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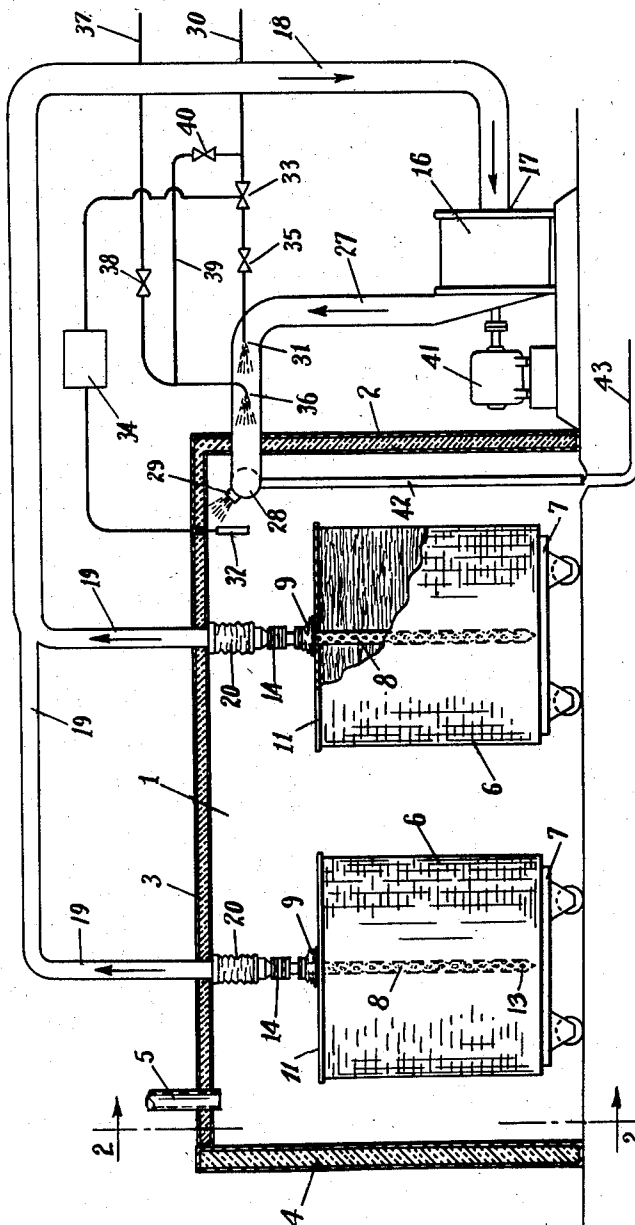
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2,869,556

APPARATUS FOR CONDITIONING TOBACCO

Original Filed Feb. 1, 1956

2 Sheets-Sheet 1



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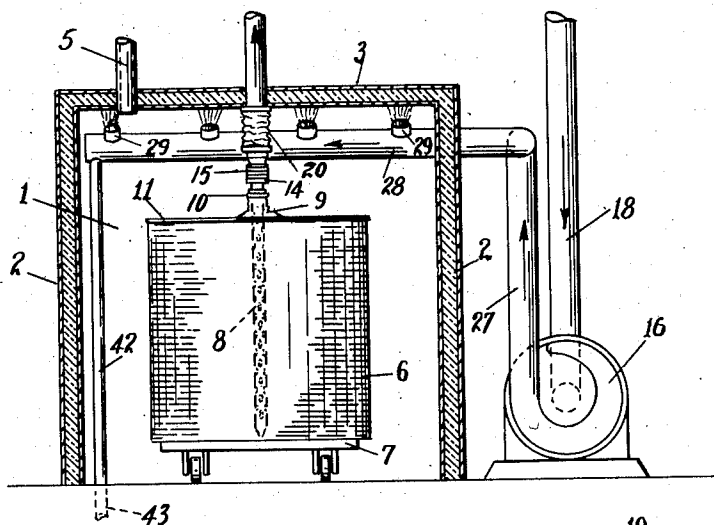


