

Feb. 8, 1955

O. E. EISSMANN

2,701,570

APPARATUS FOR THRESHING AND WINNOWING TOBACCO LEAVES

Filed Sept. 25, 1948

3 Sheets-Sheet 1

FIG. 1

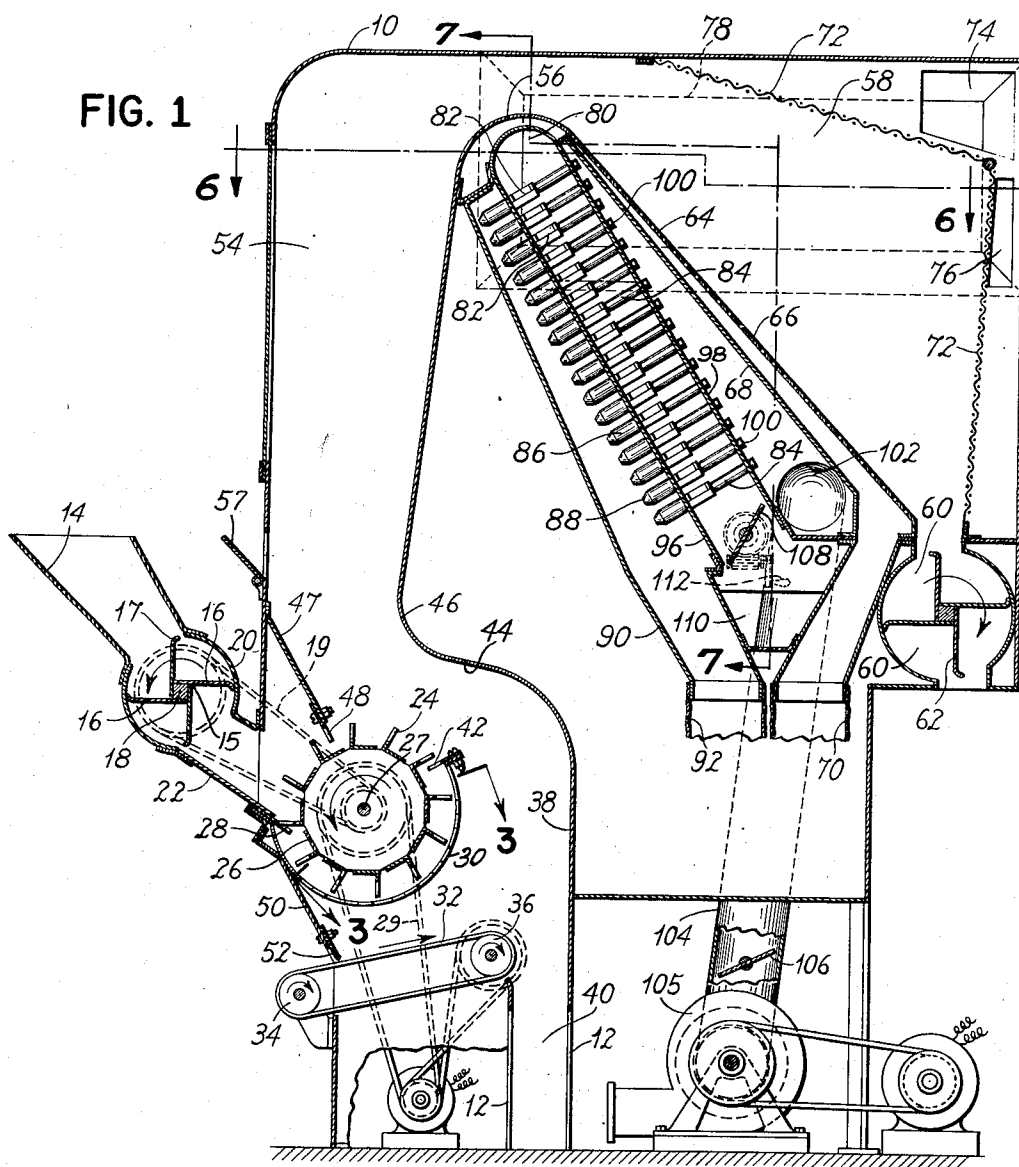
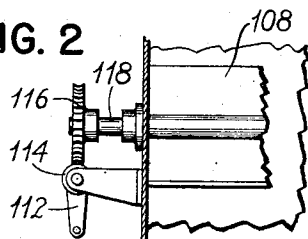


