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O. E. EISSMANN
APPARATUS AND METHOD FOR RIPPING
AND ASSORTING TOBACCO LEAVES

2,667,174

Filed Nov. 28, 1947

3 Sheets-Sheet 1

FIG. 2

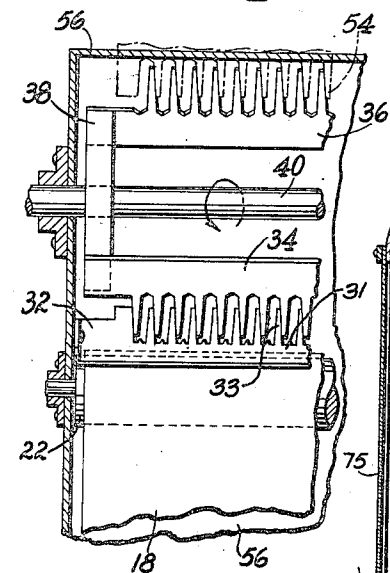
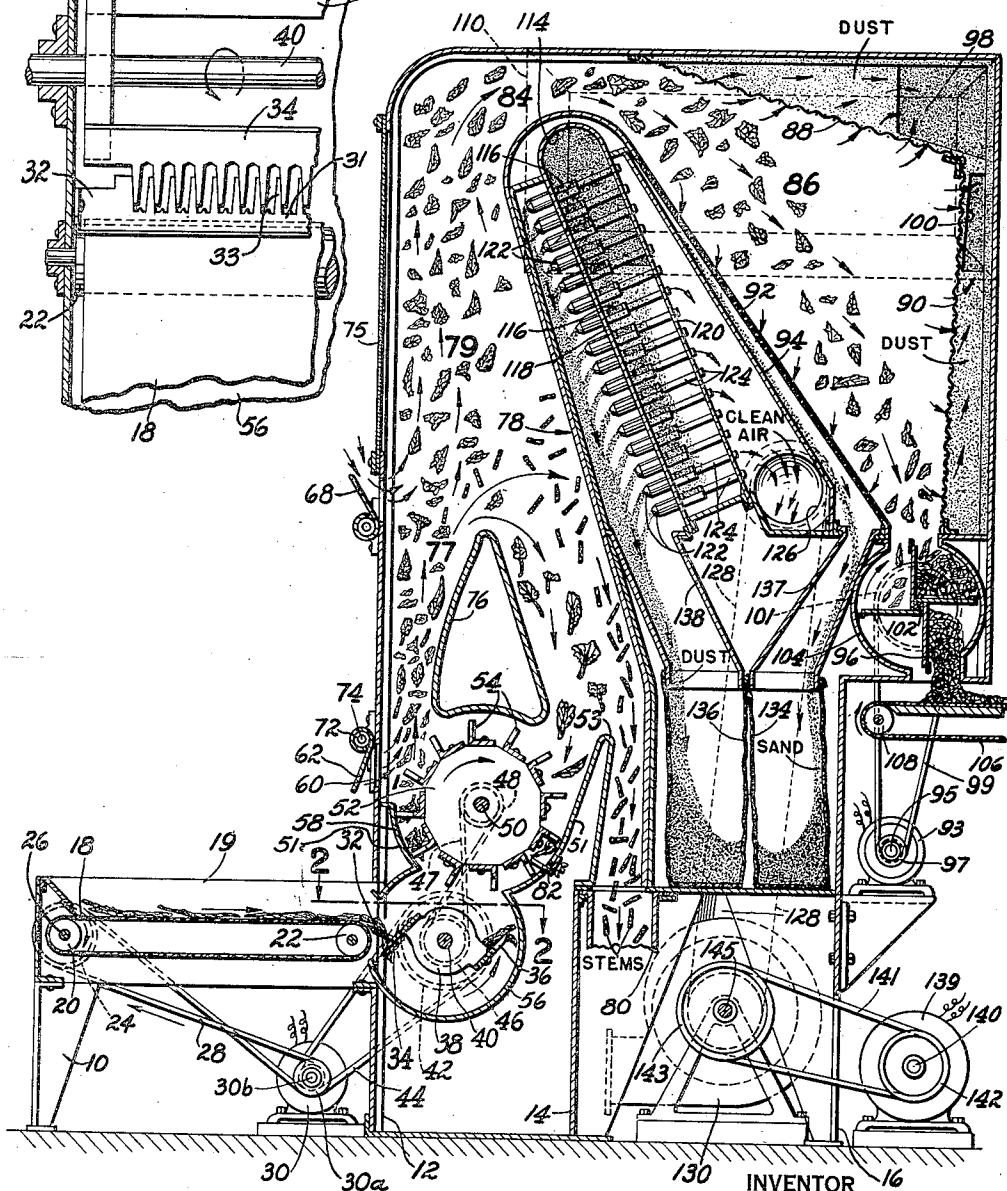


