

June 30, 1953

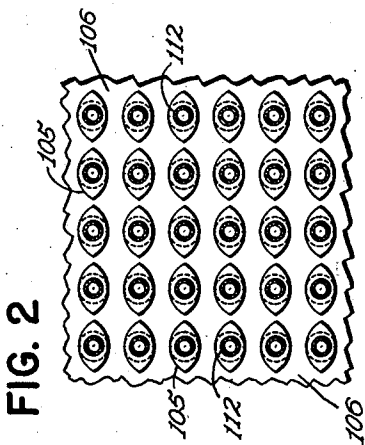
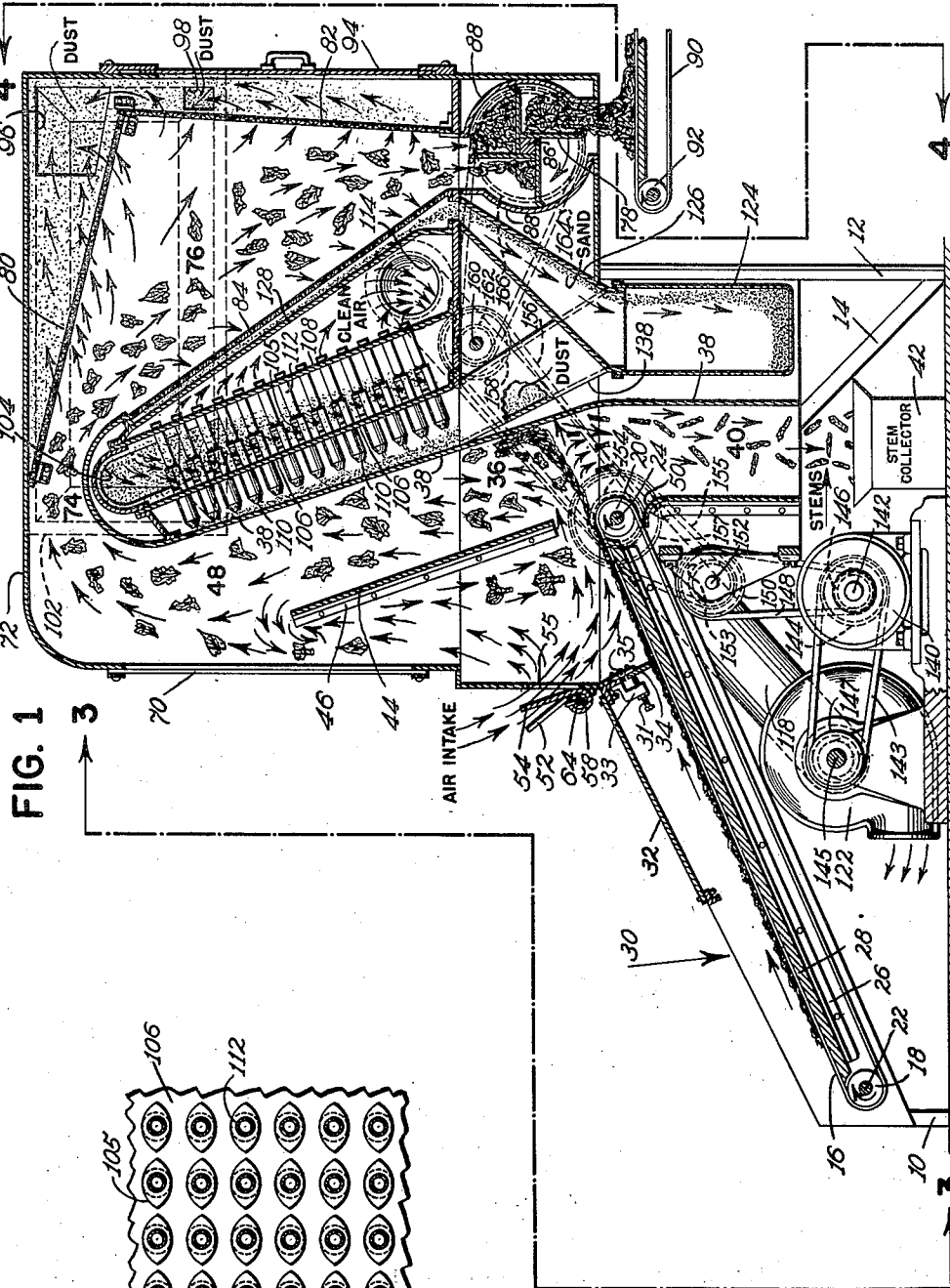
O. E. EISSMANN