FIG. 2



INVENTOR
OSWALD ERICH EISSMANN
BY *Terence J. Crist*
ATTORNEY

Feb. 8, 1955

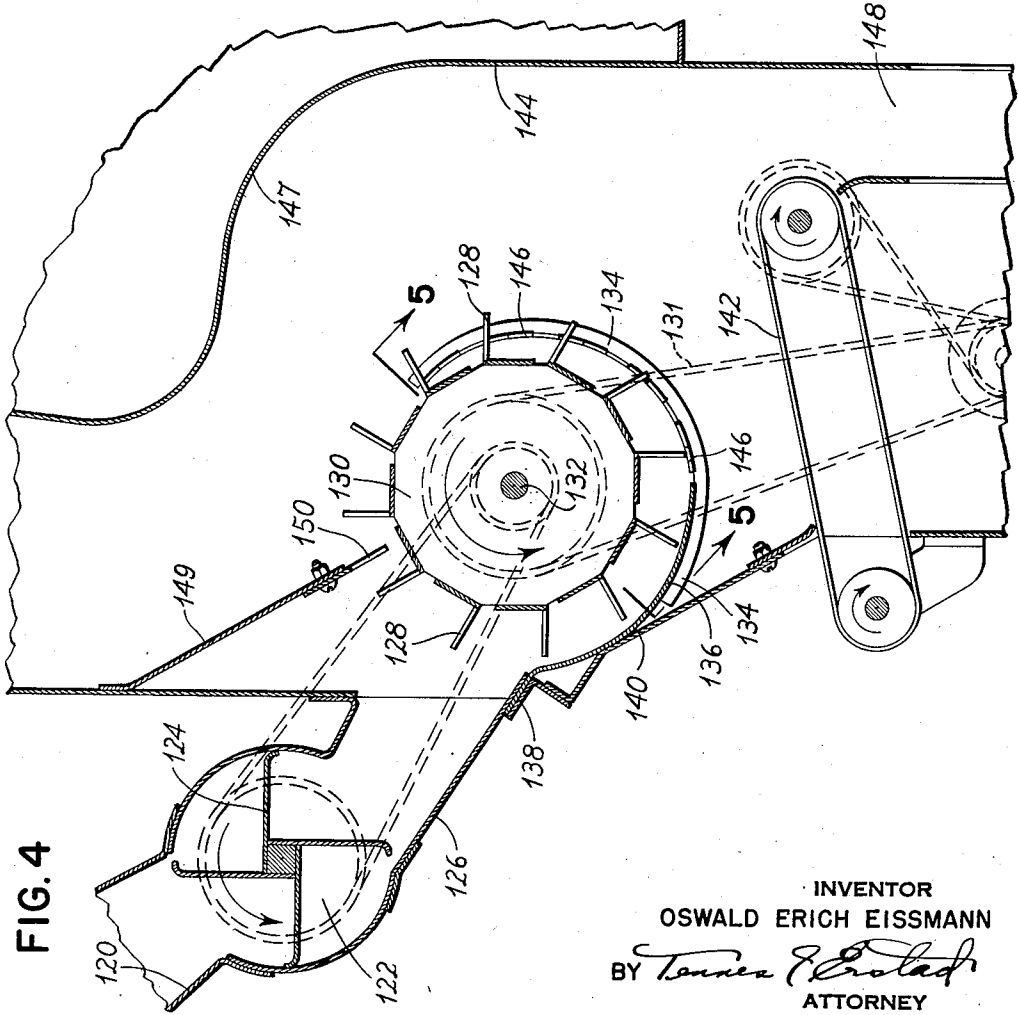
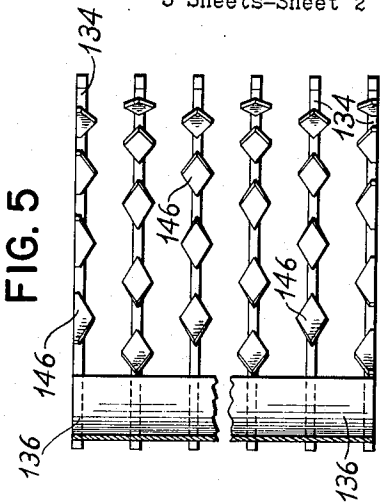
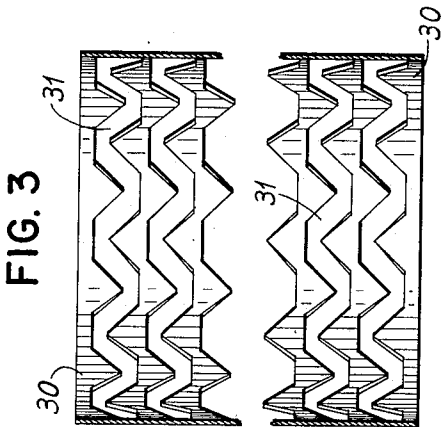
O. E. EISSMANN

