, which occurs when the temperature of the tobacco and the temperature of the atmosphere in the room equalize.

In a practical mode of procedure, leaf tobacco is supported in one position or another within a products chamber, i. e., each hand is suspended downwardly from the tied end of the bundle, or is supported to extend upwardly from the tied end of the bundle, it being desirable for the leaves to be unconfined for practically the length thereof, to the end that the leaves in a free condition may assimilate

moisture carried into the presence of the leaves by air flowing within the products chamber.

The flowing air is saturated with moisture, i. e., the air is charged with water vapor to attain substantially one hundred per cent (100%) humidity, the saturated air being at a desired operating temperature. It is preferred for humidification of the operating air to generate water vapor separately from, or independently of, the flow of air, which air is used as a carrier for conveying moisture into the presence of, and into contact with, the tobacco leaves. Such generation of water vapor in one form of apparatus is attained by heat acting directly on water and to the exclusion of air, the heat units being radiated from coils or electric heaters into a water bath for effecting the vaporization of the water, whereby water vapor passes or flows from the water bath. The water vapor is picked up by, or charged into, the flowing air, the effect of which is primarily to saturate the flowing air with moisture, and, secondarily, to heat the flowing air to a determined temperature. Such steps of air humidification and air heating are conducted concurrently at one stage of the treatment, the heat and moisture imparted to the air being derived from a single source, i. e., warm water vapor.

The saturation of the gas with moisture may be accomplished, for instance, in accordance with any of the methods and by the apparatus described in my copending applications, Ser. No. 81,606, filed January 16, 1926; No. 101,868, filed April 14, 1926; No. 112,988, filed June 1, 1926; No. 204,157, filed July 8, 1927; and No. 204,507, filed July 9, 1927.

It may be stated, as a general proposition, that in my process, viewed in a broad aspect, the temperature of the operating air is a vital factor, i. e., one salient feature is moisture saturated air at any desirable operating temperature. At an early stage in the tobacco conditioning operation, it is preferable to use moisture saturated air at a selected temperature, say of sixty degrees (60°) or seventy degrees (70°) Fahr., at a subsequent stage the temperature of the operating air is changed without variation in the moisture content of such air, the latter being still in a moisture saturated condition. Such change in the temperature may require an increase or a decrease; increased temperature may be desirable, and in such a situation more heat is supplied to bring the operating air to the outside room temperature, or if a lower temperature is desirable, the operating air is cooled to bring it substantially to the outside room temperature by the action thereon of a cooler positioned in the path of flow of the operating air.

In one form of my apparatus, water vapor emanates from a bath into a humidifying chamber or duct contiguous to the tobacco-containing chamber (products chamber), and air is circulated mechanically for effecting the flow from the humidifying chamber or duct into the products-chamber, so as to set up a recirculation within the specified chambers, the effect of which is to charge the flowing air with water vapors in the one chamber and to give off moisture to the tobacco in the other chamber.

In humidifying tobacco, I utilize air saturated to approximately one hundred per cent (100%) humidity, the operating air being maintained at a desirable temperature, and air so conditioned flows into contact with dry tobacco hands present within the products-chamber. The exposure of tobacco in dried leaf form to the action of moisture saturated air is attended by an assimilation of moisture present in the air by the dry tobacco. The moisture permeates the stems and petiole of each leaf and is diffused to all parts of the tobacco leaves, including their blades or laminæ, and imparting the desirable flexibility or pliability to the individual leaves of each bunch.

The direction of flow of the mechanically circulated air possessing a high moisture content is from the humidifying chamber to the products-chamber and thence back to the humidifying chamber, the circulated air thus carrying moisture to the dried tobacco for assimilation thereby.

Owing to the bunched condition of the tobacco leaves, it is found that the leaves on the outside of the bundle, and the free end portions of all the leaves, will attain a certain moisture content, whereas leaves on the interior of the bundle will not assimilate moisture so readily. Accordingly, it is preferred to reverse the direction of flow of the conditioned air after it shall have been circulated for a given time in one direction. The effect of the reversal of the air flow is to apply pressure upon the partially humidified leaves of each bundle, and thus to spread or disperse such leaves and to open upon the bundle, whereby the leaves on the inside of the bundle are exposed to contact more fully with the conditioned air. The treatment is thus facilitated and all the leaves comprised in the bundle are charged uniformly and thoroughly with moisture.