Fig. 2

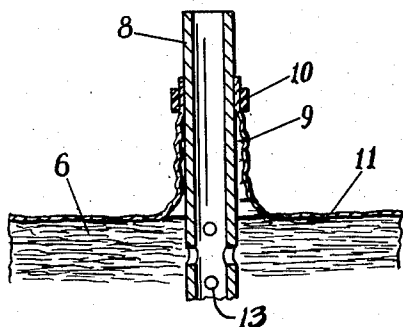


Fig. 4

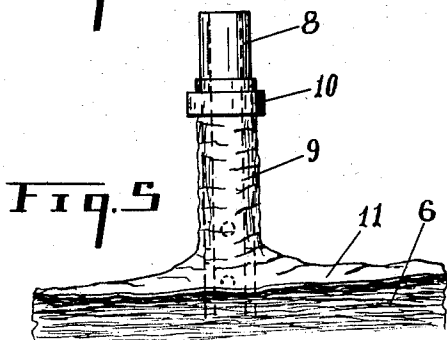


Fig. 5

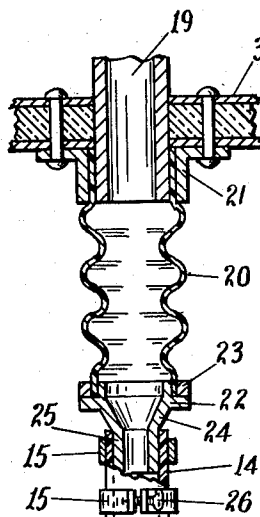


Fig. 3

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APPARATUS FOR CONDITIONING TOBACCO

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Original application February 1, 1956, Serial No. 562,887.
Divided and this application March 19, 1957, Serial No. 647,021

6 Claims. (Cl. 131—135)

This invention relates to apparatus for conditioning tobacco and particularly to the conditioning of tobacco in its compressed state as it is received at the processing plant.

The invention consists essentially in setting up the compressed tobacco in an insulated compartment into which air, conditioned as to temperature and moisture content, is pumped, and withdrawing the conditioned air from the chamber through the compressed tobacco into a hollow perforated probe which has been pressed down through the tobacco, the probe being connected to the inlet side of the fan supplying the conditioned air to the chamber. The multi-stage fan used to circulate the conditioned air maintains a pressure difference across the compressed tobacco so that the air within the chamber will readily flow through the tobacco to the centrally located probe to condition the tobacco equally through its bulk.

There have been various methods in use for conditioning tobacco which have had varying degrees of success. Some have been harmful to the tobacco itself while others involve many steps in the process, are time consuming and add a heavy expense. Most of these processes involve opening up the compressed tobacco to allow individual leaves to be conditioned in a suitable atmosphere. Others call for the playing of a stream of gas on the outer surface of the compressed block of tobacco and peeling off the surface leaves as they become conditioned. The process being continued until the whole of the compressed bulk has been treated. Another form of conditioning has been to insert steam pipes into the compressed tobacco and force the steam under pressure through the tobacco to the surrounding atmosphere. In this method the steam boiler provides the pressure necessary to force moisture vapor through the tobacco. In consequence, the temperatures of the vapor must be greater than 212° F. Temperatures this high are considered by most manufacturers too high and consequently harmful to the tobacco. Still another method of conditioning compressed tobacco is by a vacuum process. The equipment required for this method is very costly as also are the operating costs.

The object of the present invention is therefore to condition the compressed tobacco by the creation of a pressure differential through the tobacco which will allow conditioned air of any desired temperature to pass through the tobacco and in the process give up its heat and moisture to the tobacco evenly throughout its compressed bulk.

A further object of the invention is to supply controlled conditioned air to an insulated chamber enclosing the compressed tobacco and to pass that conditioned air through the tobacco for recirculation in a closed system.

A further object of the invention is to provide means whereby the ends of the compressed tobacco is kept sealed to prevent short circuiting of the conditioned air and to constrain it to flow through the tobacco in layers

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of more or less equal radii to an axial evacuation probe. These and other objects will be apparent from the following specification and the accompanying drawings in which

Fig. 1 is a schematic vertical elevation of a typical tobacco conditioning apparatus.

Fig. 2 is a vertical section on the line 2—2 of Fig. 1.

Fig. 3 is a vertical section showing an air evacuation outlet and means for attachment to a probe.

Fig. 4 is an enlarged partial vertical section showing the upper end of a probe assembly and showing the method of sealing the top of the compressed tobacco to prevent short circuiting of conditioned air to the perforated probe.