2,701,570

APPARATUS FOR THRESHING AND WINNOWING TOBACCO LEAVES

Filed Sept. 25, 1948

3 Sheets-Sheet 2



INVENTOR
OSWALD ERICH EISSMANN
BY *Tanner & Erolad*
ATTORNEY

Feb. 8, 1955

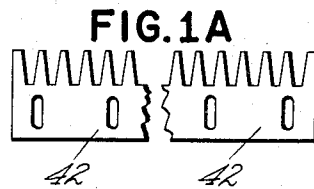
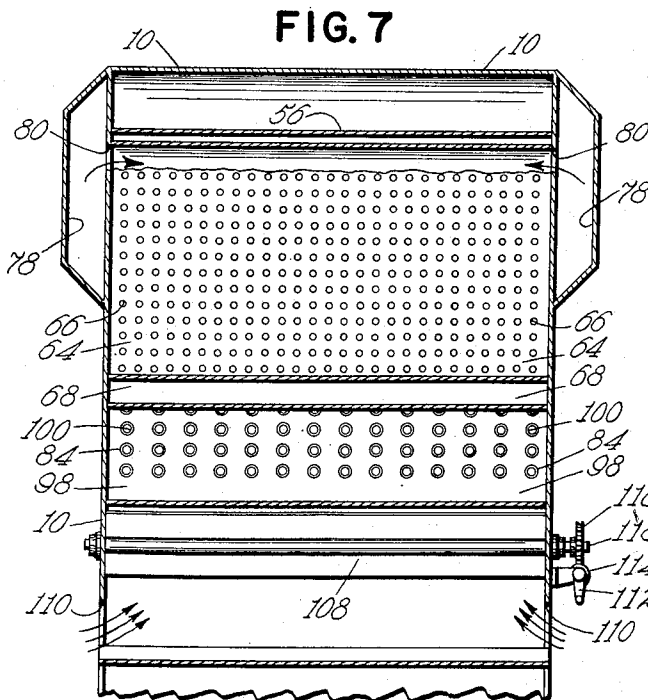
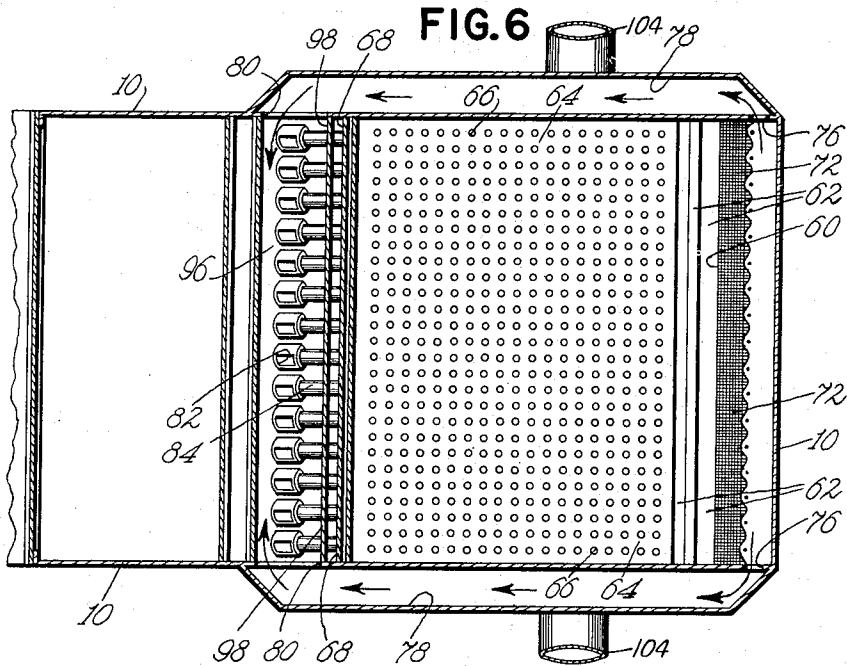
O. E. EISSMANN

2,701,570

APPARATUS FOR THRESHING AND WINNOWING TOBACCO LEAVES

Filed Sept. 25, 1948

3 Sheets-Sheet 3



INVENTOR
OSWALD ERICH EISSMANN
BY
Tennies & Pott
ATTORNEY

1

2,701,570

APPARATUS FOR THRESHING AND WINNOWER TOBACCO LEAVES

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

Application September 25, 1948, Serial No. 51,211

13 Claims. (Cl. 131-146)

This invention relates to apparatus for threshing and winnowing tobacco leaves and more particularly to tearing up whole leaves and then separating the torn leaf into the categories of tobacco leaf lamina, stems, lint, sand and dust.

In the past the ripping and winnowing efficiency of various devices developed in this field are affected by the type and condition of the tobacco being handled. Since the moisture content of tobacco and the type of tobacco for which the separator is used of necessity varies from day to day the separating efficiency of such machines also varies in a similar manner. When small diameter cyclone dust separators were employed with such apparatus, the dust separators would become clogged after being in use for a period of time due to an accumulation of dust and fine sand inside the cyclone separator. As sand and dust accumulate inside the separators the leaf and stem separating efficiency decreased still further. The job of cleaning and replacing the separators took much time and was expensive.

It is an object of this invention to provide a tobacco tearing and separating apparatus wherein the variable factors such as tobacco moisture and tobacco volume are more adequately provided for in the apparatus so as not to affect the separating efficiency of the machine.

It is also an object to provide an improvement in small diameter cyclone separators which will enable them to operate for long periods of time without becoming clogged due to accumulation of dust and fine sand inside of the filter.

It is also an object of this invention to provide a device which will enable the correct amount of air to flow through the separator to obtain efficient segregation of leaf lamina from stems and which will enable a different amount of air to flow through cyclone separators interposed in the air stream flowing through said separator to provide a flow of air having sufficient velocity to prevent the accumulation of dust in said cyclone separators.

Another object is to provide a tobacco tearing and separating apparatus which will have a minimum of parts and which will operate efficiently over long periods of time.

Another object is to provide a tobacco leaf tearing apparatus wherein torn leaf components are discharged between elongated spaces into a winnowing air stream and a stem deflector which will facilitate the separation of stems from the torn leaf.

A further object is to provide a leaf tearing device which will consist of spaced elongated tobacco tearing members which are eccentrically positioned with respect to a toothed drum to effect a gradual positive tearing action on the tobacco leaf.

Another object is to provide a pneumatic conveying channel with a contour which will facilitate the separation of stems from tobacco leaf lamina.

A further object is to provide a torn tobacco leaf separating apparatus wherein there will be no interference due to air seeping into the separator at the area where tobacco is delivered into the separating apparatus.

A further object is to provide a method for keeping cyclone separators free from clogging where they are interposed in an air stream having a volume of air different from that needed to flow through the cyclone separators to keep dust from accumulating therein.

Other objects and features of the invention will appear as the description of the particular physical embodiment

2

selected to illustrate the invention progresses. In the accompanying drawings, which form a part of this specification, like characters of reference have been applied to corresponding parts throughout the several views which make up the drawings.

Fig. 1 is a sectional side elevation of the tobacco threshing and winnowing apparatus.

Fig. 1A is a plan view of one of the rakes.