2,643,768

SEPARATING APPARATUS

Filed Feb. 20, 1947

2 Sheets-Sheet 1



INVENTOR
OSWALD ERICH EISSMANN
BY *Tanner & Crist*
ATTORNEY

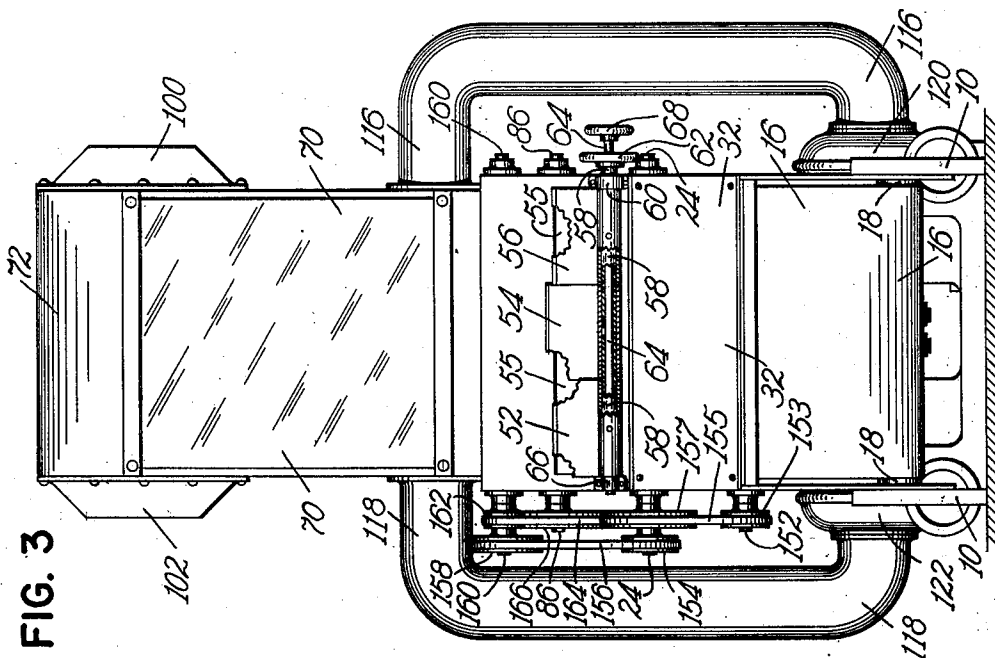
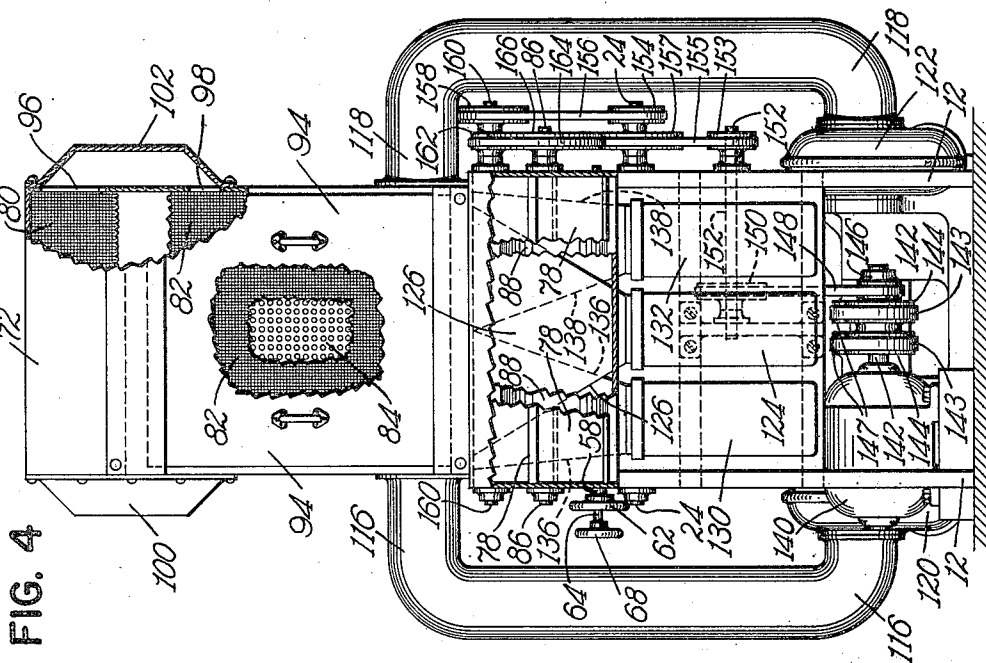
June 30, 1953

