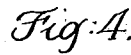


1,304,539.

Fig:1.



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DENARCOTIZING TOBACCO.

1,304,539.

Specification of Letters Patent.

Patented May 27, 1919.

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To all whom it may concern:

Be it known that I, HUGO BRINKHAUS, a citizen of the United States, residing at the borough of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Denarcotizing Tobacco, of which the following is a specification, reference being had therein to the accompanying drawings, forming part thereof.

My invention relates to denarcotizing tobacco, and the term "denarcotize" is used in the sense of removing or freeing from narcotics. Tobacco, as is well known, contains certain volatile narcotic poisons, among which is nicotin, and it is the object of my invention to remove the narcotics from the tobacco, particularly from smoking tobacco and that of cigars, without destroying the aroma or the flavor, which latter are due to the presence of constituents of a less volatile nature than is nicotin and its allied poisons.

Various attempts have heretofore been made to accomplish this result, but so far as I am aware none of these attempts have succeeded in producing practical and satisfactory results. According to the preferred method of carrying out my invention the tobacco, which may be in the form of cut-up leaves, or it may be the uncut leaves, or it may be in the form of made up cigars, is subjected to a continuous stream or draft of a suitable mixture of steam and air at a pressure at or above that of the atmosphere and at a temperature at or above that required for volatilizing the nicotin and its allied poisons but below that required to volatilize or which would destroy the aromatic substances which give the tobacco its fragrance and flavor. The air, of the proper temperature and preheated or not, as desired, is mixed with the steam in suitable regulated quantities according to the nature of the tobacco being treated and also so as to obtain the required low temperature of the mixture without condensation of the steam at a pressure at or above that of the atmosphere.

I shall now describe my invention with reference to the two different forms of apparatus illustrated in the accompanying drawings as embodiments thereof and as means for carrying out the process involved therein.

Figure 1 is a longitudinal central vertical section of one form of the apparatus.

Fig. 2 is a vertical transverse section thereof on planes indicated by the offset line 2—2 of Fig. 1 as viewed from the right.

Fig. 3 is a partial end elevation of parts of the mechanism as viewed from a vertical plane indicated by the line 3—3 of Fig. 1, as viewed from the left.

Fig. 4 is a view similar to Fig. 1 of a modified form of apparatus.

Fig. 5 is a partial transverse vertical section on a plane indicated by the line 5—5 of Fig. 4 as viewed from the left.

The apparatus illustrated in Figs. 1, 2 and 3 of the accompanying drawings as an embodiment of my invention and for carrying out the method involved therein will now be described. A double-walled chamber is provided having inner and outer walls 1 and 2, shown as of metal, spaced apart throughout, as appears in the drawings. The inclosed space within the inner wall 1 of the chamber may be externally heated by means of a heating medium, such, for example, as steam, or heated air, circulated at the outside of the inner wall 1 in the space between the inner wall 1 and the outer wall 2. The heating medium may be admitted to the lower part of the space between the inner wall 1 and the outer wall or jacket 2 by means of an inlet pipe or conduit 3, shown as entering the lower part of this outer space at one end thereof, and having therein an ordinary combined supply valve and controlling valve 4. The used heating medium, after it has parted with its heat, and including the water of condensation in case such heating medium is steam, is permitted to escape from the lower part of the heating space between the chamber wall 1 and jacket 2 through an outlet pipe or conduit 5 provided with an ordinary combined shut-off and regulating valve 6. Also if desired the heating medium may be permitted to escape from the top or upper part of this intervening space through another outlet pipe 7, provided with a similar valve 8, thereby providing means for quickly reducing the temperature or for quickly discontinuing the heating of the chamber in case this should become desirable. To prevent waste of heat and also to assure the proper or desired heating from the outside of the interior space inclosed by the chamber wall 1, so as to prevent or control condensation therein, the outer wall 2 or jacket may be provided

throughout with a covering 9 of insulating material, such, for example, as sheet asbestos.

The tobacco to be treated is supported within the chamber 1 at an intermediate or middle point between the top and bottom thereof, and, in the apparatus illustrated in the drawings, is adapted to be contained within a longitudinally extending cylindrical container or drum of sufficient length and diameter effectively to fill or close the chamber, this drum being adapted to loosely contain the tobacco leaves or shorts. The cylindrical part 10 of this drum should consist of suitable perforated, reticulated or other foraminated material, and is shown in the drawings as reticulated and as formed from woven wire or wire screen. The foraminous or foraminated cylindrical part 10 of the tobacco-containing drum is carried by metallic end disks or heads 11 and 12, shown as fixed upon a drum shaft 13 by means of pins 14.