Fig. 2 is a partial sectional front elevation of the external air control for allowing air to flow into the small diameter cyclone filters directly from the outside atmosphere.

Fig. 3 is a plan view of the serrated concave surrounding the path of travel of the rotating comb as seen from line 3-3 of Fig. 1.

Fig. 4 is a sectional side elevation of a modified form of the invention.

Fig. 5 is a plan view of the eccentrically mounted tobacco tearing elements as seen from line 5-5 of Fig. 4.

Fig. 6 is a cross-sectional plan view taken on line 6-6 of Fig. 1.

Fig. 7 is a cross-sectional elevation taken on line 7-7 of Fig. 1.

The apparatus shown in this application constitutes an improvement over that shown in my copending application S. N. 788,705 filed November 28, 1947, now Patent No. 2,667,174.

My threshing and winnowing apparatus consists of an outer housing 10 supported on suitable legs 12. Tobacco to be ripped and separated into the different categories mentioned is delivered either by hand or a suitable conveyor into the receiving chute 14. The tobacco so delivered slides into one of the revolving pockets 15 of a gate having revolving vanes or partitions 16 which act as an air seal.

Bar 18, on which the partitions 16 are mounted, is rotated in the direction shown by the arrow from a suitable source of power by a belt 19. An air tight seal between the circular housing 20 and the partitions 16 is obtained by providing the outer edge of each partition 16 with a suitable flexible material 17, as shown in U. S. Patent 1,928,791 granted October 3, 1933 to Sigurd Norman, along the edge of each partition 16 to prevent air from being drawn in at this point of the machine. The tobacco leaves received by the pockets 15 are fed at a more or less uniform rate onto the chute 22 which is provided at its lower end with a stationary rake 28. The tobacco moving over rake 28 comes within the path of travel of combs 24 mounted on rotating drum 26. The projections or combs 24 are mounted at spaced intervals on the drum 26. Drum 26 mounted on shaft 27 is driven in the direction indicated by the arrow from a suitable source of power through a belt 29.

Tobacco leaves engaged by the teeth of combs 24 are pulled through the teeth of a stationary rake 28 where they undergo a preliminary tearing action. The torn tobacco is then forwarded by the combs 24 along the serrated strips 30 where a further separation of the tobacco leaf lamina from the stems takes place. The strips 30 are constructed as shown in Fig. 3 and permit the torn tobacco to be discharged through the spaces 31 between the strips 30. Some of the tobacco discharged through the spaces 31 is hurled towards the wall 38 while the balance is discharged onto a belt 32 which travels in the direction indicated by the arrow over rollers 34 and 36.

The plate 50 forms part of the housing 10 for the separating apparatus and directs any lamina and stems passing out through the spaces 31 onto the belt 32. At the lower end of the plate 50 is mounted a suitable flexible sealing element 52 which prevents air from entering into the separating apparatus at this point.

Any tobacco not discharged between the strips 30 in this manner is carried upwardly by the combs 24 through a second stationary rake 42 mounted across the separator at the ends of strips 30 where a still further tearing of the remaining tobacco takes place. After passing through the rake 42 centrifugal force causes the tobacco to be hurled upwardly. The tobacco hurled in this manner comes in contact with the air stream as it travels

around the horizontal bend 44. The velocity of the air stream is controlled, in a manner hereinafter described, so as to elevate tobacco leaf lamina through a chamber 54 while allowing stems having lamina adhering thereto to fall back onto the plate 47 where they slide down again into the range of action of the teeth 24.

The stems which slide down the plate 47 are pulled through the teeth of a third stationary rake 48 by the combs 24 where any lamina still adhering to the stems will be torn off. As such stems continue traveling around with the teeth 24 they again pass the first mentioned stationary rake 28 and by this time are sufficiently separated from each other to pass out through the spaces 31.

Belt 32 traveling over rollers 34 and 36 in the direction indicated by the arrow hurls tobacco deposited thereon towards the vertical wall 38. Air drawn upwardly through the passageway 40 carries with it the lighter material consisting of leaf lamina, stems having lamina attached thereto, dust, sand, lint, feathers, and string while allowing the heavier material consisting of stems without lamina attached thereto to fall downwardly through the air passageway 40 into a suitable stem collector (not shown).

Any stems having lamina attached thereto are deflected by the horizontal bend 44 across the air stream towards plate 47 to be automatically reprocessed to remove the attached lamina. The stems deflected towards the plate 47 instead of being drawn upwardly by the air stream with the lighter elements such as lamina, string, lint and feathers. The lighter material just mentioned is carried around the bend 46 upwardly through a shaftway which widens at the area 54 where a further decrease in velocity takes place so that any stems having lamina still adhering thereto will fall downwardly.

A triple gate 57 similar to that shown in my copending application S. N. 729,818 filed February 20, 1947, now Patent No. 2,643,768 allows more air to enter in the center portion of the passageway than at the sides to facilitate the elimination of swirling tobacco which is too heavy to be lifted up and too light to fall down. This causes such heavier elements of torn tobacco leaves such as stems having flags or portions of lamina still adhering thereto to move to the sides of the passageway where friction further reduces the velocity of the air. This further reduction in air velocity allows the stems and flags adhering thereto to settle downwardly where they fall into the path of travel of the teeth of combs 24. In this way I have accomplished my objective of providing an apparatus which will be very efficient in obtaining a substantially complete separation of the leaf lamina from the stems and which will automatically reprocess any stems having flags still adhering thereto.