Fig. 5 is an enlarged outside view similar to Fig. 4 but showing the top sealing cover following the tobacco downwards as it slumps during conditioning and sealing the top apertures of the probe which have been uncovered by the slumped tobacco.

This present application is a division of the applicant's copending application Serial No. 562,887, filed February 1, 1956.

Referring to the drawings, Figs. 1 and 2 show a typical assembly in which a chamber 1 is formed of insulated side walls 2 and top 3. An insulated door 4 can be mounted on hinges or be arranged to be lifted vertically in suitable guides. The chamber 1 is insulated to minimize condensation and to conserve heat and, when in operation is kept completely closed except for the vent 5 on the top of the chamber which allows the chamber to be kept in atmospheric pressure at all times.

The mass of compressed tobacco 6 as taken from bales or hogsheads are set on the wheeled dollies 7 for easy transportation into and out of the chamber 1, the dollies being of a size which will cover most of the base of the tobacco 6 to prevent air from entering the tobacco from below. A hollow perforated probe 8 is pressed into the compressed tobacco 6 from the top as near the vertical axis of the mass as possible, the probe penetrating to the bottom of the mass as shown in Figs. 1 and 2. The probe 8 has a flexible annular collar 9 mounted on its upper end and secured about the probe by the band 10. The flexible collar 9 is preferably an air tight sleeve securely attached to a flexible cover 11 and so arranged that it can extend in length as the tobacco slumps during conditioning. The top end is clamped to probe 8. As the bottom end slides down probe 8 it serves to cover the perforations 13 which otherwise would be exposed to the atmosphere in chamber 1. The flexible cover 11 covers completely the top of the cylindrical or rectangular pile of compressed tobacco and prevents air from short circuiting through the top of the tobacco into the upper perforations 13 of probe 8.

The air conditioning and circulating system comprises a multi-stage fan 16 driven by the motor 41. The inlet side 17 of the fan 16 is connected to the suction pipe 18 which is divided into branch pipes 19 to connect with as many probe coupling units as the chamber 1 is fitted with. These coupling units consist of a flexible tube 20 secured at its upper end and within the chamber 1 to the lower end of the branch pipes 19, with the pipe 19 and tube 20 being held securely to the top 3 of the chamber 1 by the clamp ring 21. The lower end of the tube 20 is secured to the fitting 22 by the ring 23. The fitting 22 is tapered at 24 to a reduced diameter at 25 to take the flexible coupling sleeve 14 which is slipped over the top end of the probe 8 after the dolly 7 carrying the compressed tobacco is rolled under the coupling unit. Clamp rings 15 secure the flexible coupling sleeve 14 to the reduced diameter 25 of the fitting 22 and to the probe 8 by means of the screws 26.

A pipe 27 is connected to the discharge side of the fan

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16 and is projected horizontally into the chamber 1 to form the distribution header 28 having branches 29 adapted to spray conditioned air into the top of the chamber 1.

A high pressure steam pipe 30 is projected into the air discharge pipe 27 and terminates in a nozzle 31 adapted to spray a jet of steam into the air passing through the pipe 27 to the header 28. Steam requirements are determined by the temperature at the bulb 32 situated within the chamber 1 adjacent to the discharge branches 29 of the header 28 to control the opening and closing of the valve 33 by the controller 34. The rate of temperature rise can be adjusted by the valve 35 on the steam line 30 between the valve 33 and the nozzle 31.

A nozzle 36 within the air discharge pipe 27 ahead of the nozzle 31 projects a spray of water from the water supply line 37, the spray of water being controlled by the valve 38. The water spray from the nozzle 36 is atomized by high pressure steam fed from the steam line 30 through the pipe 39 and controlled by the valve 40. Excess condensate in the distribution header 28 is drained off through the drain pipe 42 into the floor drain 43.

In the operation of this invention, the hollow perforated probe 8, of minimum diameter, is first pressed down into the mass of compressed tobacco, the probe being placed as near as possible to the vertical centre of the mass. The compressed tobacco can be placed on the dolly 7 before or after insertion of the probe 8, which ever is most convenient. The flexible cover 11 and sleeve 9 are then fitted over the probe 8, the sleeve 9 being held on the probe by the elastic band 10 while the flexible cover is spread over the top surface of the tobacco so that only the sides of the mass of tobacco is exposed.