O. E. EISSMANN
SEPARATING APPARATUS

2,643,768

Filed Feb. 20, 1947

2 Sheets-Sheet 2



INVENTOR
OSWALD ERICH EISSMANN
BY *Tanner & Erstad*
ATTORNEY

UNITED STATES PATENT OFFICE

2,643,768

SEPARATING APPARATUS

Oswald Erich Eissmann, Richmond, Va., assignor
to American Machine Development Corpora-
tion, a corporation of New York

Application February 20, 1947, Serial No. 729,818

3 Claims. (Cl. 209—135)

1

The present invention relates to improvements in separating devices and, more particularly, relates to devices for separating cleaned tobacco leaf lamina, stems and heavy ribbed portions of tobacco leaf, lint, sand and dust from a continuous stream of ripped tobacco wherein these materials are all intermingled.

None of the tobacco segregating or separating machines in use up to the present time is able to effectuate a complete recovery of the blade portions of the leaf in one separating action. As a result, it has been necessary to make a further separation of the stems from the separated leaves after they have been through a separator, by either removing the stems by hand or by sending the segregated portions through a series of separating machines. The stems which are separated also have intermingled with them so much lamina that it is necessary to process this material through a successive number of separators to effect a further recovery of tobacco leaf lamina.

In the separating and segregating machines, in use at the present time, the atmosphere surrounding the machines is also extremely dusty and constitutes an undesirable health hazard for the people working in the vicinity of these machines. To overcome this dust condition, sifter bags, operating in a manner similar to a bag used on a vacuum cleaner, have been employed to remove as much dust as possible from the air pulled through the machine by the suction fan. These bags are usually located at some area remote from the machine which necessitates the use of pneumatic tubes connecting the fan to the filter bags. These tubes and filter bags use up a great deal of space, interfere with cleaning, and form undesirable obstructions in a factory processing tobacco.

It is, therefore, an object of my invention to provide a segregating apparatus which will have high segregating efficiency and which will enable a complete segregation to be made on the first run of ripped tobacco through the machine by having the segregation so complete that it would be unnecessary from an economic point of view to re-run the ripped tobacco through the segregating machine to effectuate a further separation.

It is also an object of my invention to provide a self-contained separating unit which dispenses with the requirement of employing large, cumbersome dust filters which, because of their size are usually located at a distance from the separating units, so that it is necessary to employ

2

long cumbersome ducts, which are relatively expensive to install, connecting the filters with the separating unit.

It is also an object of my invention to provide a separating machine which will be compact and occupy a minimum of space while maintaining a maximum of segregating efficiency which can be used for effecting a segregation of commingled material into separate classes.