A form of apparatus for carrying into practice the process of conditioning tobacco in leaf form is shown in the accompanying drawings, wherein—

Figure 1 is an elevation of the machine.

Figure 2 is a vertical section taken longitudinally through the machine, and

Figure 3 is a vertical cross section thereof.

Figure 4 is a horizontal sectional view taken through the upper conditioning chamber of the apparatus shown in the preceding

figures and illustrating the construction of the water vapor generator.

Figure 5 is a diagrammatical representation of the electrical circuit employed for controlling the operation of the apparatus herein described.

Referring to the drawings, A is a housing of appropriate dimensions, the interior of which is divided by horizontal partitions *a*, *b*, near the top and the bottom to form a products-chamber B, a humidifying chamber of duct C, and a return flue or chamber D. The housing is further divided interiorly by vertical walls *c*, *d*, to produce vertical return flues E, F, the latter having communication at their lower ends with flue or chamber D, whereas at their upper ends said vertical flues connect with the humidifying chamber or duct C. As shown, the floor or partition *a* of chamber B is perforated, at a^1, for the free flow of conditioned air out of chamber B into return flue or chamber D, hence the downflowing air divides and thence passes upwardly within the return flues E, F, and thence flows into the humidifying duct or chamber C, as indicated by the arrows in Figure 2.

Partition *b* constitutes the roof of products-chamber A and the floor of humidifying duct or chamber C. The partition *b* is a water-tight tank supported in the housing, said tank comprising a tank chamber G, the upper part of which is open for substantially the width and length of the housing, and said water tank having free and unobstructed communication with the duct or chamber C, whereby water vapor, in a warm condition emanating from the water present in the tank G, passes freely into the duct or chamber C, the latter constituting the humidifying chamber or air conditioning chamber.

Extending vertically within the water tank are short tubes H, the latter being fixed to partition *b* and extending upwardly within the tank above the level of the water therein.

Tubes H extend in series lengthwise and crosswise of the tank chamber G and of the duct or chamber C, and they open at their lower ends into the products-chamber B. The tubes act to prevent the downflow of liquid water from the water tank into the products-chamber, but the main purpose of said tubes is to distribute the moisture saturated air within the products-chamber in a manner to conduct such air into contact with all the tobacco hands, which hands are distributed in spaced order throughout the length, width, and depth of said products-chamber.

Air is circulated mechanically within the apparatus by the motion of appropriate fans or blowers, two of which are shown at I, I'. Said fans are mounted within the air conditioning chamber C, above the partition *b*, and adjacent the return flues E, F; said fans having shafts *i* extending horizontally to the outside of the housing, and said fans are driven through belts and pulleys from motors *i'*, supported on the roof of the housing, although the location of the fans and the driving mechanism therefor may be altered and modified by a skilled constructor.

According to my invention, water vapor is generated by heat in the presence of, and in contact with, water present in the tank G, the resultant water vapor rising from the water and passing into the air flowing within the flue or chamber C. Heaters for generating water vapor may vary in construction, and I may use pipes or coils for conveying steam or hot gases within the water for effecting the vaporization required for the production of the water vapor. In the embodiment of the invention illustrated herein, I have elected to disclose heaters which utilize electrical energy, and to this end the water vapor generator embodies a series of heating elements or units J, which are in the nature of electrical resistances each suitably encased from the access thereto of water and moisture. The heater units are immersed in the water of tank G, wherein they are supported as by ledges *g* rising from the tank bottom *b*, and said heater units are shown as arranged in relatively spaced order, crosswise of the tank floor. Electrical current is supplied and controlled by appropriate appliances. For example, the heater units are electrically connected with bus-bars *j* insulated from the housing and the tank, and ranging lengthwise of the apparatus, so as to constitute a source of common supply for all the heater units employed. Said bus-bars are associated with a control panel J' supported on the housing in an accessible position, said panel having the required electrical equipment such as a switch *j'*, for the manual control of current to the bus-bars and the heater units.

In Figure 5 of the drawings there is shown a diagrammatical representation of the electrical circuit employed in the apparatus herein described. As clearly shown in Figure 5 the moisture controller is electrically connected with the mini-breaker in such a manner as to connect the heaters with the source of electrical power or to disconnect the same therefrom. When the movable element of the moisture controller moves to one extreme position a circuit is established in the mini-breaker to move the armature of the breaker to close the circuit between the heaters and the power line and when the movable element of the moisture controller moves to the other extreme position a circuit is established to move the armature of the mini-breaker so as to open the circuit between the heaters and the power conduit. The structure diagrammatically shown in Figure 5 is conventional and may be varied in construction so long as the desired result of breaking and making

the circuit to the heaters is accomplished in accordance with the operation of the moisture controller.