The tobacco-containing drum, having the foraminated or reticulated cylindrical part 10 and the front and back ends or heads 11 and 12 carried by the shaft 13, is mounted in and carried by a slidable frame or drawer so that the drum may be withdrawn or pulled out when desired, for putting in the tobacco to be treated and for taking it out when the operation is completed, as well as for occasional inspection, if desired. This drawer-like frame is open at the top and bottom and is shown as having sheet metal sides 15, an inner end 16 and a double-walled outer end having spaced inner and outer walls 17 and 18. The inner and outer walls 17 and 18 of the front end or outer end of the drum-carrying frame or drawer are shown as joined at their margins by a tapered or inwardly inclined connecting web 19 which coöperates with a similar tapered or inclined connecting web or wall 20 which joins the inner and outer walls 1 and 2 of the chamber at the opening provided for the drum-carrying frame or drawer, thereby producing at this point a hermetic seal for the chamber formed within the inner wall 1. These inclined or tapered surfaces of the connecting webs 19 and 20 are thus held in sealing relation by means of buttons or clamps 21 provided with thumb screws 22, the outer end wall 18 being shown as projecting marginally beyond the tapered web 19 so as to overlap upon the outer side of the outer chamber wall 2, as appears in Fig. 1 of the drawings. The outer end wall 18 is provided with a handle knob 23 for pulling the slidable frame or drawer out of the chamber. The sides 15 of this slidable drum-carrying frame are shown as provided along their lower edges with inturned supporting flanges 24 which rest upon and are adapted to slide along angular guide strips 25 secured to the side of the chamber wall 1.

The reticulated drum part 10 is shown, as appears in Fig. 2, as provided with a door having a handle, this door, as will be readily understood, being for gaining access to the interior of the drum.

Automatically-acting means now to be described are provided for agitating or stirring up the tobacco leaves or shorts, in the drum while they are being treated, and this is accomplished by imparting to the drum both a slow rocking or oscillating movement and also at the same time a more rapid longitudinal reciprocative or shaking movement. The drum shaft 13 is mounted for both rotative and longitudinal movement in bearings carried by the ends of the slidable frame or drawer. One of these bearings for the drum shaft 13 is an inner bearing member 26 which is firmly secured, for example by means of pins or rivets as appears in Fig. 1, to the inner side of the inner end wall 16 of the slidable drum-carrying frame. A bearing 27 for the forward end of the drum shaft 13 is similarly secured to the inner side of the inner wall 17 of the outer end of the slidable frame. A coiled thrust spring 28 surrounds this forward bearing sleeve 27 and the adjacent portion of the drum shaft 13 and abuts against a flange shown as formed on the bearing 27 and thrusts against the outer end or head 11 of the drum, this head 11 being shown as offset inwardly at 29 to provide sufficient space for the spring 28, as clearly appears in Fig. 1. The rear head 12 of the drum is shown as provided with a similar inwardly offset part 30 for receiving a toothed ratchet member 31 which is shown as fixed therein by means of a set screw 32. The abutting contiguous faces or sides of the hereinbefore described bearing member 26 and of the ring 31 are provided, as is shown in Fig. 1, with interfitting or interengaging inclined teeth, shown as of a V-shape.

The rear end of the drum shaft 13 is provided with a squared end portion 33 which projects rearwardly beyond the frame end 16 through the inner wall 1 of the chamber and is adapted to be removably and slidably received in a socket member 34. The socket member 34 is rotatively mounted in a bearing 35 and projects rearwardly to the outer side of the outer chamber wall 2 where it is provided with an operating disk 36. The operating disk 36 is provided with an operating pin 37 which is connected by means of a connecting rod 38 with a crank pin 39 projecting from a crank disk 40 which is rotative with a pulley 41, the crank disk 40 and pulley 41 being mounted upon a bearing stud 42 projecting from the rear face of the outer casing wall 2, as appears in Fig. 1. It is to be noted in this connection that the operating pin 37 is located farther from the center of the operating

disk 36 than the crank pin 39 is from the center of the crank disk 40, this difference being such that each complete rotation of the crank disk 40 will produce in the operating disk 36 a partial rotation in opposite directions or oscillation amounting to about one-fourth of a complete rotation, or through an angle of substantially ninety degrees for each complete rotation of the crank disk 40, as clearly appears in Fig. 3. The crank disk 40 is adapted to be continuously and automatically rotated as desired by means of an electric motor 43 having a small pulley 44 connected to the larger pulley 41 by a belt 45, for thereby imparting desired slow rocking movement to the operating disk 36, which is thence transmitted, as will be readily understood, through the socket member 34 to the drum shaft 13 and drum parts carried thereby.