Another object of my invention is to provide a segregating apparatus which will employ a bank of small diameter cyclone dust separators which will be part of the tobacco separating device.

Another object is to provide a tobacco separating device which will enable the volume of air pulled through the machine to be increased without increasing the pressure.

Another object is to provide a dust separating device, as an integral part of the machine, which will enable the atmosphere surrounding the machine to be kept free of tobacco dust and thus promote the general health and well being of the attendants who have to work in the vicinity of the tobacco separating machines.

Another object of this invention is to provide an improved machine and an improved method for separating and segregating the stems and blade portions of a conglomerate mass of stems and blade portions of tobacco leaves by first removing the stems and heavy ribbed portions from a tobacco laden air stream, then removing the sand from the air stream, then removing lint from the stream and then removing the tobacco dust and fine sand from the stream to thus remove substantially all material from the air stream before engaging with the blades of the fan producing the suction.

Another object is to provide a tobacco separating machine which will not only avoid contaminating the body of air surrounding the machine but will actually clean the air surrounding the machine while it is segregating tobacco in the manner described.

A further object is to provide a device for separating a variety of material other than tobacco which will have controls enabling it to be adapted for such usage.

Other objects and features of the invention will appear as the description of the particular physical embodiment selected to illustrate the invention progresses. In the accompanying drawings, which form a part of this specification, like characters of reference have been applied

3

to corresponding parts throughout the several views which make up the drawings in it.

Fig. 1 is a sectional side elevation of the tobacco separator unit.

Fig. 2 is a fragmentary section showing the arrangement of the dust collector unit;

Fig. 3 is a front elevation of tobacco separating unit taken on line 3—3 of Fig. 1; and

Fig. 4 is a rear elevation with parts broken away taken on line 4—4 of Fig. 1.

The separating unit that I have disclosed in the drawings accompanying this specification may be used for separating a variety of materials, and is particularly adapted for separating tobacco leaf lamina and other materials from a continuous stream of ripped or torn tobacco. The apparatus consists of a frame having legs 10 and 12 and suitable braces 14 which support the unit above the floor. The items to be separated, such as a mass of tobacco leaves, consisting of the blade portions and stem portion which have been torn away from each other, are placed on an infeed conveyor belt 16 which travels over rollers 18 and 20. Roller 18 is freely mounted on shaft 22 which is supported in the framework of the machine; while roller 20 is fixedly mounted on the drive shaft 24 which, in turn, is supported by suitable bearings formed in the frame of the separating machine.

A suitable angle iron 25, attached to the framework of the machine, is provided to support the plates 28 over which the belt 16 carrying a layer of tobacco travels.

When the separating machine is used in conjunction with a tobacco ripping machine, the ripping machine will be placed over the opening 30 so that as soon as the heavy ribbed portions and stems have been torn from the leaf portions, they are dropped onto the conveyor belt 16 and carried through the segregating machine shown in the drawings.

A cover 32 is provided to prevent air from entering into the separating unit. An adjustable plate 34, mounted on a suitable hinge 35, is provided for also limiting the air that will enter into the segregating machine at that portion of the machine which receives tobacco from the tobacco ripping machine or other source of supply which has to be segregated. A bracket 33, connected to the housing of the separator, carries and adjusting screw 31 which enables the plate 34 to be adjusted. If a quantity of tobacco in excess of that for which the plate 34 is adjusted is fed into the machine, the excess tobacco will merely push the plate 34 up when entering the separator. Hence, no stoppages occur at this point.

After the tobacco has been deposited on the conveyor belt 16, it is forwarded with sufficient speed to throw it into the channel enclosure or air passageway 36 with such force that the heavier stem portions will hit the rear wall 38.