FIG. 1



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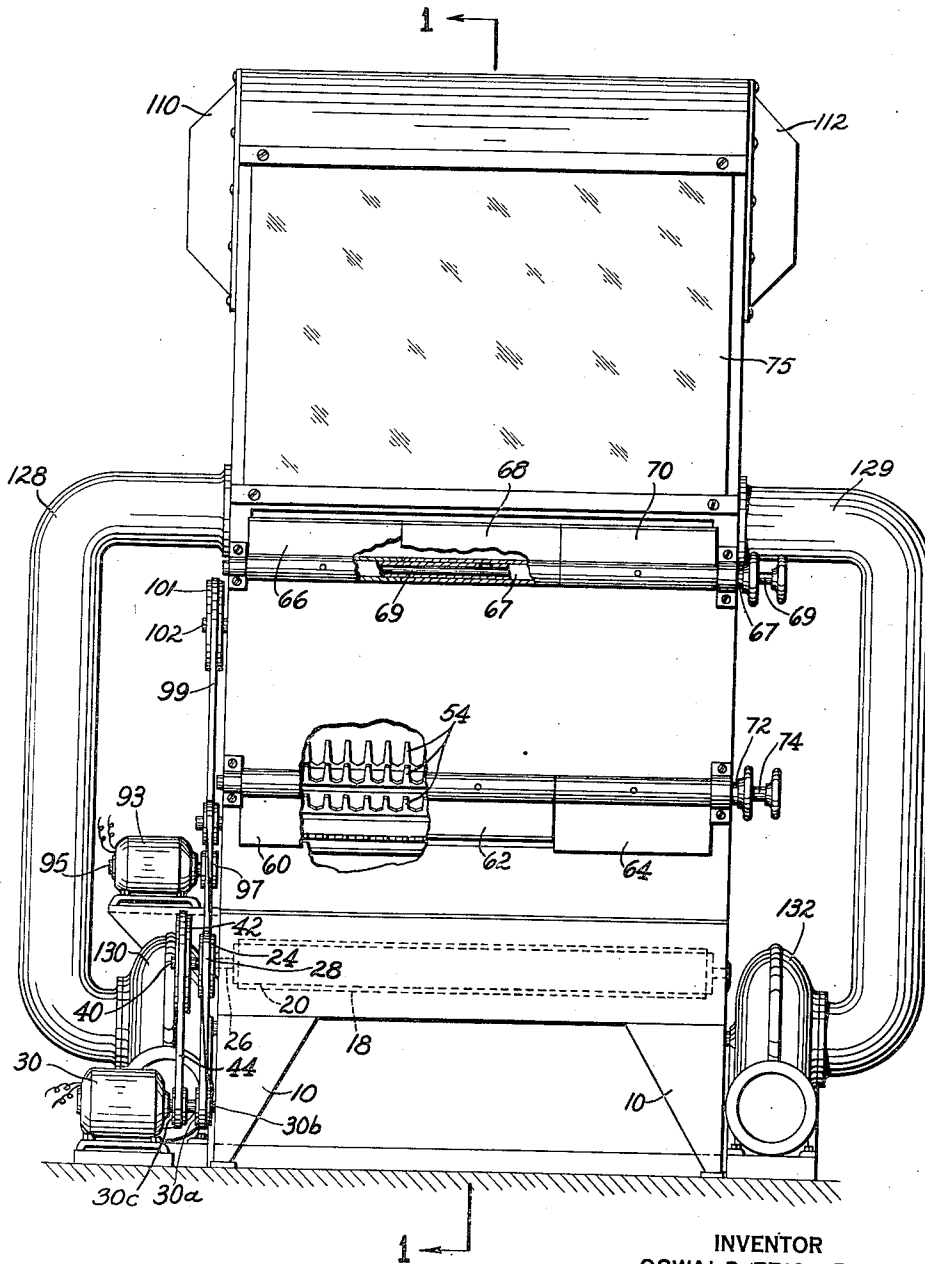
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FIG. 3