The lighter materials are pulled upwardly around the bend 56 into another separating chamber 58 similar to that shown in my copending application S. N. 729,818. The decrease in velocity in chamber 58 allows the lamina to settle out of the air stream in this area and fall downwardly into the pockets 60 of the revolving gate 62. Lamina is discharged from the pockets 60 by the rotation of gate 62 without allowing air to enter into the separator at this point. Coarse sand particles settle down upon the inclined perforated plate 64 and pass through the perforations 66 onto the inclined plate 68. The sand then slides downwardly into suitable sand collectors 70.

Screens 72 through which air is exhausted from the chamber 58 separates lint, string and feathers from the air stream at this area. The air stream then passes outwardly through openings 74, 76 formed in the sides of the separating apparatus into suitable ducts 78 mounted on each side of the separator. The air stream is then led into the opening 80 which connects with the tangential inlets 82 of the small diameter cyclone separators 84. The air entering the tangential inlets 82 of each small diameter cyclone separator is caused to spin around the inside of the tubular shell 86 of each separator. This spinning action results in centrifugal force separating the dust from the air and the dust is discharged outwardly through the discharge end 88 of each separator onto the inclined wall 90 and slides downwardly into a suitable collector.

The air from which the dust has been separated by centrifugal force is exhausted from each small diameter cyclone separator through its respective outlet ducts 100. The walls 96 and 98 make up an air duct separating the inlets 82 from the dust outlets 88 and the air outlets 100. Air is exhausted from the air passageway confined be-

tween the walls 68 and 98 and the sides of the separator housing 10, through openings 102 which connect with ducts 104 mounted on each side of the separator in a manner similar to that shown in copending application S. N. 788,705. Ducts 104 in turn are connected with a suitable source of suction such as an exhaust fan 105. The velocity of the air flowing through ducts 104 is controlled by valves 106.

Heretofore it was the practice to adjust an air gate such as that designated by the numeral 106 to obtain efficient lamina and stem separation in chamber 54. This adjustment would have to be changed from time to time depending on the moisture content of the tobacco being separated and also on the quantity of tobacco passing through the separator. I have found that when these adjustments were made the volume and velocity of air passing through the cyclone separators, were also changed and that this was one of the principal reasons why material tended to slowly accumulate inside of the cyclone separators. This is due to the fact that the volume and velocity of air passing through the cyclone separators was not always adequate for them to cause all dust to be completely discharged therefrom.

I have solved this problem by associating a gate 108 with the air passageway in which the cyclone separators 82 are interposed which automatically compensates for changes made in air volume and velocity by allowing a secondary source of air to enter the separators from the outside atmosphere and thereby allows a sufficient volume and velocity of air to flow through the cyclone separators at all times. The valve gate 106 is set so that the correct amount of air flows through the cyclone separators to keep them free from accumulating dust.

By cranking handle 112 worm 114 meshes with worm gear 116 as shown in Fig. 2 which causes the shaft 118 on which the gate 108 is mounted to turn. In this way the extent to which the gate 108 is opened may be set thereby controlling the amount of air which enters the cyclone separators from the outside atmosphere. Since the balance of the air drawn through the classifier has to come through the chamber 54 the setting of the gate 108 controls the velocity of the air passing through the separator chamber 54 and this can be adjusted so as to obtain the most efficient separation of lamina from stems without interfering with the dust removing feature of the cyclone separators.

A modified form of my invention has been shown in Fig. 4 wherein my invention is employed in combination with elongated bars 134 having cutters eccentrically arranged with respect to the drum 130. Tobacco is delivered either by hand or manually through the chute 120 into the pockets 122 of the revolving gate 124 onto the plate 126 in the same manner as is done in the apparatus shown in Fig. 1. The tobacco leaves to be torn move down the plate 126 into the range of action of the prongs 128 mounted on the drum 130. The drum 130 is fixedly mounted on a shaft 132 and rotated by belt 131 in the direction indicated by the arrow from a suitable source of power. The bars 134, the construction of which is shown in detail in Fig. 5, are eccentrically arranged with respect to the drum 130 so that the prongs 128 extend through the spaces in between bars 134 when the drum 130 is rotated so as to subject all the tobacco to a tearing action.

The bars 134 are affixed to the left guide plate 136 which partially surrounds the path of travel of the prongs 128. The end of guide plate 136 is secured by suitable means to the skeleton frame 138 of the separator and also to the housing 140 enclosing the separator. The belt 142 and the air passage enclosure 144 are similar to the belt 32 and the wall 38 shown in Fig. 1.

The eccentrically arranged bars 134 have diamond shaped cutting element 146 mounted along the length of their concave surfaces which tear the stems and lamina of tobacco leaves from each other as they are forwarded past the cutters 146 by the prongs 128.

One advantage of eccentrically arranging the cutter carrying bars 134 is the fact that the ends of the cutter carrying bars 134 will extend downwardly between the prongs 128 so that they will engage with tobacco which is lying closely adjacent to the periphery of the drum 130. This action causes a progressive tearing action which results in larger pieces of lamina and all tobacco is forced into contact with the cutters 146.

The tobacco torn and ripped by means of prongs 128 and the cutters 146 falls and is thrown outwardly be-

5

6

tween the bars 134. Some of the tobacco so discharged falls on the conveyor belt 142 and is thrown by the belt 142 towards the wall 144 while the remainder of said tobacco is thrown towards the walls 144 and 147. The stems having no lamina attached thereto which are discharged in this manner are separated at this area and fall downwardly through the chute 148. Stems which will have lamina attached thereto are carried upwardly by the air stream. Such stems strike against deflector wall 147. This causes them to be deflected through the air stream to the top of drum 130 which results in their being conveyed through rake 150 and automatically reprocessed a second time.