The clean stems and whole leaves having their stems still affixed thereto fall through the chute 40 into the stem collecting box 42. The rest of the material is elevated upwardly by the rush of air through channel 36 toward the expanded area 48 which constitutes a means for lowering the air pressure. As a consequence when the rest of the material reaches the expanded area 48, the air velocity drops down due to the greater expanse. The air velocity, however, is sufficient to elevate all the leaf portions which do not have stems up around the bend 74 into a second expansion chamber 76 which also acts as a means

4

for lowering the air pressure. The leaf portions, which still have some stem pieces attached, are blown toward the window 70 due to the lower velocity at this portion of the chamber where they tend to drop back toward the belt 16.

Doors 52, 54 and 56 are adjustable and the amount of air drawn through the opening 55 goes partly up behind the glass wall 70 and engages with any leaves starting to fall down at this area. It would seem that there is some friction between the vertical glass plate 70 and the air stream so that the velocity of the stream near the glass is somewhat less than further away. As a result, any leaf having a stem portion attached, if heavy, will fall. When the doors are properly adjusted, door 54 will normally be opened wider than doors 52 and 56, thus allowing more air to enter in the middle than on the sides. Any leaves having stem parts that do not fall down on to belt 16 will be whirled around by the air coming up through the opening covered by door 54. The velocity of this air is sufficient to prevent many of the leaves with stem from falling, but the velocity will be insufficient to raise it up through the band 74. The whirling leaf is finally pushed to one side or the other of the separator and, since the doors 54 and 56 do not allow quite as much air to enter through the openings 55 on either side of the housing 72, the leaf finally falls downwardly close to the side walls on to the sides of belt 16.

In the chamber 36, the air flow close to the side walls has a slightly lower velocity due to the friction between the air stream and the side walls. This lower velocity has been found sufficient to allow the piece of leaf, having the stem affixed thereto, to drop through the chute 40. The whirling motion has the advantage that it causes sand to be loosened and separated from the tobacco.

When a leaf of tobacco does not have a stem attached to the same but instead has a stem which is entangled with the leaf, the whirling or washing motion will separate them from each other so that a segregation can be effected.

The opening formed by the doors 52, 54 and 56 is adjusted so that a maximum separating action is effected by the machine when it is in operation. A glass plate 70 is provided in front of the machine to enable the attendant of the machine to see that the tobacco separating unit is operating properly and also to see that the separation effected on the tobacco leaves is proper and thus facilitates checking and making adjustments to the machine. The upper part of the tobacco segregating unit is enclosed by means of a sheet of sheet metal 72.

The bladed portions of the tobacco leaf, which have no stems attached thereto, are carried upwardly around the bend 74 into the air chamber 76. A suitable scraper 50 made of suitable material, such as heavy canvas or woven rubberized material, is provided for removing any leaves that might adhere to the belt 16 and for sealing off the chute 40 to prevent any undue leakage of air through this opening into the separating unit.

Suitable hinged air adjusting doors, consisting of three parts 52, 54 and 56, shown in Figures 1 and 3, regulate the amount of air entering the separating apparatus. Doors 52 and 56 are fixedly mounted on a sleeve 58 supported in a suitable bracket 60. The sleeve 58 is rotated by means of a hand wheel 62, shown in Figure 3. The door 54 is mounted on a shaft 64 passing

5

through the sleeve 58. The shaft 64 is supported at one end in a bracket 66 attached to the machine and has, at the other end, an adjusting knob 68 which permits the shaft 64 to be rotated to open and close door 54. Reference to Figures 1 and 3 will, therefore, show that the doors 52 and 56 can be swung independently of the door 54 due to a suitable slot being formed in the sleeve 58.

The tobacco laden air stream, as it passes around the bend 74, carries with it not only the bladed portions of the tobacco leaves but also sand, lint and tobacco dust. As soon as the tobacco has passed through the comparatively constricted portion of the air passage 74, it enters into a chamber 76 which has separating screens 80 and 82 on one side and an inclined sifting screen or plate 84 on the other side.