Another control panel K′ is provided at the opposite end of the housing from panel J′, said panel K′ being equipped with a manually operable switch *k* for the control of current to the motors *i′* for driving the fans I, I′.. Provision is thus made for heat control through switch *j′*, and for air control (circulation) through switch *k*. It is desirable to control automatically the moisture saturation of air by charging such air with the water vapor generated by the vaporization of water through the heat emanating from the submerged heater units J. The temperature of the conditioned air, and the saturation (more or less) of such air by water vapor, is indicated by wet and dry bulb thermometers, mounted on control panel K′ in a position admitting of ready inspection and access. For controlling automatically the moisture of the air, the wet bulb thermometer L is in the form of an instrument (hydrodeik) connected with the units of the submerged heater J for arresting the service of said heater in the generation of water vapor when the instrument indicates a determined moisture content say one hundred per cent (100%) saturation of the operating air, said instrument being influenced by, or responsive to, the moisture present in the air.

The dry bulb thermometer L′ on panel K′ indicates the temperature of the moisture-saturated air. In this invention, no air heaters are provided for heating the air to a determined temperature, but in recirculating the air by the action of the fans I, I′, the air is charged with water vapor, emanating from the water present in the tank, and, accordingly, the air in the cycles of its recirculation is heated to a certain temperature by absorption of the water vapor, which temperature is indicated by the dry bulb thermometer, whereas the moisture saturation of the air is indicated by the hygrodeik.

Provision is made for replenishing the supply of water in the tank, for keeping the water at a level required to submerge the heater units. Water is supplied by a pipe M, leading from an appropriate source, and to this pipe is attached a valve *m* adapted to be opened by the drop of a float *m′* when the water descends below a determined level in tank G, although under normal conditions the float closes the valve and shuts off the inflow of water.

Dry leaf tobacco in the form of tied bundles or "hands" are supported by appropriate means within products-chamber B, said bundles being usually spaced apart in individual rows and the rows themselves being spaced horizontally and vertically in a manner to substantially fill the products chamber throughout the length, width and depth thereof. The bundles are desirably attached to rods or bars N which are supported demountably and fixedly within the products chamber, see Figures 2 and 3. The individual bundles are attached at the tied ends of their stems to the rods or bars, leaving unconfined the leaves of the individual bundles. Each bundle is in a dry condition at the initial stage of the humidifying or conditioning treatment, and said bundle may occupy either of the positions relatively to the supporting rod or bar shown in Figures 2 and 3, i. e., the bundle may hang downwardly from its point of attachment to the rod N, as seen at the left of Figure 2 and also shown in Figure 3, or the bundle may extend upwardly from the point of attachment to the rod N, as shown at the right in Figure 2. In either position of the bundle, air is circulated at one stage of the conditioning treatment to flow in a direction to avoid disturbance of the dried unconfined leaves, and at this stage, the dry leaves are conditioned by the assimilation of moisture so that the leaves become flexible, more or less. When the leaves are in a flexible condition they can without injury be spread or the bundle opened to fully expose the leaves to the accession of air and moisture, and such spreading is obtained in my invention at a subsequent stage in the treatment of the leaf tobacco by reversing the direction of flow of the conditioned air the pressure of which reversed air flow acts to open or spread the bundle for exposure of the leaves present interiorly of said bundle, as shown at the right of Figure 2.

For reversing the air current, I provide a reversing switch mechanism O positioned on the control panel J′ or K′, the operation of which switch drives the fan motors I, I′ in one direction, at one stage of the treatment, and in an opposite direction at a subsequent stage of the treatment, whereby the fans I, I′, are controllable for directing the flow of conditioned air within the products chamber in the required direction or directions to meet the requirements of the service.

In Figure 5 an electrical circuit is diagrammatically shown in which connections for reversing the direction of rotation of the fan motors *i′* are illustrated. For purposes of simplicity the motors are shown connected in series with the poles of a reversing switch O. It will be obvious that by actuating the switch O, the direction of flow of current to the motors *i′* will be reversed.