The slow rocking movement imparted to the tobacco-containing drum will cause the contents thereof to tumble or roll from one side thereof to the other and thereby to become more or less turned over and stirred. If the construction were such that the drum made a complete rotation, then the contents thereof would have a tendency to pile up at one side of the shaft 13, and thereby to leave an open or unfilled space at the other side of the drum which would permit large quantities of aeriform fluid, such as the hereinbefore mentioned mixture of steam and air, to pass upward in the drum-containing chamber 1 and escape without coming in contact with the tobacco and would occasion a big loss of such fluid, as will be readily understood. This oscillating or rocking movement of the tobacco-containing drum oscillates the toothed ring 31 upon the similarly toothed bearing member 26 so that at each swinging or angular movement of the drum the teeth of the ring 31 will ride over those of the bearing member 26 and will be immediately again pressed into engagement therewith by the thrust spring 28, thereby, as will be readily understood, imparting a rapid longitudinal to and fro or reciprocating shaking movement to the tobacco-containing reticulated drum. This rapid shaking movement keeps the tobacco in a loose condition so that the aeriform fluid may readily pass through and into intimate contact with all parts thereof. Also this shaking or rapid agitation prevents the sticking together of the tobacco leaves.

In order to provide space for the endwise shaking movement of the drum, the inner wall 17 of the outer end of the drum-carrying frame is offset outwardly and is provided with an inwardly extending annular flange 46 into which the drum end 11 is adapted to slide. For the purpose of providing an effective seal at the ends of the longitudinally movable drum, similar arcu-

ate drum-receiving flanges 47 and 48 are provided above and below the ends of the drum so that no free space for the passage of fluid will be provided at the ends of the longitudinally movable drum. The flanges 47 for receiving the inner end 12 of the drum are secured to the adjacent face of the inner end 16 of the slidable drum-carrying frame and the similar flanges 48 for receiving the outer head 11 of the drum are similarly secured to a flat annular part 49 of the forward frame wall 17 and which connects the annular end flange 46 with the hereinbefore described tapered or inclined sealing web 19, as appears in Fig. 1 of the drawing. It is to be noted in this connection that the reticulated cylindrical part 10 of the drum fits closely within or between the side walls 15 of the slidable drum-carrying frame, so that there is no free space left for the passage of aeriform fluid excepting through the drum and consequently through the tobacco contained therein.

The means for supplying a suitable aeriform fluid to the action of which the tobacco contained in the drum is subjected will now be described. The aeriform fluid for treating the tobacco is discharged into the lower part of the chamber 1 below the tobacco-containing drum through a plurality, shown as four in number, of similar conduits or pipes 50, 51, 52 and 53 of graduated varying lengths, as appears in Fig. 1, and provided respectively with similar discharge ends or nozzles 54, 55, 56, and 57 arranged in opposed pairs, as is shown in Fig. 1, this arrangement being adopted for the purpose of breaking up the jets so as to distribute substantially equally the aeriform fluid, such as the hereinbefore described mixture of air and steam, for thereby assuring that all parts of the tobacco contained in the drum are similarly treated. Also the plurality of similar pipes 50, 51, 52 and 53 assures substantially equal supplies of fluid to the respective discharge ends or nozzles 54, 55, 56 and 57. The inlet pipes 50, 51, 52 and 53 pass through the inner and outer chamber walls 1 and 2, being shown as arranged one above the other, and at the outside of the outer wall 2 are provided respectively with regulating valves 58, 59, 60 and 61 by which independent regulation of the treating fluid may be effected. Outward from the regulating valves all of the inlet pipes 50, 51, 52 and 53 are connected to or originate in a single large pipe or header 62 from which all of the smaller inlet pipes receive their supply of the aeriform fluid to which the tobacco is to be subjected.