Any clumps of tobacco or stems with or without lamina will, because of their weight, also fall downwardly onto the plate 149, which results in their being reprocessed a second time in the manner described.

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

As previously stated the tobacco to be threshed and winnowed is delivered either by hand or by automatic means into the chute 14 where the revolving gate 16 forwards the tobacco into the range of action of the prongs 24 while preventing air from entering into the separator at this area. The tobacco delivered in a more or less constant stream in this manner is engaged by the prongs 24 and pulled past the rake 28 and along the serrations 30. This action is sufficient to separate the stems and leaf lamina from most of the tobacco so carried.

This separated and torn tobacco material is discharged outwardly through the openings 31 formed between the teeth 30 onto the belt 32 and then thrown towards the wall 38, or thrown towards the wall 38 directly from the spaces 31. The velocity of air drawn upwardly through the passageway 40 by fan 105 is controlled by the gate 108 so that the heavier stem portions of tobacco drop downwardly through the chute 40 and the lighter leaf lamina is carried upwardly. The horizontal portion 44 of the wall 38 diverts the vertically moving air stream briefly along a substantially transverse path of travel which is sufficient to cause stems having lamina still attached, which are thrown outwardly into the air stream by the rotary movement of the prongs 24 to be deflected by the wall 44 through the air stream towards the plate 47 and the top of the drum 26. The balance of the leaf lamina is carried around the bend 46 upwardly through the chamber 54. Any tobacco not discharged through the openings 31 (Fig. 3) is conveyed upwardly by the teeth 24 past the stationary rake 42. After this additional tearing action by rake 42 this tobacco is thrown upwardly into the path of the air stream where it passes around the bend 46.

The gate 108 is adjusted so that bare stems and stems having flags or lamina attached thereto will not be raised upwardly through the chamber 54 but will fall downwardly onto the plate 47 into the path of travel of the prongs 24. The triple gate 57 is adjusted so that more air enters into the separator at the center portion thereof than at the side so that there will be less velocity at the sides of the separator enclosing the chamber or passageway 54. This decrease in velocity enables the bare stems and stems having lamina attached thereto to settle downwardly along the sides of said separator walls. The friction between the air stream and the side wall just mentioned causes a further lowering of the air stream velocity which facilitates the separation and dropping of said stems.

In the modified form of my invention tobacco leaf is forwarded into the range of action of prongs 128 in the same manner as described in connection with Fig. 1. The leaves are then brought into contact with the eccentrically arranged cutter elements 146 without passing through a preliminary stationary rake structure such as designated by the numeral 28 in Fig. 1. Since the diamond shaped members 146 are eccentrically arranged the tobacco is positively brought into contact therewith and the stems and lamina quickly separated from one another by the resulting tearing action. In view of the elongated openings between the bars 134 and the strips 30 shown in Figs. 3 and 5 the pieces of lamina which are discharged are much larger than those which are forced out through the type of perforated concave commonly used heretofore.

Stems having no attached lamina are not elevated by the air stream and drop out through passageway 148.

Stems which have attached lamina are carried upwardly by the air stream and upon striking the deflector 147 pass through the air stream to the top of drum 130. This results in their being automatically reprocessed in the manner already described. Stems and clumps of leaves, too heavy to be elevated by the air stream fall down upon plate 149 and slide into the path of travel of prongs 128 resulting in their being reprocessed a second time.

Tobacco leaf lamina, sand, dust, string, lint and feathers from which the tobacco stems have been removed are carried upwardly through the passageway 54 around the bend 56 into the separating chamber 58. Separating chamber 58 is arranged and operates in a manner similar to that shown in my copending application S. N. 729,818 whereby lint, string, and feathers are separated from the air stream by screens 72. The lowering of velocity of the air stream in the chamber 58 causes the leaf lamina to settle downwardly into the pockets 60 of the revolving gate 62.

The coarse sand carried by the air stream settles upon the perforated plate 64 and falls through the perforations 66 onto the inclined plate 68 which conveys the material into the sand collector 70. The dust laden air passes out through the openings 74 and 76 into the ducts 78 and through the openings 80 on each side of the separator and thence into the tangential inlets 82 of the small diameter separators. The air entering the tangential inlets is given a spinning action which separates the dust therefrom by centrifugal force. The clean air is passed out through the outlet ducts 100 into the opening 102 and out through the air ducts 104. The dust separated by centrifugal force is discharged out of the ends 88 of the cyclone separators where it slides down the wall 90 into a suitable dust collector 92.

The opening of gate 106 is set so as to provide the volume and velocity of air required to make the separators 82 self cleaning. A similar result can be obtained without the use of gate 106 by providing a controlled source of suction such as a variable speed drive for the suction fans 105, which will give you the air volume and velocity which corresponds to the requirements of the particular cyclone separators being used. Once this adjustment has been made it need not be changed again unless the number and type of cyclone separators are changed.