The dolly 7 is now wheeled into the chamber 1 and aligned under the coupling sleeve 14 and the coupling is fitted over the open end of the probe 8 and secured thereon by tightening up the screw 26 in the lower clamp ring 15, the flexible tube 20 adjusting itself to the height of the probe 8.

The chamber 1 can be made to take any convenient number of compressed tobacco units, the capacity of the chamber being limited only by the production level required and the size of the conditioning installation available.

When the chamber has been loaded and the installation set in operation, the chamber 1 is filled with air delivered by the fan 16 through the pipe 27 and header 28, the air being conditioned by means of steam and water introduced into the air from the nozzles 31 and 36. Normally the quantity of water introduced into the air is sufficient to maintain a fog in the chamber 1, denoting slight supersaturation of the air.

The conditioned air, in passing from the chamber 1 and through the tobacco to the probe 8, gives up heat and moisture to the tobacco evenly throughout the whole volume of the tobacco mass, the air being drawn out of the probe 8 through the pipe 19 to the intake side of the fan 16. The perforations 13 are distributed over the length of the probe 8 so that the air flow through the mass of the tobacco is substantially uniform from the top to the bottom of the mass.

The circulation of air through the system is maintained because of the pressure difference across the compressed tobacco, created by the multi-stage fan 16 and is re-circulated in re-conditioned form for as long as is necessary to thoroughly condition the tobacco.

With the tendency of the tobacco to slump during the conditioning operation, any tendency for the air to short circuit the tobacco and pass directly through the top perforations 13 of the probe, is prevented by the flexible cover 11 which follows the slumping tobacco to keep the top surface covered and sealed, so that the air must always pass through the tobacco from the sides in horizontal layers in line with the perforations 13 in the probe.

It should be noted that in this invention the circulating

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air in the system is a vehicle for the conveyance of heat and moisture to the tobacco. The only energy which can be lost is the slight amount through radiation from the machine, condensation in the machine, and a small amount of leakage at the vent 5. Most of the energy delivered to the fan 16 by the motor 41 is transferred to the circulating air in the form of heat which in turn is absorbed by the tobacco. These facts explain the extremely high thermal efficiency of this machine compared to most other tobacco conditioning machines. Moisture gains of as much as 36 lbs. have been obtained with the use of only 25 lbs. of steam. The remaining gain of 11 lbs. being atomized water converted to vapour when mixed with the dry heat from the fan.

What I claim is:

1. Apparatus for the conditioning of compressed tobacco comprising an insulated chamber, means to support a block of compressed tobacco within said chamber, a hollow perforated probe insertable in the block of tobacco, an air discharge header in said chamber, an air outlet from said chamber, a fan connected on its discharge side with said discharge header and on its inlet side with said air outlet from the chamber, a flexible cover resting on and sealing a portion of the block of tobacco, said flexible cover being secured to said probe by a flexible sleeve allowing vertical displacement of said flexible cover with respect to said probe, a flexible coupling joining the said probe and the air outlet on said chamber, means to inject steam and water into the discharge side of said fan to said header to condition the air discharge from said header to said chamber, said fan on its inlet side setting up a pressure differential between the said hollow probe and the said chamber to effect a flow of conditioned air from the chamber through the tobacco in layers between the tobacco support means and said flexible cover.

2. Apparatus for the conditioning of compressed tobacco comprising an insulated chamber, means to support a block of compressed tobacco within said chamber, a hollow perforated probe insertable in the block of tobacco, an air discharge header in said chamber, an air outlet from said chamber, a fan connected on its discharge outlet side with said discharge header and on its inlet side with said air outlet from the chamber, a flexible cover resting on and sealing a portion of the block of tobacco, said flexible cover being secured to said probe by a flexible sleeve allowing vertical displacement of said flexible cover with respect to said probe, a flexible sleeve coupling joining the said probe and the air outlet in said chamber, steam and water nozzles in the discharge outlet from said fan, a temperature sensitive controller regulating the flow of steam to said steam nozzle, means to control the flow of water to said water nozzle, the steam and water conditioning the air discharged from said air discharge header into said chamber, said fan on its inlet side setting up a pressure differential between the said probe and the said chamber to effect a flow of conditioned air from the chamber through the tobacco between the tobacco support means and said flexible cover.