The header pipe 62 is provided with two supply pipes 63 and 64 shown as connected to the opposite ends or to the upper and lower ends thereof. The upper supply pipe

63 is provided with a combined regulating and supply valve 65, and the lower supply pipe 64 is provided with a similar valve 66. These independent supply pipes 63 and 64 opening into or communicating with the common header pipe 62 provide for the mixing together of different kinds of aeriform fluids, such, for example, as steam and air, which may be heated to the extent desired. For example, the lower supply pipe 64 may convey dry steam while the upper supply pipe 63 conveys air to become mixed with the steam in the common header pipe 62 from which the mixture of air and steam is supplied through the inlet pipes 50, 51, 52 and 53. The proportions of the air and steam may be controlled by means of the valves 65 and 66. Also, if desired, the supply of either one of these fluids may be shut off entirely and the other fluids used alone, and under some conditions or at some stages of treatment, as will hereinafter appear, this is desirable and the apparatus is operated in this way.

During the denarcotizing treatment a mixture of steam and air is employed, the proportions and temperature of the mixture being determined by the condition and nature of the tobacco being treated. The steam may be supplied from an ordinary boiler and the air may be supplied by an ordinary air compressor or suitable pump of any type and the heating thereof, if desired, may be effected in any convenient way. The means for supplying or providing these aeriform fluids being well known need not be illustrated nor further described. If desired steam may be supplied to the pipe 3 for heating the chamber 1 and to the pipe 64 for treating the tobacco, from the same source or boiler, but preferably these supplies should be taken from different sources.

An outlet pipe 67 is connected with the inner chamber 1 above the tobacco-containing drum adjacent to the top of the chamber and permits the escape from the chamber of the used mixture of air and steam, together with the volatilized substances carried thereby. Suitable regulation of the escape of the fluid may be effected by means of an ordinary valve 68 in the outlet pipe 67 and if desired this valve may be entirely closed so as to prevent any escape of fluid from the inner chamber 1, but usually this valve 68 would be open to a greater or less extent.

If desired, the used fluid together with the volatilized substances may be discharged from the outlet pipe 67 directly into the atmosphere through an upstanding discharge pipe 69 which is provided with a valve 70. However, in view of the fact that the volatile substances which are extracted from the tobacco leaves are of a noxious nature, be-

ing both disagreeable and poisonous, it would ordinarily be preferable to close the escape valve 70 and to deliver the used aeriform fluid and the volatilized substances through a downwardly directed pipe 71 into a vessel 72 containing water for condensing the vapors and volatilized substances. This condenser pipe 71 is shown as provided with a valve 73.

A drain pipe 74 having therein a valve 75 is provided leading from the bottom or floor of the inner chamber 1 and provides means for removing or carrying away any condensation which may take place within the chamber. The chamber is provided with a rounded top, as appears in Fig. 2, so that any condensate collecting thereon will run down the sides of the inner wall 1, and not drip upon the tobacco in the drum. It is to be understood that condensation may be either caused to take place or may be avoided, as desired, and ordinarily or under most conditions of operation there would be no condensation within the chamber as such condensation would soak the tobacco with water and would destroy its valuable qualities.

A thermometer 76, which may be of a usual or any suitable construction, is provided and has its bulb or sensitive element 77 within the inner chamber 1, so that at any time the temperatures within this chamber and therefore the temperature of the aeriform fluid therein may be ascertained merely by observing the indication of the thermometer 76. Also a manometer or pressure gage 78 is connected by means of a small pipe 79 with the interior of the chamber for indicating the pressure therein, which may be above that of the atmosphere, if desired, as hereinbefore noted.

In operating the above described apparatus for carrying out the process of treating tobacco according to my invention, the empty chamber is first brought to the proper condition of temperature before any tobacco is placed within the drum. This is accomplished by supplying a heating medium, such as heated air or steam, through the inlet pipe 3. This heating medium circulates between the inner and outer walls 1 and 2, the water of condensation, in case steam is employed, running out through the outlet pipe 5 at the bottom of the chamber 1, and in case heated air is employed as a medium this may also pass out through the outlet pipe 5 or preferably through the upper outlet pipe 7, or through both as desired. This preliminary heating of the chamber is desirable so as to prevent condensation within the chamber at the beginning of the operation, which would soak and spoil the tobacco.