Due to the sudden lowering of air velocity in chamber 76, the coarser sand immediately falls or dribbles down upon the inclined plate 84 and ultimately passes through the perforations formed in this plate on to the inclined wall 128 from which it slides into a suitable collecting bag to be hereinafter described. The bladed portions of the tobacco leaves, due to the lowering of air pressure, drop down into the pockets of the revolving door 78. The lowering in the air pressure, however, is not sufficient to cause the dust, lint and fine sand to settle out of the air stream. These particles are, therefore, drawn against the screens 80 and 82 which act to remove the lint from the air stream. The tobacco dust and fine sand, on the other hand, pass through the screens out through the openings 96 and 98 formed in the side walls of the tobacco segregating device.

The revolving door 78 is mounted on a shaft 86 and is rotated in a cylindrical housing 88. The door 78 acts to remove the cleaned bladed portions of tobacco leaves that have been removed from the air stream in chamber 76, while maintaining a constant seal against leakage of the outside atmosphere into the chamber 76. The tobacco, which has been received in the pockets of the revolving door or gate 78, is deposited on a conveyor belt 90 traveling around roller 92 in the direction indicated by the arrow.

A removable door 94 is provided to facilitate removing the lint and other foreign matter that accumulates against the screens 80 and 82. As disclosed in Figure 1, the door may be removed by first lifting it up and then pulling the bottom outwardly and downwardly. After the tobacco dust laden air has passed through the openings 96 and 98, it enters and passes through the connecting ducts 100 and 102 located on each side of the separating unit (Figure 4).

The opposite ends of the ducts 100 and 102 are connected through openings 104 to the intake side 105 of a bank of small diameter centrifugal type dust collectors which are shown partially in cross section in Figure 2. The intake side of the bank of cyclone dust separators 110 of the small diameter type is confined by the side walls of the housing, forming the tobacco segregating unit, and by the plates 106 and 108. After the dust laden air passes into the inlets of the various centrifugal type dust collectors, the air is given a twirling motion which separates the dust from the air by centrifugal force. If desired, reference may be made to U. S. Patent No. 1,990,943 issued to Mr. George H. Horne on February 12, 1935, for a more detailed explanation of the operation of this general type of dust collector.

The dust falls out of the conical opening 110

6

of each dust collector and the clean air passes out through the exhaust tube 112 of each dust filter. The clean air then passes through openings 114 formed on opposite sides of the side walls making up the housing for the tobacco separating unit. These openings 114 are connected by ducts 116 and 118 to the intake side of a suitable air exhausting means such as exhaust fans 120 and 122.

The air ejected by the exhaust fans 120 and 122 can be ejected directly into the atmosphere because it has been freed from tobacco dust and grit and foreign matter. It can be pointed out here that the structure I have provided not only avoids contaminating the air in a tobacco plant but, due to the fact that it is taking in air which is less clean than the air it ejects, it will also act as an air purifier for the plant because of the large volume of air that it is able to handle.

By referring to Figures 1 and 4, it will be seen that three bags are provided for collecting the dust and sand removed from the air which has had a washing effect on the tobacco leaves as they passed through the tobacco segregating machine. The center bag 124 is used to collect the sand through a tapered chute 126 which extends, at its upper end, across the entire width of the wall 128. The sand, which has passed through the screen or perforated sheet, slides down this inclined wall 128 through the chute 126 into the collecting bag 124. The other two bags 130 and 132 collect the tobacco dust which is discharged from the conical openings 110 of the dust filters. The dust removed by the dust filters 110 slides along the back separation wall 38 down through one of the chutes 136 or 138 into their respective collecting bags 130 and 132.

The driving mechanism for my separator is provided by a motor 140 having a shaft 142 (Figs. 1 and 4). On the shaft 142 is mounted a double pulley 144 and a single V belt pulley 146. The double pulley 144, through a pair of V belts 143, drives a pair of pulleys 147 mounted on the drive shaft 145 which drives the exhaust fans 120 and 122. The pulley 146, by means of a suitable V belt 148, drives pulley 150 fixedly mounted on shaft 152. Pulley 153, also fixedly mounted on shaft 152, through V belt 155 imparts driving movement to pulley 157 fixedly mounted on shaft 24.