The tobacco under treatment within the products-chamber is exposed at one stage or another of such treatment to the action of air conditioned both as to temperature and humidity. The cased tobacco is removed from the products chamber following the expiration of the time devoted to the treatment, and such removal from the products-chamber takes place, ordinarily, into a room

or part of a factory the air in which room may or may not be conditioned as to humidity, but which air frequently is at a different temperature from the temperature of the operating air at the first, second, or other stages of the tobacco treatment. It is desirable in the interest of keeping the tobacco in an unchanged condition when removed from the products-chamber into the outside air, i. e., the air present in the room or apartment wherein the apparatus is located, and in my invention the tobacco when cased is further conditioned to bring it to a temperature corresponding to the temperature of the outside air, such further conditioning being obtained by changing the temperature of the tobacco product prior to removing such tobacco product from the products chamber. Such change in the tobacco temperature may require an increase in the temperature of the operating air or it may, and sometimes does, require a decrease in the temperature of the operating air, in order that the product may be in a condition or at a temperature corresponding, at least approximately, to the condition (temperature and humidity, either alone or conjunctively) of the outside air prevailing in the room into which the tobacco is stored when removed from the products chamber.

To meet the conditions of service, I provide the apparatus, in addition to the humidifier and the air circulating means, with cooling means positioned in the path or paths of flow of the humidified air, and when such cooling means are in service, the same act on the air to reduce the temperature to a determined point whereby the product temperature may be decreased to approximately the temperature of the air prevailing in the room outside the products-chamber. Said cooling means are shown as coils Q positioned within the return flues E, F, and with the coils are associated pipes q for feeding a cooling medium, such as cold water or other cooling agent, to said cooling coils. The flow of the cooling medium is shut off or set up by appropriate valves q' in the pipes q, and under certain conditions, the flow of the cooling agent is controlled automatically by a thermostat R positioned on one of the panels J′ or K′, and operatively connected with a valve q^2. Said thermostat R is exposed to the operating air flowing in the closed circulatory path afforded by the products-chamber, the humidifying chamber, and the flues or ducts, and such thermostat is influenced by and responsive to the temperature of the operating air for opening and closing valve q^2, whereby the flow of the cooling agent is controlled.

In Figure 5 the electrical connections between thermostat R, the motors for actuating the valves q^2 and the electrical power conduits are clearly shown. When the thermostat R moves to close the circuit the motors associated with valves q^2 will be actuated to move the valves to a determined position.

Assuming that the product at a certain stage in its treatment is at a temperature less than the temperature of the air in the room or apartment, it is desirable to continue the conditioning operation of the tobacco for a length of time for the operating air, humidified by water vapor, to impart to such product a temperature corresponding approximately to the room temperature, at the same time the air gives off moisture to be assimilated by the leaf tobacco. It happens, also, that the tobacco undergoing treatment is increased in temperature above the room temperature, and under such conditions, the cooler is brought into service, either automatically by the thermostat R, or by operation of valves q', to set up a flow of the cooling agent within the cooling elements Q. The operating air flowing into contact with the cooler is reduced in temperature, and such air, at the required humidity, flows into contact with the tobacco present in the products-chamber for reducing the temperature of the tobacco without, however, affecting its moisture content, the operating air being charged with humidity supplied by water vapor from the vapor generator. The water of condensation resulting from the contact of humidified air with the cooler is collected by a tray t below the cooler, and such water is discharged through a pipe or trap t'.

The operation is as follows: Water is supplied to tank G, and current is admitted to the heater units for the vaporization of water, the water vapor rising from the tank into the flue or chamber C. The machine is loaded or charged with tobacco "hands" in dry leaf condition, and thereupon the motors are operated to drive the fans in one direction, for setting up the flow of air downwardly upon the suspended bundles at the left of Figure 2, or upwardly against the bundles supported at the right of Figure 2, such air flow being in a direction to avoid disturbance of the dry tobacco at the initial stages of the casing treatment. At such initial stage, the flowing air has a low moisture content and is at the prevailing outside temperature, but the moisture content of the air undergoing circulation and recirculation, is progressively increased or built up by the increment of the water vapor supplied by the vapor generator. Due to the heat units given off by the heater submerged in the water tank, the air is conditioned both as to temperature and humidity. The air is recirculated to attain the desired moisture saturation, for the reason that at the initial stage the conditioned air is flowing through the products-chamber in one direction and into contact with the tobacco "hands" present therein, with the result that a certain percentage of moisture is assimi-

lated by the tobacco, resulting in a decrease temporarily of the moisture content, at once restored by the further increment of water vapor from the vapor generator. The generation of water vapor and the assimilation of moisture by the tobacco take place concurrently with the flow of air in one direction under the action of the fans, but at a desirable stage in the casing of the tobacco, the fans are driven in an opposite direction to reverse the flow of the conditioned air, the pressure of which on the unconfined flexible leaves of tobacco opens and spreads the bundles, for exposing the bundles interiorly thereof to the accession of moisture.