After the tobacco has been introduced into the drum, having the foraminated cylindrical

cal wall 10, it will often be found desirable, depending upon the condition of the tobacco, to subject the tobacco to a regulated stream or draft of air, which may be either
 5 heated or cold, as desired, for thereby bringing about a proper preliminary or preparatory condition of the tobacco as to the amount of moisture it contains, usually air alone and no steam being employed. Dry
 10 air alone is particularly effective in removing excess of moisture from the tobacco. In this way also condensation at the beginning of the operation may be avoided by first initially removing some of the moisture from the tobacco, so that it will be
 15 slightly drier at the beginning of the treatment and, as above noted, this being accomplished by the use of air alone without steam. However, of course, it is to be understood that dry tobacco may be made
 20 moist, if desired, by admitting the air in a moist condition, which may be effected by permitting small quantities of steam to mix therewith in the header pipe 62.
 25 When the proper initial condition as to moisture of the tobacco has been obtained then it is subjected to the steaming operation, condensation, however, being avoided. In this operation, which is for volatilizing
 30 and carrying away the poisonous volatile constituents of the tobacco, the steam suitably mixed with air is admitted into the chamber in suitable regulated quantities and as it escapes from the inlet nozzles 54,
 35 55, 56 and 57 it forms an ascending stream or draft which passes upward and into intimate contact with the surfaces of the continually agitated tobacco leaves, or shorts, contained within the foraminated cylinder
 40 10, and this stream or draft extracts and carries away with it the volatile constituents containing the poisonous substances in the tobacco, these volatilized substances being immediately carried upward and out of
 45 the tobacco-containing chamber through the outlet or discharge pipe 67. In view of the fact that the power of dissemination of these volatile constituents is very great, as soon as those which are upon and near the
 50 surfaces of the tobacco leaves are removed those which lie deeper will immediately make their way to the surface and will thus in their turn be likewise removed. Also in this connection it is to be noted that the
 55 poisonous substances in the volatilized condition still retain their disseminating properties so that they rapidly and quickly become mixed with or disseminated through the steam and air, this also assisting in
 60 their removal from the tobacco, which is further greatly enhanced by the fact that the steam having air mixed therewith flows upward in a continuous draft or stream so that none of the mixture remains long in
 65 contact with the tobacco but simply brushes

over or passes over the surfaces of the tobacco leaves, being continuously replaced by a fresh mixture which does not contain any of the poisonous substances.

The use of air mixed with steam, particularly at or above atmospheric pressure, provides an effective means for reducing the temperature of the steam, so that the mixture of steam and air will not be hot enough
 70 either to injure the texture of the tobacco or to volatilize and drive out or to destroy the harmless and desirable aromatic substances which are less volatile than the nicotin and allied poisons. The proportionate amount of air supplied to the mixture may be controlled or regulated so that
 75 the mixture will neither be too hot, as above noted, nor too cool for accomplishing the desired result. As hereinbefore noted, the mixture of air and steam is maintained at
 80 a temperature sufficient to volatilize nicotin and the like but insufficient to volatilize or destroy the desirable substances of the tobacco, and this temperature has been found in practice to be from 120 to 200 degrees Fahrenheit. Also the proportions of
 85 steam and air in the mixture, at the proper temperature, may be varied according to the requirements as determined by the nature of the tobacco, which varies greatly in its
 90 constituents.

The stirring up or agitation of the tobacco during treatment has been found highly important in the treatment of large quantities. Without such stirring the tobacco would become packed and prevent the
 100 effective permeation of the steam-charged air. Moreover, without the agitation or stirring, nicotin and the like volatilized from the tobacco in the lower strata would
 105 ascend and be taken up by and accumulate in the undisturbed upper strata.

I have found that tobacco treated as hereinbefore described for periods varying according to the nature of the particular tobacco being treated is found to be substantially free from its narcotic poisons, including nicotin, and that those substances which
 110 give to the tobacco its desirable qualities and which are harmless being less volatile or not volatile at all have been retained by the tobacco, so that tobacco which has been thus treated according to my invention has
 115 been found to retain its full flavor and fragrance, but to have lost its poisonous qualities.

At the end of the denarcotizing treatment to which the tobacco in the chamber is subjected it may be brought to a proper condition as to the amount of contained moisture by means of a regulated stream or
 120 draft of air, similar in this respect to the initial or preparatory treatment.

The apparatus illustrated in Figs. 1, 2 and 3 of the drawings and hereinbefore de- 130