In order to obtain the correct velocity of air through air passageways 40 and 54, the gate 108 is rotated by means of handle 112. The greater the opening of gate 108 is the greater the amount of air which will enter through the duct 110 from the outside atmosphere. The balance of the air drawn through duct 104 comes through the air passageway 54. In other words the adjustment of gate 108 controls the velocity of air passing through the separating chamber 54. The gate 108, however does not accomplish this by shutting off the amount of air passing through the cyclone separators 82, but instead allows the balance of air needed to keep the cyclone separators 82 self cleaning to come in from the outside atmosphere through duct 110 which secondary source of air supplements that received through the chamber 54. The air control arrangement that I have provided in this apparatus allows the velocity of air passing through the separating chamber 54 to be changed without either increasing or decreasing the amount of air passing through the cyclone separators 82. This feature has the advantage that dust will not accumulate inside the cyclone separators 82 as occurs when the correct volume and velocity of air passing through the cyclone separators is not maintained. While this feature of the invention when combined with the improved air locks, tobacco rippers and stem deflectors shown herein leads to a better product than has been obtainable heretofore, it should nevertheless be understood that it may also be advantageously used in fields other than tobacco separating.

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. Apparatus for separating stems and lamina into separate categories from a continuous stream of tobacco delivered thereto, comprising, a housing, mechanism for moving a continuous stream of air through said housing,

mechanism for delivering a continuous stream of torn tobacco into said air stream while sealing off the outside atmosphere from entering the separator with the torn tobacco, a pneumatic separator for separating stems and tobacco leaf lamina into separate categories, a bank of small diameter cyclone filters interposed in said air stream for removing dust therefrom, and an air gate for allowing a controlled amount of air to enter said filters from the outside atmosphere to obtain the volume of air passing through said filters which is necessary to prevent said separators from becoming clogged.

2. Apparatus for tearing and separating tobacco leaves comprising, a housing, a vertical air passageway formed in said housing for conducting air upwardly in a vertical path, means for causing a stream of air to flow through said passageway, a tobacco leaf ripping device for discharging torn tobacco leaves into the path of said air stream, a substantially horizontal imperforate wall connecting with the vertical passageway and positioned transversely across the path of travel of said air stream for changing the direction of travel of said air stream from a vertical direction to a substantially horizontal direction immediately above and toward said tobacco leaf ripping device to effectuate a removal of tobacco leaf lamina while deflecting the stems having lamina attached through said air stream into the path of travel of the tobacco tearing apparatus.

3. Apparatus having the features provided for in claim 1 wherein said second named mechanism includes a drum, teeth mounted on said drum at spaced intervals for conveying tobacco, mechanism for rotating said drum to move said teeth in a circular path of travel, spaced elongated supports eccentrically arranged along and in between the paths of travel of said teeth, and tobacco tearing elements formed on said elongated supports for separating stems from tobacco leaf lamina forwarded past said tobacco tearing elements by said teeth.

4. Apparatus for separating torn tobacco leaves into separate categories for stems, tobacco leaf lamina and dust comprising, a housing, an air passageway formed in said housing, mechanism for moving a stream of air through said passageway, means for delivering commingled torn tobacco to said air passageway, a stem removing station located in said passageway wherein the velocity of the air stream passing therethrough allows tobacco stems to fall downwardly through said passageway, a second separating station for reducing the velocity of the air stream passing through said passageway to allow tobacco leaf lamina carried by said air stream to settle, small diameter cyclone filters interposed in said air passageway between the station where said tobacco leaf lamina is removed from the air stream and the mechanism for moving a stream of air through said passageway, a gate for regulating the volume and velocity of air moved through said passageway to obtain an optimum separation of stems without lamina from stems having lamina still adhering thereto and a second gate for allowing air to enter said passageway from the outside atmosphere at an area adjoining the point where air passes through said small diameter cyclone filters to obtain an optimum separation of dust by said cyclone separators.

5. Apparatus for separating torn tobacco leaves into separate categories for tobacco stems, tobacco leaf lamina, lint and dust comprising, a housing, an air passageway formed in said housing, a source of suction for drawing a stream of air through said passageway from a primary source of air, a revolving air seal allowing tobacco to be delivered to said apparatus while excluding any substantial quantity of air from entering with said tobacco, a series of separating stations arranged along said air passageway to effect a successive separation of tobacco stems, tobacco leaf lamina, and lint from the torn tobacco delivered to said air stream, small diameter cyclone filters interposed in the path of travel of said air stream between the source of suction and the series of separating stations, a secondary source of air connected with the area where air enters said small diameter cyclone separators, mechanism for controlling the velocity of air moved through said air passageway to obtain efficient separation of stems and tobacco leaf lamina, and a second control for regulating the volume of air entering said cyclone filters from said secondary source of air to control velocity of air drawn through said small diameter cyclone filters to obtain an optimum of dust separation.

6. Apparatus having the features provided for in claim 1 wherein said second named mechanism includes a rotary member having teeth projecting therefrom, mechanism for rotating said rotary member at a predetermined rate, elongated bars having cutter elements eccentrically arranged with respect to the path of travel of said projecting teeth so that a portion of said elongated bars and cutter elements extend between the teeth of said rotary member to come into contact with all tobacco lying in between said teeth, an air passageway for receiving torn tobacco discharged from said rotary member and mechanism for moving an air stream through said passageway to convey torn tobacco upwardly while allowing stems having no lamina attached thereto fall downwardly.

7. A threshing and winnowing apparatus for tobacco leaves comprising, a housing having an opening for receiving tobacco leaves to be threshed, a rotary drum having teeth projecting therefrom positioned adjacent to said opening, a device having spaced elongated serrated members extending around the path of travel of the teeth projecting from said drum, a drive for rotating said drum continuously in one direction, a plurality of stationary rakes positioned adjacent the path of the travel of the teeth on said drum and having teeth extending in between the teeth on said drum to tear tobacco leaves carried thereby, an air passageway associated with the area where torn tobacco leaves are discharged from said drum, a device forming part of said air passageway for deflecting discharged stems having lamina attached thereto back to the teeth formed on said drum for reprocessing, and means for causing a continuous stream of air to flow through said passageway to separate and remove torn tobacco leaves.