Mounted on the shaft 24 is a pulley 154 which is connected by means of a belt 156 to another pulley 158 mounted on an intermediate shaft 160. The intermediate shaft, carrying a second pulley 162, is connected by means of a belt 164 to a pulley 166 which is mounted on and drives the shaft 86.

The operation of my machine may be briefly described as follows:

As I have previously indicated, my separating device may be operated as a unit by itself or it may be connected to a tobacco ripping or shredding machine of the type shown in my previous Patent No. 2,127,329 issued on October 16, 1938, which will loosen or tear the tobacco stem and the heavy ribbed portions of the tobacco leaf from the blade portions of the tobacco leaf. When my machine is used in this latter manner, the tobacco ripping machine will be positioned over the opening 39 of my segregating machine and the ripped tobacco leaves and stems will be deposited directly upon the conveyor belt 16. If my device is used by itself, ripped tobacco will be deposited on the conveyor belt 16 either by hand

or by a conveyor system which automatically delivers the material to be separated to my machine.

The conveyor belt 16 delivers the material deposited thereon into my segregating machine with sufficient speed to throw it out into the air passage 36 so that the heavier objects are thrown against the rear wall 38. This preliminary throwing has been found to be of material assistance in increasing the separating efficiency of my machine. The heavy ribbed portions of the leaf and the stems and any other heavy objects then fall down the chute 40 into a box or other receiving means 42. The lighter material, such as the blade portions of the tobacco leaf, lint, dust and sand are raised by the air stream up between the walls 46 and 38 into the area designated by the numeral 48.

At this point, there is a slight drop in air velocity and if any of the leaves or items raised by the air stream are too heavy to be pulled around the bend 74, they will fall down between the wall 44 and the glass plate 70. These leaves or items are then ejected for the second time into the area designated by the numeral 36.

The leaf portion which travels around the member 44 in a circuitous manner will receive a certain amount of washing which helps to loosen any adhering stems and also acts to open up to a certain extent the blade portion of the leaves so that, on the second entrance into the chamber 36, a separation may then be more readily made.

As previously mentioned, the doors or gates 52, 54 and 56 are adjusted to regulate the amount of air passing through the opening 55 to secure a controlled distribution of air volume and pressure across the entire width of the separator unit.

It will be noted that air is primarily drawn into the machine through a second entrance formed by chute 40 and through the openings 55. A certain amount of air, of course, seeps in with the leaves under the air adjusting door 34. When the tobacco leaves pass around the bend 74 into the chamber 76, the velocity again drops so that the tobacco leaves fall into the pockets of the revolving door 78. The coarser sand also, because of the drop in pressure, falls on to and trickles down the inclined perforated plate 84. When the sand falls through the small mesh openings formed in this screen, it drops on to an inclined wall 128 where it slides into the chute 126 and finally into the sand collecting bag 124.

Lint is separated from the air stream by means of the screens 80 and 82. Any fine sand and dust which passes through the screens 80 and 82 passes through the connecting ducts 100 and 102 into the intake side 105 of the bank of the small diameter centrifugal dust filters. As the air is pulled through the intake side of the filters and out through the exhaust tubes 112, it is given a twirling motion which separates the dust by centrifugal force from the air. The dust trickles down on the wall 38 into one of the chutes 136 or 138, thence into their respective dust collecting bags 130 and 132. The clean air which is removed through the exhaust ducts of the dust filters 112 and out through the openings 114 through the ducts 116 and 118 is then sucked out through the exhaust fans 120 and 122. It will, therefore, be evident that the rotor blades will not come in contact with coarse abrasives and their useful life will be materially increased as a result of my invention.

My invention also aids in the promotion of the general health and well being of attendants working in the vicinity of the machine because it not only avoids contaminating the air surrounding the machine but it also, by pulling in air which may not be clean and replacing it with air that has been cleaned, provides a more healthful atmosphere for an employee to work in.