scribed is well adapted to carry out the process of my invention in reference to comparatively small and loose, cut or uncut, tobacco leaves such as are employed in cigars for filling purposes, but is not so well adapted to treat the larger leaves which are employed for wrappers or binders. Figs. 4 and 5 of the drawings illustrate an apparatus of somewhat modified construction which is adapted to carry out the process of my invention in reference to these larger leaves for wrappers. In this latter or modified construction instead of a drum a number, for example, three, of tobacco-supporting rods 80 are provided upon which the tobacco leaves may be hung, as appears in Fig. 4. Each of the tobacco supporting rods 80 at its forward end is mounted for sliding movement in a bearing 81, rotation of the rod 80 being prevented by means of a pin 82 passing through the rod and guided in a slot in the bearing 81, as appears in Fig. 4. Each of the rods 80 at its rear end is supported by a bearing 83 through which it may slide. All of the tobacco-supporting rods 80 are bodily carried by a slidable frame having a front end or front wall 84 to the inner side of which the front bearings 81 are secured, and having a rear end or rear wall 85 to the inner side of which the rear bearings 83 are secured. The front and rear ends 84 and 85 of this rod-carrying frame are secured together by side walls 86, one only of which appears in Fig. 4. This slidable rod-carrying frame or drawer is provided with a foraminated bottom 87 which is shown as of reticulated construction and the purpose of which is to receive any broken parts of the tobacco leaves which may drop thereupon. The rod-carrying frame having the side 86 is adapted to slide upon guide strips 88, one of which appears in Fig. 4. The front end 84 of the slidable frame or drawer is shown as provided with a handle 89 for pulling out or pushing in this slidable rod-carrying frame which is received into a closed chamber having an interior wall 90 from which there is spaced an outer wall 91, similar in this respect to the construction hereinbefore described with references to Figs. 1, 2 and 3.

A longitudinal reciprocative shaking movement is imparted to the tobacco-carrying rods 80 for agitating the tobacco leaves carried thereby so as to prevent them sticking together, and also which aids in bringing the stream or draft of aeriform fluid, such as the hereinbefore described mixture of steam and air, into intimate contact with the surfaces of the leaves. Referring now to Fig. 4, interengaging toothed members or heads 92 and 93 are provided with cooperating teeth shown as inclined in both directions or as being of V-shape. These cooperative heads 92 and 93 are shown as located

in a sleeve or bushing 94 which extends between the inner and outer chamber walls 90 and 91. The toothed head 92 is fixed upon the projecting rear end of the tobacco-supporting rod 80. A coiled thrust spring 95 surrounds the rod 80 and is interposed between the toothed head 92 and the rear bearing 83 for the rod 80 so as to have a tendency to move the rod 80 to the rear, as is shown in Fig. 4. The other toothed head 93 which cooperates with the similar toothed head 92 is fixed upon the inner end of a short shaft or stub shaft 96 which is in alinement with the rod 80, reference being now had to Fig. 4 and to the shaft 96 appearing at the middle in Fig. 5. The stub shaft 96 projects rearwardly to the outside of the outer chamber wall 91 through a supporting bearing 97 and at its outer projecting end is shown as provided with a pulley wheel 98 fixed thereon and to which rotation may be imparted by means of a belt 99 from any suitable source of power and similar in this respect to the pulley 41 and belt 45 hereinbefore described in reference to Figs. 1, 2 and 3. From the foregoing description of the construction it will now be readily understood that rotation of the stub shaft 96 will impart longitudinal reciprocation at a rapid rate to the non-rotative longitudinally slidable tobacco-supporting rod 80.

As hereinbefore mentioned, a plurality of the rods 80 are arranged side by side so that when the tobacco leaves are hung thereon they will substantially fill the horizontal cross-sectional space within the chamber, and all of the rods may be of similar construction and arrangement and may have longitudinal shaking movement imparted thereto from the power applied by the belt 99 to the single pulley wheel 98, through a train of gears 100 of which the middle gear is fixed upon the stub shaft 96 and of which the two similar outer gears are similarly fixed upon corresponding stub shafts 101, as appears in Fig. 5. It is to be understood that these outer stub shafts 101 are in alinement with and are similarly arranged to reciprocate longitudinally other tobacco-carrying rods 80 in a similar manner to that described with reference to the middle rod 80, appearing in Fig. 4. In other respects than above noted the construction and operation of the modified apparatus illustrated in Figs. 4 and 5 are substantially the same as of the apparatus illustrated in Figs. 1, 2, and 3 and hereinbefore particularly described.

Cigars may also be satisfactorily treated in the apparatus illustrated in Figs. 4 and 5. To accomplish this, the cigars, preferably having both ends left open, are closely packed on end upon the reticulated bottom 87 of the slidable frame or drawer. Also cigars with closed ends may be loosely

placed in the drawer upon the reticulated bottom 87, but the results will be less thorough.

It is obvious that various modifications may be made in the constructions shown in the drawings and hereinbefore particularly described and also in the process which is adapted to be carried out thereby and also hereinbefore particularly described, within the principle and scope of my invention.

