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Cristiani

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[54] **PNEUMATIC SEPARATOR FOR A STREAM OF CUT TOBACCO**

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[52] **U.S. Cl.**.....**209/45,** 209/133 T, 209/147, 131/110, 131/146

[51] **Int. Cl.**.....**B07b 13/00**

[58] **Field of Search**.....209/45, 46, 133, 209/133 T, 136, 137, 140, 141, 147, 154, 139 R; 131/110, 134, 136–138, 146

[56] **References Cited**

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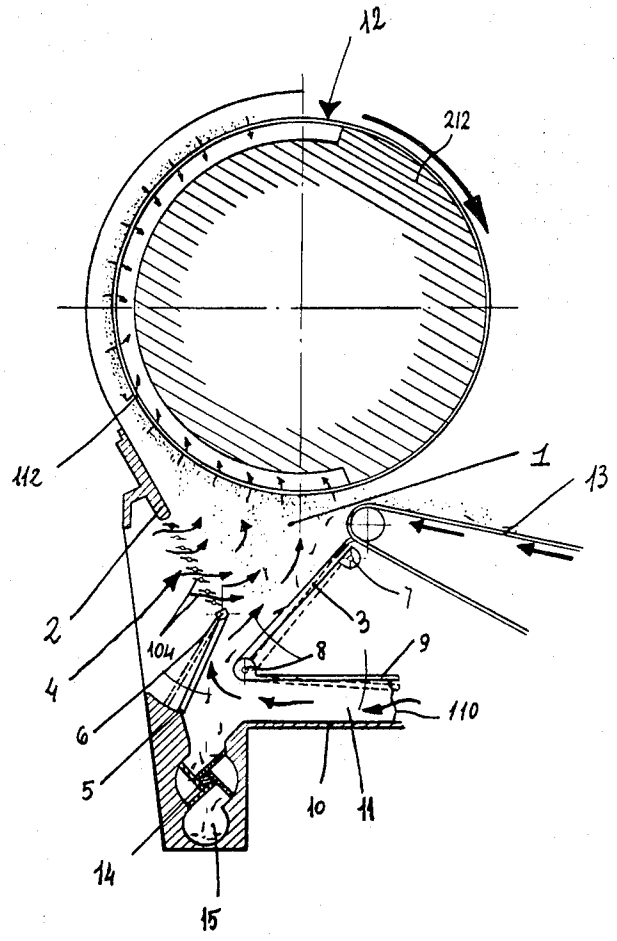
[57] **ABSTRACT**

A stream of cut tobacco having undesired stems and heavy foreign matter is directed to move almost tangentially passed and beneath a drum having an air permeable surface. A source of suction is coupled to suck air through the air permeable surface and into the drum. The movement of air through the surface of the drum causes relatively light particles of tobacco from the stream to move upward and collect on the surface of the drum, the relatively heavy stem and foreign matter falling down into a collecting bin.