The invention above described may be varied in construction within the scope of the claims, for the particular device selected to illustrate the invention is but one of many possible embodiments of the same. The invention, therefore, is not to be restricted to the precise details of the structure shown and described.

What is claimed is:

1. A tobacco classifier unit having a housing for separating torn tobacco leaf into different categories comprising an enclosed passageway having a vertical current separator having an inlet for receiving into said passageway torn tobacco to be separated, settling areas connected with said passageway for separating the torn tobacco into different categories received from said vertical current separator, a plurality of small diameter cyclone filters having diameters of less than 12 inches mounted on said classifier and connected with said passageway subsequent to the settling areas for receiving the air stream after it has had the torn tobacco removed therefrom to remove fine dust from the air stream and fan means connected with said cyclone filters for causing a stream of air to flow through the vertical current separator, the settling areas, said passageway and said cyclone filters to act as a carrier for said torn tobacco and to discharge clean air into the room.

2. A tobacco classifier for separating torn tobacco leaves into separate categorical classes having similar characteristics comprising, a classifier housing, an air passageway having a vertical current separator leading through said housing for carrying torn tobacco to be separated through said housing, a device for causing a stream of air to flow through said air passageway to carry torn tobacco therethrough, a plurality of settling chambers formed in said air passageway to separate said torn tobacco into different categories having similar characteristics, and a plurality of small diameter cyclone separators mounted within said housing in said air passageway between said vertical current separator and subsequent to said settling chambers for removing dust and fine sand from the air stream passing through said air passageway, and a conduit connecting said settling chamber with said bank of small diameter cyclone separators to separate the dust and fine sand from the air discharged from the settling chamber.

3. A tobacco classifier enclosed in a housing for torn tobacco leaves comprising a vertical current separator chamber, a settling chamber having an inclined wall connected to the top of the separating chamber, means for causing a stream of air to flow upwardly through said vertical current separator into said settling chamber, a screen positioned adjacent said settling chamber through which said air stream passes, a bank having a multiplicity of small diameter cyclones mounted in the space between the vertical separator chamber and the settling chamber, and a conduit connecting said settling chamber with said bank of small diameter cyclone separators

to separate the dust and fine sand from the air discharged from the settling chamber.

OSWALD ERICH EISSMANN.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
380,096	Davis	Mar. 27, 1888
460,078	Barnard	Sept. 22, 1891
602,250	Ancel	Apr. 12, 1898
651,022	Sterling	June 5, 1900
743,814	Boyd	Nov. 10, 1903
969,157	Day	Sept. 6, 1910
1,143,587	Marsden	June 15, 1915
1,236,147	Cary	Aug. 7, 1917
1,597,261	Bishop	Aug. 24, 1926
1,706,787	Kellie	Mar. 26, 1929
1,791,673	Karlson et al.	Feb. 10, 1931
1,854,209	McLean	Apr. 19, 1932
1,931,555	Mosley	Oct. 24, 1933
1,945,771	Dahlstrom et al.	Feb. 6, 1934

Number

1,720,861
2,033,833
2,130,880
2,138,529
2,173,087
2,173,088
2,186,167
2,233,432
2,257,552
2,281,610
2,360,355
2,367,281
2,373,969
2,403,740
2,405,625

Number

382,776
661,963
93,386

Name

Date

Stebbins July 16, 1929
Kent Mar. 10, 1936
Durning Sept. 20, 1938
Thys Nov. 29, 1938
Eissmann Sept. 19, 1939
Eissmann Sept. 19, 1939
Eissmann Jan. 9, 1940
Schramm Mar. 4, 1941
Hammack Sept. 30, 1941
Watson et al. May 5, 1942
McBride et al. Oct. 17, 1944
Johnson Jan. 16, 1945
Lincoln Apr. 17, 1945
Muench July 9, 1946
Whiton et al. Aug. 13, 1946

FOREIGN PATENTS

Country

Date

Great Britain Nov. 3, 1932
Germany July 1, 1938
Sweden Nov. 19, 1938