I claim:

1. The process of denarcotizing or treating tobacco to remove the nicotin and other undesirable elements and to leave in the tobacco the desirable aromatic substances thereof, such process consisting in preliminarily forming a mixture of steam and air at a temperature sufficient to remove from the tobacco the nicotin and other undesirable elements but insufficient to remove or destroy the desirable aromatic substances of the tobacco, and subjecting the tobacco in a closed chamber to a stream or draft of such mixture flowing through the chamber.

2. The process of denarcotizing or treating tobacco to remove the nicotin and other undesirable elements and to leave in the tobacco the desirable aromatic substances thereof, such process consisting in preliminarily forming a mixture of steam and air at or between a temperature of 120° and 200° Fahrenheit, and subjecting the tobacco in a closed chamber to a draft or stream of such mixture flowing through the chamber.

3. The process of denarcotizing or treating tobacco to remove the nicotin and other undesirable elements and to leave in the tobacco the desirable aromatic substances thereof, such process consisting in preliminarily forming a mixture of steam and air mixed in proper proportions to obtain a suitable temperature without condensation of the steam, and subjecting the tobacco in a closed chamber to a draft or stream of such mixture flowing through the chamber.

4. The invention claimed in claim 1 which further consists in agitating the tobacco during its exposure in the chamber to the draft or stream of the mixture of steam and air.

5. The process of denarcotizing or treating tobacco to remove the nicotin and other undesirable elements and to leave in the tobacco the desirable aromatic substances thereof, such process consisting in preliminarily forming a mixture of steam and air mixed in proper proportions to obtain without condensation of the steam a suitable temperature at or between 120° and 200° Fahrenheit, in subjecting the tobacco in a closed chamber to a draft or stream of such mixture flowing through the chamber, and in agitating the tobacco during its exposure in the chamber to the draft or stream of the mixture of steam and air.

6. The process of denarcotizing or treat-

ing tobacco to remove the nicotin and other undesirable elements and to leave in the tobacco the desirable aromatic substances thereof, such process consisting in preliminarily forming a mixture of steam and air having a pressure at least as great as that of the atmosphere and at a temperature sufficient to remove from the tobacco the nicotin and other undesirable elements but insufficient to remove or destroy the desirable aromatic substances of the tobacco, and producing a stream or draft of such mixture through a closed chamber in which the tobacco is exposed to such stream or draft.

7. The process of denarcotizing or treating tobacco to remove the nicotin and other undesirable elements and to leave in the tobacco the desirable aromatic substances thereof, such process consisting in preliminarily forming a mixture of steam and air having a pressure at least as great as that of the atmosphere and at or between a temperature of 120° and 200° Fahrenheit, and producing a stream or draft of such mixture through a closed chamber in which the tobacco is exposed to such stream or draft.

8. The process of denarcotizing or treating tobacco to remove the nicotin and other undesirable elements and to leave in the tobacco the desirable aromatic substances thereof, such process consisting in preliminarily forming a mixture of steam and air having a pressure at least as great as that of the atmosphere and mixed in proper proportions to obtain a suitable temperature without condensation of the steam, and producing a stream or draft of such mixture through a closed chamber in which the tobacco is exposed to such stream or draft.

9. The invention claimed in claim 6 which further consists in agitating the tobacco during its exposure in the chamber to the draft or stream of the mixture of steam and air.

10. The process of denarcotizing or treating tobacco to remove the nicotin and other undesirable elements and to leave in the tobacco the desirable aromatic substances thereof, such process consisting in preliminarily forming a mixture of steam and air having a pressure at least as great as that of the atmosphere and mixed in proper proportions to obtain without condensation of the steam a suitable temperature at or between 120° and 200° Fahrenheit, producing a stream or draft of such mixture through a closed chamber in which the tobacco is exposed to such stream or draft, and in agitating the tobacco during its exposure in the chamber to the stream or draft of the mixture of steam and air.

11. An apparatus for denarcotizing tobacco comprising an inclosing chamber for containing the tobacco, means for producing outside the chamber a mixture of air and steam, means for controlling the relative pro-

portions of air and steam in the mixture, means for introducing the mixture of air and steam in a stream into the chamber at one side of the tobacco contained therein, and means for concurrently permitting a stream of the used mixture of air and steam together with substances driven out of the tobacco to flow from the chamber at the other side of the tobacco contained therein, whereby the tobacco in the chamber is subjected to a flowing stream of such mixture of steam and air.

12. The invention claimed in claim 11 in combination with means for agitating the tobacco contained in the closed chamber during its exposure therein to the draft or stream of the mixture of air and steam.