The operating air is substantially moisture saturated at all stages in the treatment of leaf tobacco, and at one or more of such stages, the operating air is at a determined temperature, which temperature is changed prior to the removal of the tobacco from the products-chamber, and which change in air temperature is desirable for bringing the tobacco to a temperature corresponding approximately to the prevailing temperature in the room into which the tobacco is removed from the products-room and in which room the tobacco is or may be stored for an appreciable time. Should the product temperature be less than the room temperature, the treatment by humidified air is continued for the time required to condition the tobacco and bring it to the room temperature. If it happens, however, that the tobacco temperature exceeds the room temperature, then it is desirable to decrease the tobacco temperature to bring it to approximately the room temperature. Such reduction is brought about by the action of the coolers brought into service either by operation of valves q', or thermostat R to set up the flow of the cooling medium in the coolers. The operating air flows into contact with the coolers and the temperature of the air is reduced without effect on the relative humidity of the operating air which remains substantially 100%, and the humidified air in a cooler condition flows into contact with the tobacco in a humidified condition, with the result that the product is reduced in temperature, also without appreciable effect on the moisture content of such humidified product.

In my invention tobacco is cased by the assimilation of moisture supplied thereto by air which is itself conditioned by moisture in the form of water vapor. The tobacco is permeated by moisture filling the pores and the cellular structure of all its parts, with the result that the tobacco is in such a pliable or flexible condition that it is susceptible of working without the possibility of injury to the leaf, thus contributing to the manipulation of the tobacco by hand or machinery in the manufacture of tobacco products.

It has been stated that my invention, in a broad sense, is useful in arts other than tobacco, as in the production of leather gloves, etc. For the treatment of such products, the product at one stage of its manufacture is placed in the products-chamber and exposed to the action of humidified air for a desirable period of time, to render pliable the leather components of the product and placing the product in a condition favorable for the subsequent manipulations required to complete the article.

It is to be understood that where the term saturated or saturation is used, that substantially saturated or substantial saturation is implied.

Having thus fully described the invention, what I claim as new and desire to secure by Letters Patent is:

1. In the art of humidifying materials, the process which consists in generating water vapor by the action of heat in the presence of water, substantially completely saturating air with the water vapor the heat in which conditions the air in the presence of the water vapor for the absorption of such vapor whereby the air is substantially completely saturated, and exposing the material to access by the moisture saturated air.

2. In the art of casing tobacco, the process which consists in exposing tobacco, in dry leaf form, to humidification in the presence of air substantially completely saturated with moisture by water vapor having the capacity for permeating the tobacco leaf in the several components thereof.

3. In the art of casing tobacco, the process which consists in setting up a flow of air, vaporizing water by the action of heat in the presence of water to the exclusion of air, thereby generating water vapor, charging the flowing air with water vapor to a substantially complete saturation, and exposing tobacco in leaf form to the access of the substantially complete moisture saturated air.

4. In the art of casing tobacco, the process which consists in substantially completely saturating air with water vapor the heat in which vapor conditions the air for carrying the water vapor, circulating the air so conditioned within a substantially closed chamber, and exposing tobacco in bundled form within said chamber to contact with the substantially completely saturated air, whereby the tobacco in the components thereof assimilates moisture from the conditioned air during such exposure within the chamber.

5. In the art of conditioning tobacco, the process which consists in exposing leaf tobacco at one stage of its treatment to the action of substantially completely moisture saturated air heated to a determined temperature, and at a subsequent stage exposing the tobacco to air substantially completely saturated with moisture at a lower temperature.

6. In the art of conditioning tobacco, the

process which consists in exposing leaf tobacco at one stage of its treatment to the action of air substantially completely saturated with moisture at a determined temperature, and at a subsequent stage exposing the tobacco to air substantially completely saturated with moisture at a higher temperature.