9 Claims, 2 Drawing Figures



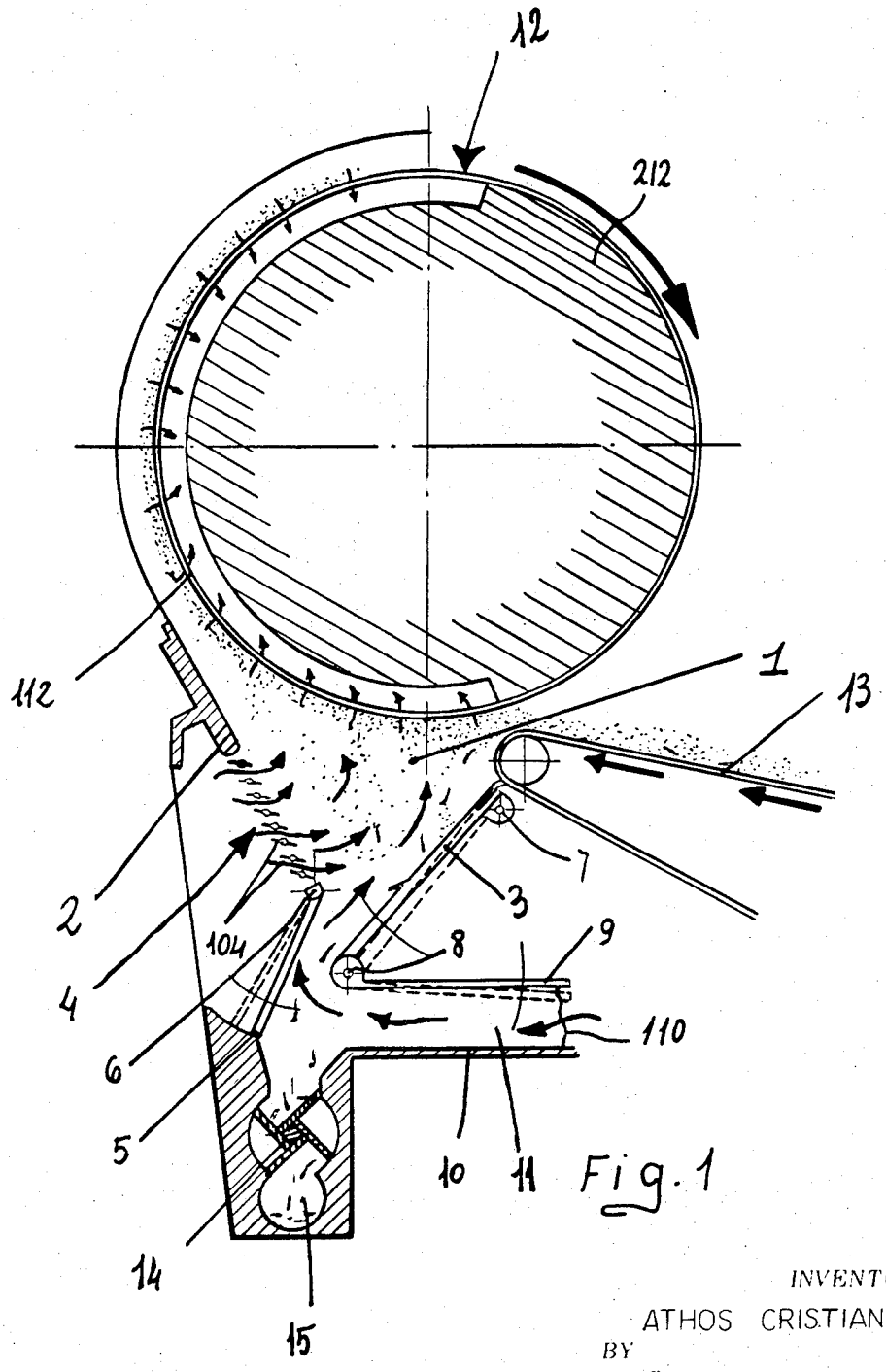


Fig. 1

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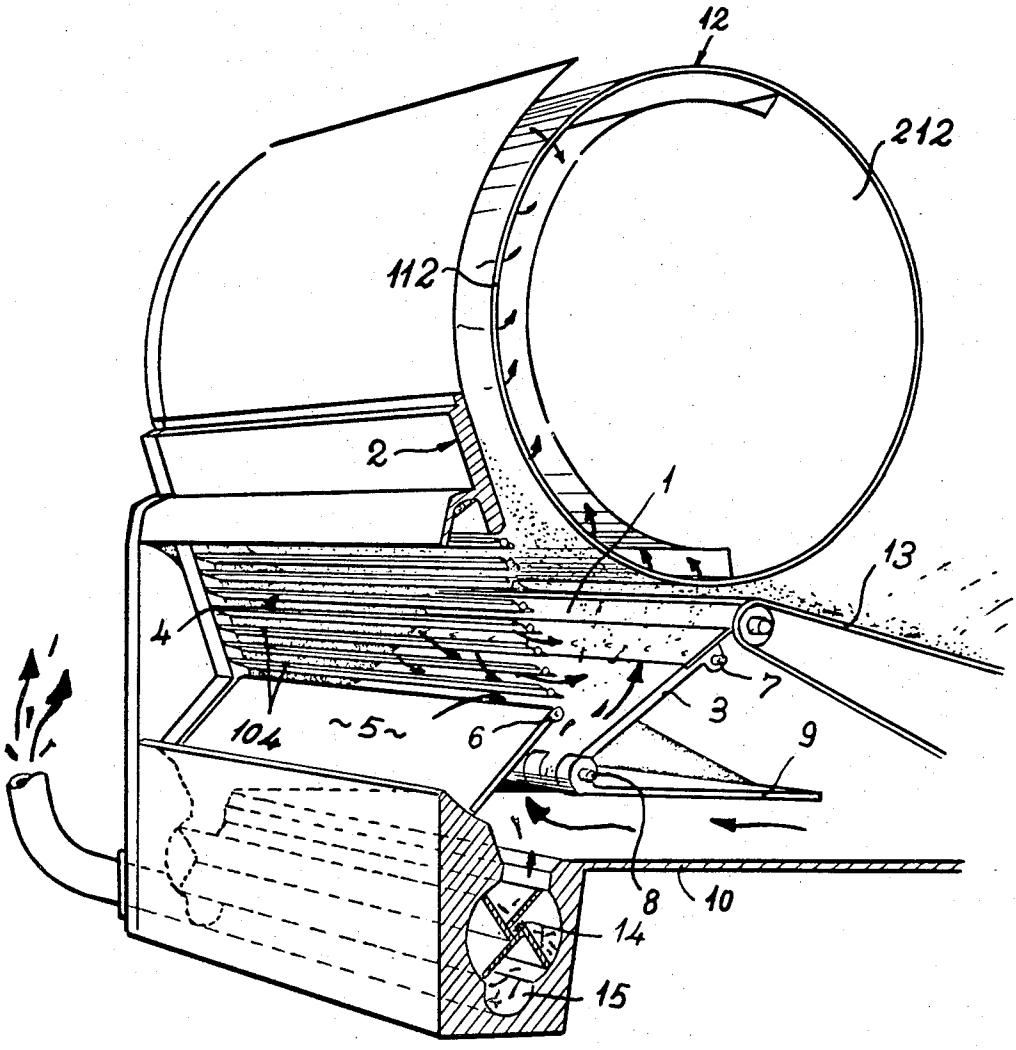

Fig.2

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PNEUMATIC SEPARATOR FOR A STREAM OF CUT TOBACCO

This invention relates generally to tobacco processing equipment and, more particularly to an improved machine which separates the stems and other dense foreign matter from a stream of cut tobacco to enable a cigarette maker to be fed continuously with selected cut tobacco for forming a tobacco braid.

Heretofore, there has been disclosed, in U.S. Pat. No. 3,542,037, entitled "Cut Tobacco Stemmer" by Ivano Pietralunga, a tobacco stemmer in which the separation of stems and other dense foreign matters from cut tobacco is accomplished by mechanical separation through hurling (ballistic separation) and, thereafter, further separation is effected by means of air currents (pneumatic separation).

In U.S. Pat. No. 3,542,037, pneumatic separation, or selection by ventilation is effected in a ventilation chamber which communicates with a duct. Selected cut tobacco is moved away from the chamber by means of air current that flows through the duct. The bottom of the chamber is inclined downward towards the inlet of the duct and supports perforated plate elements. Cut tobacco that is partially processed by ballistic separation is fed to an upper end on an angle that is substantially tangent to the ventilation chamber, a stem dropping aperture being provided at the lower end of the ventilation chamber to feed tobacco stems to a stem collecting belt. The ventilation chamber has at least two successive chambers arranged in tandem in the inclined bottom for ventilation. The chambers are also connected with the cut tobacco suction duct and communicate with each other.

In U.S. application Ser. No. 879,092, entitled "Ventilation Chamber for Cut Tobacco Stemmer" by Ivano Pietralunga now abandoned, a ventilation chamber is divided into two parts, each being associated with a hood which defines the chamber at the top and communicates with a suction pipe. The bottom of the chamber consists of a plurality of plates in overlapping and spaced relationship relative to each other and laterally interspaced to form apertures for stems separated from the cut tobacco. The stem drop through the spaces between the plates onto an underlying stem collecting belt.