13. An apparatus for denarcotizing tobacco comprising an inclosing chamber for containing the tobacco, means for producing outside the chamber a mixture of air and steam, means for introducing said mixture of air and steam in a stream into the chamber at one side of the tobacco contained therein and at a pressure at least as great as that of the atmosphere, means for concurrently permitting a stream of the used mixture of air and steam together with substances driven out of the tobacco to flow from the chamber at the other side of the tobacco contained therein, and means for regulating the flow of said fluids from the chamber, whereby the tobacco in the chamber is subjected to a regulated stream of the mixture of air and steam having a pressure equal to or greater than that of the atmosphere.

14. An apparatus for denarcotizing tobacco comprising an inclosing chamber for containing the tobacco, means for producing outside the chamber a mixture of air and steam, means for controlling the relative proportions of air and steam in the mixture, means for introducing the mixture of air and steam in a stream into the chamber at one side of the tobacco contained therein, and at a pressure at least as great as that of the atmosphere, and means for concurrently permitting a stream of the used mixture of air and steam together with substances driven out of the tobacco to flow from the chamber at the other side of the tobacco contained therein, whereby the tobacco in the chamber is subjected to a flowing stream of the mixture of air and steam having a pressure equal to or greater than the pressure of the atmosphere.

15. The invention claimed in claim 14 in combination with means for agitating the tobacco contained in the closed chamber during its exposure therein to the draft or stream of the mixture of air and steam.

16. An apparatus for denarcotizing tobacco comprising an inclosing chamber, means for passing a stream of aeriform fluid through the chamber and including an in-

let and an outlet for the chamber, a slidable frame in the chamber between the inlet and outlet and adapted to be withdrawn from the chamber, means for supporting the tobacco on the frame including a longitudinally movable rod carried by the frame, and means for reciprocating said rod to agitate the tobacco.

17. The invention claimed in claim 16 in which the means for reciprocating the rod include coöperative relatively movable members at least one of which is toothed, and a spring for pressing said members into engagement and for imparting return movement to said rod.

18. An apparatus for denarcotizing tobacco comprising an inclosing chamber, means for passing a stream of aeriform fluid through the chamber and including an inlet and an outlet for the chamber, a slidable frame in the chamber between the inlet and outlet and adapted to be withdrawn from the chamber, a foraminated tobacco-containing drum rotatively mounted in the frame with its axis extending from front to back thereof, and means for oscillating the drum on its axis.

19. The invention claimed in claim 18 in which the oscillating movement of the drum is comparatively slow, in combination with means operated by the drum in its oscillating movement to impart to the drum a more rapid longitudinal reciprocating movement, the drum being slidably mounted in the frame to provide for said reciprocating movement.

20. The invention claimed in claim 19 in combination with means for closing the free spaces in the chamber around the oscillating and sliding drum for thereby compelling the stream of aeriform fluid to pass transversely through the drum and through the contents thereof.

21. The invention claimed in claim 19 in which the drum is of a diameter to fill the free space in the chamber, in combination with flanges in the chamber into which the ends of the drum telescope for sliding movement, whereby the stream of aeriform fluid is compelled to pass through the drum and the contents thereof.

22. An apparatus for denarcotizing tobacco comprising an inclosing chamber for containing the tobacco, means for producing a mixture of air and steam, means including discharge nozzles arranged to discharge toward each other for introducing the mixture of air and steam into the chamber at one side of the tobacco contained therein, and means for permitting the used mixture of air and steam together with volatilized substances to escape from the chamber at the other side of the tobacco contained therein.

23. An apparatus for denarcotizing tobacco having, in combination, a forami-

nated tobacco-containing drum, means for slowly oscillating the drum on its axis, means for rapidly reciprocating the drum longitudinally, and means for passing a stream of aeriform fluid through the drum transversely of its axis for acting upon the tobacco contained therein.

24. An apparatus for denarcotizing tobacco having, in combination, an inclosing chamber for containing the tobacco, means including discharge nozzles arranged to discharge toward each other for introducing aeriform fluid into the chamber at one side of the tobacco contained therein, and means

for permitting the used aeriform fluid to- 15
gether with substances carried thereby to escape from the chamber at the other side of the tobacco contained therein.

25. The invention claimed in claim 16 in which the means for supporting the tobacco 20
on the frame includes, in combination, a perforated tobacco-containing receptacle carried by the reciprocating rod to partake of its reciprocating movement for supporting and agitating the tobacco.

In testimony whereof I have affixed my 25
signature.

HUGO BRINKHAUS.