8. A threshing and winnowing apparatus for tobacco leaves comprising, a housing, a tobacco receiving station, a rotating air seal for forwarding tobacco into the said apparatus while excluding air from entering said apparatus with said tobacco, a passageway, means for causing an air stream to flow through said passageway, a drum having spikes projecting therefrom at spaced intervals positioned to directly receive said tobacco from said rotating air seal, elongated laterally spaced members extending along the path of travel of the spikes of said drum and having leaf tearing elements projecting from said members and being non-contiguous with the elements of neighboring members, a drive for rotating said drum to forward tobacco along said leaf tearing elements to tear the lamina and stems of tobacco leaves from one another on said elements and to discharge said torn leaves into said air stream, the velocity of said air stream being set so as to permit stems to fall downwardly while the air stream conveys the balance of the tobacco so discharged to a separating station.

9. In a threshing and winnowing apparatus for tobacco leaves, a housing having a tobacco receiving station, projecting pronged members traveling along a circular path of travel, a concave having irregular edged elongated slots formed therein and extending along the path of travel of said pronged members, a passageway, means for causing an air stream to flow through said passageway, mechanism for rotating said pronged members to forward tobacco leaves along said elongated slots to cause stems to be torn from tobacco leaf lamina as they are forwarded along said slots and to discharge said torn leaves into said air stream, an obstruction positioned in front of said air stream and the path of travel of said pronged members for decelerating stems discharged from said concave and said pronged members to allow said stems to settle downwardly out of said air stream, and a tobacco discharge station for receiving tobacco leaf lamina removed by said air stream.

10. A threshing and separating apparatus for tobacco leaves comprising, a housing, a tobacco leaf ripping device for separating stems from tobacco leaf lamina, a conveyor device for delivering tobacco to said leaf ripping device, an air passageway having a substantially vertical section positioned adjacent to said leaf ripping device for receiving tobacco delivered therefrom, a curved imperforate deflecting wall forming one side of said air passageway and being positioned across the upper end of said substantially vertical section and extending toward and above the leaf ripping device for deflecting stems having lamina attached thereto through said air stream into the range of action of said leaf ripping device to be ripped a second time, and mechanism for causing a con-

tinuous stream of air to flow through said passageway at a set velocity to effect a separation of lamina without stems from substantially bare stems.

11. In a threshing and winnowing apparatus for tobacco leaves, a housing, a tobacco leaf ripping apparatus having an intake area for receiving tobacco leaves to be ripped and a discharge area for ripped tobacco leaves, an air passageway having a vertical section associated with said discharge area for allowing stems having no lamina attached thereto to fall downwardly and settle from the ripped tobacco leaves, mechanism for causing a continuous stream of air to flow through said passageway, and a curved wall forming one side of said air passageway along which said stream of air travels and being positioned at an area inside of said housing across the path of travel of the air stream and extending toward and above the leaf ripping apparatus to decelerate tobacco stems discharged into the air passageway to permit them to settle downwardly out of the air stream.

12. A threshing and winnowing apparatus for tobacco leaves comprising, a housing having a tobacco receiving opening formed therein, a spiked roller positioned adjacent said opening, mechanism for rotating said spiked roller continuously, serrated means having elongated openings surrounding a substantial portion of the path of travel of said spikes through which openings torn tobacco leaves are discharged, an air passageway having a portion thereof positioned adjacent to said elongated openings, means for moving a continuous stream of air through said air passageway, and a device forming part of said air passageway and positioned transversely across said passageway to decelerate heavy portions of tobacco leaves to facilitate their separating from the air stream.

13. Apparatus for classifying tobacco leaves having a tobacco receiving opening formed therein, an air passageway formed in said housing, means for discharging

a continuous stream of ripped tobacco into said air passageway, settling chambers formed in said passageway for separating stems from tobacco leaf lamina, mechanism for drawing a continuous stream of air through said passageway at a velocity which will efficiently separate stems from stems having lamina adhering thereto, cyclone separators interposed in said air passageway between said mechanism and said settling chambers, and an air gate associated with said air passageway at a position adjacent to the intake side of said cyclone separators for regulating the amount of air drawn through said cyclone separators from said settling chambers by allowing a controlled amount of air to enter said passageway and separators from the atmosphere through said air gate.

References Cited in the file of this patent

UNITED STATES PATENTS

669,150	Strickler	Mar. 5, 1901
743,814	Boyd	Nov. 10, 1903
1,150,219	Monahan	Aug. 17, 1915
1,418,735	Plaisted	June 6, 1922
1,660,685	Stebbins	Feb. 28, 1928
1,660,686	Stebbins	Feb. 28, 1928
1,699,849	Lykken	Jan. 22, 1929
1,879,016	Austin	Sept. 27, 1932
1,928,791	Norman	Oct. 3, 1933
1,945,771	Dahlstrom et al.	Feb. 6, 1934
2,130,880	Durning	Sept. 20, 1938
2,173,087	Eissmann	Sept. 19, 1939
2,173,088	Eissmann	Sept. 19, 1939
2,208,896	Dahlstrom et al.	July 23, 1940
2,209,339	Knight	July 30, 1940
2,270,143	Schaich	Jan. 13, 1942
2,281,610	Watson et al.	May 5, 1942