In this invention, a stream of cut tobacco having undesired stems and heavy foreign matter is directed to move substantially tangentially passed and beneath a rotating drum having an air permeable surface. A source of suction is coupled to suck air through the air permeable surface of the drum to the interior of the drum. The movement of air through the stream of cut tobacco and through the surface of the drum causes the relatively light particles of tobacco from the stream to move upward and collect on the surface of the drum. The relatively heavy stems and foreign matter of the stream of tobacco are not effected by the flow of air through the air permeable surface of the drum and down into a collecting bin.

The novel features that are considered characteristic of this invention are set forth with particularity in the appended claims. The invention itself, however, both as to its organization and method of operation, as well as advantages thereof, will best be understood from the following description when read in connection with the accompanying drawings wherein:

FIG. 1 is a cross sectional view of structure in accordance with the principles of this invention; and,

FIG. 2 is a view in perspective of the structure of FIG. 1.

Similar reference numerals refer to similar parts throughout the several view of the drawings of this invention.

With reference to the drawings, the device according to the invention, comprises essentially a hopper-shaped chamber **1** defined by two side walls **2**, **3**, inclined towards each other and two substantially vertical end walls to provide an upper opening and a lower opening. Side wall **2** supports a plurality of horizontally oriented louvers **104** which extend across the width of wall **2** from one end wall to the other to form an air permeable wall. Each louver is rotatably supported by a horizontally oriented shaft. Thus, the plurality of louvers forms a grate **4** having openings that are adjustable.

Positioned below grate **4** and swingably coupled to the lower edge of side wall **2** by means of a hinge type of structure **6** is a non air permeable wall member **5**. The hinge structure **6** is positioned to permit the wall member **5** to rotate about an axis that is parallel to the axis of rotation of the louvers **104**.

Side wall **3**, which is not air permeable and which, together with side wall **2** forms the hopper shape of chamber **1**, is pivotally coupled by means of a hinge **7** or the like to swing about its upper edge about an axis that is parallel to the axis of rotation of non air permeable wall member **5**. The lower edge **8** of wall **3** is pivotally coupled to support a flat wall member **9** which, together with an opposite wall **10** and two side walls **110**, defines a duct **11** that communicates to feed air through the lower opening of hopper-shaped chamber **1**.

The upper opening of hopper chamber **1** is positioned immediately below the lower peripheral portion of a rotary drum **12**, having a peripheral air permeable face or surface **42**. A stationary member **212** positioned within the drum **12** and coupled to a source of suction contains suction conducting channel **112** contacting the inner surface of the air permeable face **42** of the drum **12** to define those portions of the air permeable face **42** that is exposed to suction.

Referring specifically to FIG. **1**, the surface of the drum exposed to suction conducting channel **112** is the only portion of the surface **42** of the drum **12** that is subjected to the source of suction. The suction applied to the selected portion of the surface **42** of the drum **12** creates an air current which flows into the hopper-shaped chamber **1** from grate **4** and partly through duct **11**. The air in chamber **1** is sucked through the surface of the drum.

A stream of cut tobacco having stems and other dense foreign matters is fed to chamber **1** by means of a belt conveyor **13** or the like. The conveyor **13** unloads or dumps the tobacco into the upper opening of chamber **1** in the vicinity of the lower portion of the face or peripheral surface **42** of the drum **12**. The channel **112** of the stationary member **212** follows a path from a point near where the conveyor **13** dumps the tobacco to a point slightly past the top most portion of the drum **12** in the direction of rotation of the drum, as illustrated in FIG. **1**. Thus, as the peripheral surface **42** of the drum **12** moves over the end of the conveyor **13** it is exposed to the source of suction and air is drawn

through the surface 42 of the drum. Belt 13, whose speed is quite high, thrusts into chamber 1 cut tobacco intermingled with stems and various heavy foreign matters which must be separated from it. The cut tobacco, as it leaves the belt 13, as illustrated in FIG. 1, is projected almost tangentially to the lower peripheral surface 42 of drum 12. The stream of tobacco contacts the surface 42 of the drum 12 and, by virtue of the lightness of the particles of tobacco and the movement of air through the surface of the drum, the particles of tobacco adhere to the face of the drum. The stems and the heavy foreign matters in the stream of tobacco are too heavy to adhere to the surface 42 of the drum 12 and drop by gravity where they collect between the paddles of an airlock 14 which, when rotated about its shaft, discharges them into a manifold 15. It is to be noted that the manifold does not communicate directly with chamber 1 of the separator. The stems and heavy foreign matter in manifold 15 can be discharged pneumatically.