3. Apparatus for the conditioning of compressed tobacco comprising an insulated chamber, means to support a block of compressed tobacco within said chamber, a hollow perforated probe insertable in the block of tobacco, an air discharge header in said chamber, an air outlet from said chamber, a fan connected on its discharge outlet side with said discharge header and on its inlet side with said air outlet from the chamber, a flexible cover resting on and sealing a portion of the block of tobacco, said flexible cover being secured to said probe by a flexible sleeve allowing vertical displacement of said flexible cover with respect to said probe, a flexible sleeve coupling joining the said probe with the air outlet from said chamber, steam and water nozzles in the discharge outlet from said fan, a temperature sensitive controller regulating the flow of steam to said steam nozzle, means to control the flow of

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water to said water nozzle, the steam and water combining to condition the air discharged from said air discharge header into said chamber, said fan on its inlet side setting up a pressure differential between the said probe and the said chamber to effect a flow of conditioned air from the chamber through the tobacco between the tobacco support means and said flexible cover, and a vent in said chamber keeping said chamber at atmospheric pressure.

4. Apparatus for the conditioning of compressed tobacco comprising an insulated chamber, means to support a block of compressed tobacco within said chamber, a hollow perforated probe insertable in the block of tobacco, an air discharge header in said chamber, a water drain pipe leading from said discharge header, an air outlet from said chamber, a fan connected on its discharge outlet side with said discharge header and on its inlet side with said air outlet from the chamber, a flexible cover resting on and sealing a portion of the block of tobacco, said flexible cover being secured to said probe by a flexible sleeve allowing vertical displacement of the flexible cover with respect to said probe, a flexible sleeve coupling joining the said probe with the air outlet from said chamber, steam and water nozzles in the discharge outlet from said fan, a temperature sensitive controller regulating the flow of steam to said steam nozzle, means to control the flow of water to said water nozzle, the steam and water combining to condition the air discharged from said air discharge header into said chamber, said fan on its inlet side setting up a pressure differential between the said probe and the said chamber to effect a flow of conditioned air from the chamber through the tobacco between the tobacco support means and said flexible cover, and a vent in said chamber keeping said chamber at atmospheric pressure.

5. Apparatus for the conditioning of compressed tobacco comprising an insulated chamber, portable means to carry and support a block of compressed tobacco, a

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hollow perforated probe insertable in the block of tobacco, a flexible cover resting on the block of tobacco, said flexible cover being secured to said probe by a flexible sleeve allowing displacement of said flexible cover with respect to said probe, a fan, air conducting conduit means between said fan and said flexible sleeve and hollow probe and between said fan and said chamber, means to inject steam and water into the air being delivered by said fan to condition the air, said fan setting up a pressure differential between said chamber and said hollow probe to effect a flow of conditioned air through the tobacco in layers between the tobacco support means and the said flexible cover.

6. Apparatus for the conditioning of compressed tobacco comprising an insulated chamber, portable means to carry and support a block of compressed tobacco, a hollow perforated probe insertable in the block of tobacco, a flexible cover resting on the block of tobacco, said flexible cover being secured to said probe above the tobacco allowing displacement of said flexible cover with respect to said probe, a fan, air conducting conduit means between said fan and said flexible sleeve, a flexible coupling joining said conduit means to said flexible sleeve, air conducting conduit means between said fan and said chamber, means to inject steam and water into the air being delivered by said fan to condition the air, a temperature sensitive controller regulating the flow of injected steam, said fan setting up a pressure differential between said chamber and said hollow probe to effect a flow of conditioned air through the tobacco in layers between the tobacco support means and the said flexible cover.

References Cited in the file of this patent

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 2,869,556

January 20, 1959

Lorne A. Rowell

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

In the grant, line 1, and in the heading to the printed specification, line 3, address of patentee, for "Lachline, Quebec, Canada" read -- Lachine, Quebec, Canada --.

Signed and sealed this 30th day of June 1959.

(SEAL)

Attest:

KARL H. AXLINE

Attesting Officer

ROBERT C. WATSON
Commissioner of Patents