7. A conditioning device comprising a chamber, a partition spaced from and adjacent one end of the chamber, a partition spaced from and adjacent the other end of the chamber, said partitions extending from the top of the chamber to points adjacent to, but spaced from the floor of said chamber, spaced perforated partitions extending between the aforementioned partitions, spaced from the upper and lower walls of the chamber and forming a products compartment, the upper portion of the first mentioned partitions being provided with openings and means in said openings for circulating a gas through the products compartment and the compartments surrounding the same.

8. A conditioning device comprising a chamber, a partition spaced from and adjacent one end of the chamber, a partition spaced from and adjacent the other end of the chamber, said partitions extending from the top of the chamber to points adjacent to but spaced from the floor of said chamber, spaced perforated partitions extending between the aforementioned partitions, spaced from the upper and lower walls of the chamber and forming a products compartment, the upper portion of the first mentioned partitions being provided with openings, means in said openings for circulating gas through said chamber and products compartment and a vapor generator above the uppermost perforated partition for substantially completely saturating the gas with moisture.

9. A conditioning device comprising a chamber, a partition spaced from and adjacent one end of the chamber, a partition spaced from and adjacent the other end of the chamber, said partitions extending from the top of the chamber to points adjacent to but spaced from the floor of said chamber, spaced perforated partitions extending between the aforementioned partitions, spaced from the upper and lower walls of the chamber and forming a products compartment, the upper portion of the first mentioned partitions being provided with openings, means for circulating a gas through the products compartment and the compartments surrounding the same a tank positioned on the upper perforated partition adapted to contain a body of water, and means in said tank for heating the water to substantially completely saturate the gas with moisture.

10. A method of treating tobacco and materials requiring similar treatment to cause them to assimilate moisture comprising subjecting the material to conditioned air humidified solely by passing it over the surface of a body of heated water and controlling the temperature of the air by regulating the temperature of the water.

11. A process for conditioning material comprising generating water vapor by heating a body of liquid, passing a gas at substantially the same temperature as the liquid over the body of liquid to substantially completely saturate the gas with the vapors generated from the liquid body, then passing the conditioned gas in contact with material to be treated.

12. A process for conditioning material comprising supplying moisture to a conditioning gas by passing the gas over a body of water, heating the water to effect evolution of vapors to substantially completely saturate the gas solely from the water body, controlling the temperature of the gas solely by controlling the temperature of the water body, and then passing the conditioned gas while substantially completely saturated, in contact with material to be treated.

13. A process for conditioning material comprising circulating a gas in a closed circuit including a conditioning zone and a zone containing the material to be treated, passing the gas over the surface of a body of liquid, heating the liquid to vaporize the same, and controlling the rate at which heat units are supplied to the liquid body to effect substantially complete saturation of the gas with vapor and to affect the temperature of the gas, and passing the gas while substantially completely saturated with vapor in contact with the material to be treated, the saturation of the gas and the heating of the gas being effected exclusively by the heat supplied to the body of liquid.

14. A process of casing tobacco comprising generating water vapor by internally heating a body of water, cyclically passing a gas over the surface of the body of water to substantially completely saturate the gas with moisture and through a zone containing the tobacco to be treated for a time sufficient to render the tobacco so pliable that it may be worked without damaging the structure thereof.

15. A process of casing tobacco comprising generating water vapor by internally heating a body of water, cyclically passing a gas over the surface of the body of water to substantially completely saturate the gas with moisture and through a zone containing the tobacco to be treated and maintaining the gas at a desired temperature and substantially completely saturated with moisture by regulating the temperature of the body of water.

16. A process of casing tobacco comprising generating water vapor by internally heating a body of water, cyclically passing a gas over the surface of the body of water to substantially completely saturate the gas with mois-

ture and through a zone containing the tobacco to be treated, and subsequently changing the temperature of the tobacco to the temperature of a zone to which it is to be removed by modifying the temperature of the gas until it is substantially equal to the temperature of the zone.

17. A process for conditioning materials comprising generating water vapor by internally heating a body of liquid, cyclically passing a gas at substantially the same temperature as the liquid over the surface of the body of liquid to substantially completely saturate the gas with vapors generated by heating the liquid, and passing the substantially completely saturated gas in contact with the material to be treated.

18. A process of conditioning material comprising moving a gas along the surface of a body of liquid, heating the liquid to heat the gas to substantially the temperature of the liquid and to substantially completely saturate the gas with vapor, and causing the saturated heated gas to flow over material to be treated.

In testimony whereof I have hereto signed my name this 23rd day of November, 1928.

GORDON DON HARRIS.