The cut tobacco particles, which have failed to adhere to the drum 12 as they left the conveyor belt 13 are caught in the upward flow of air in the hopper 1. The movement of air in the hopper is caused by air being sucked through the air permeable surface 42 of the drum 12 to draw air through grate 4 and through duct 11. The air flow from the grate 4 mixes with the air drawn through duct 11 to return particles of tobacco to the surface 42 of the drum 12 under the influence of suction.

The rotatable louvers 104 of grate 4 are oriented to be inclined downward towards the inside of chamber 1 to create, in the hopper-shaped chamber 1, a whirling flow of air which helps to move the cut tobacco particles up toward the surface 42 of the drum 12. If desired, the velocity of the air flowing upward in chamber 1 from the duct 11 can be controlled by changing the angle of inclination of wall member 9 to increase or decrease the cross sectional area of channel 11.

Another adjustment of the flow of air through chamber 1 can be obtained by changing the angle of inclination of wall member 5 not permeable to air and/or that of side wall 3, so as to vary the shape and, consequently, the fluidic characteristics of the lower opening of hopper-shaped chamber 1.

The structure of this invention can be utilized either as an independent unit or incorporated into a cigarette maker. In those instances where the structure of this invention is incorporated within a cigarette maker, the suction drum 12 or some other operatively equivalent means, such as, for instance, a suction belt, can be utilized to accomplish other functions which relate to the operation of the cigarette maker such as, for example, a cut tobacco braid forming device as described in U.S. Pat. No. 3,548,837 entitled "Tobacco Rod forming Method and Device" by Athos Cristiani. Obviously, in those instances where the structure of this invention is not incorporated into a cigarette maker, the selected tobacco adhering to the face of drum 12 can be transferred to an appropriate means for further processing.

Obviously, many modifications and variations of the present invention are possible in the light of the above teaching. It is, therefore, to be understood that the invention may be practiced otherwise than as specifically described herein without departing from the spirit of the invention as defined in the appended claims.

What is claimed is:

1. A device for the pneumatic separation of stems and heavy foreign matter from a stream of cut tobacco, comprising

a hopper-shaped chamber having an air permeable wall converging toward a wall not permeable to air to provide an upper opening and a lower opening, said upper opening being larger than said lower opening;

a manifold coupled to the lower opening of said chamber to receive stems and heavy foreign matter;

an airlock interposed between said manifold and the lower opening of said chamber;

a duct coupled between said airlock and the lower opening of said chamber to direct air to said chamber through the lower opening thereof;

an air permeable surface positioned over the upper opening of said chamber;

suction means coupled to suck air into said chamber through said air permeable wall and from said duct to move tobacco particles upward to said air permeable surface, and out of said chamber through said air permeable surface to hold tobacco particles against said air permeable surface while stems and heavy foreign matter fall down to said manifold after passing through the lower opening of said chamber and said airlock; and

means coupled on the side of said chamber opposite from said air permeable wall to feed a stream of cut tobacco to the upper opening of said chamber substantially tangent to said air permeable surface.

2. The structure of claim 1 wherein said air permeable wall comprises louvers positioned one above another each rotatably supported by a horizontally oriented shaft.

3. The structure of claim 2 wherein said duct coupled to the lower throat of said hopper includes a movable wall pivotally coupled to said wall not permeable to air to define the cross sectional area of the duct.

4. The structure of claim 3 including a wall member not permeable to air coupled to the lower portion of said air permeable wall.

5. The structure of claim 4 wherein said wall member not permeable to air is pivotally coupled to the lower portion of said air permeable wall.

6. The structure of claim 5 wherein said means coupled to feed cut tobacco to the hopper comprise a belt conveyor.

7. The structure of claim 6 wherein said air permeable surface positioned over the upper opening of said hopper comprises a rotary drum having an air permeable face.

8. The structure of claim 7 including means to couple a selected area of the air permeable face of said drum to said suction.

9. The structure of claim 8 wherein said means to couple a selected area of the air permeable face of said drum to said suction means comprises a stationary member having at least one suction conducting channel.

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