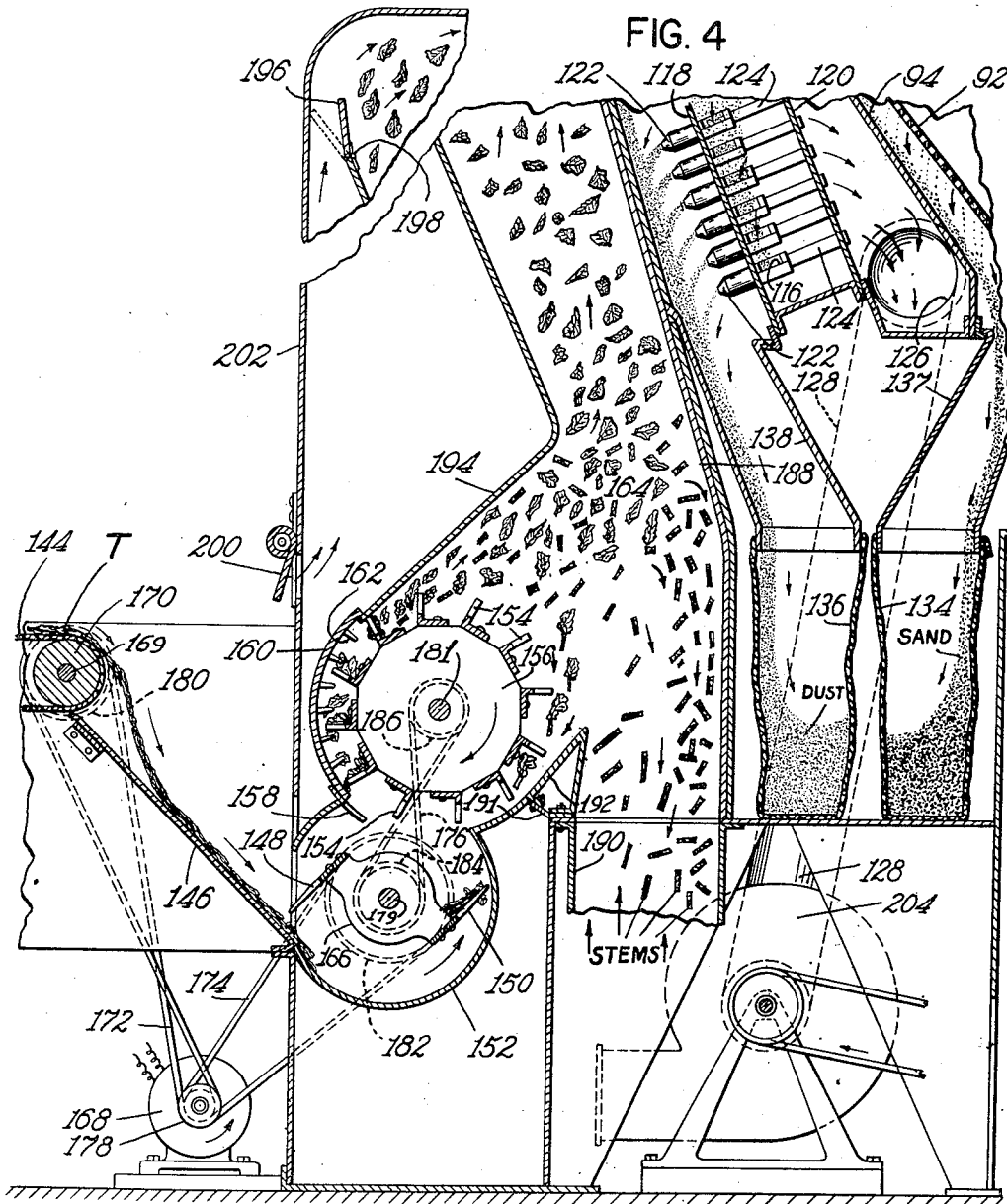


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2,667,174

3 Sheets-Sheet 3



BY Tenneco I. E. L. Ltd.

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UNITED STATES PATENT OFFICE

2,667,174

APPARATUS AND METHOD FOR RIPPING
AND ASSORTING TOBACCO LEAVESOswald Erich Eissmann, Richmond, Va., assignor
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tion, a corporation of New York

Application November 28, 1947, Serial No. 788,705

21 Claims. (Cl. 131-146)

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The present invention relates to tobacco leaf ripping and separating apparatus and method, and more particularly to improvements in combined apparatus for ripping and tearing the tobacco stem and heavy ribbed portions of a tobacco leaf from the leaf lamina and then segregating and separating the cleaned tobacco leaf lamina, stems and heavy ribbed portions of tobacco leaf, lint, sand and dust, at separate stations. The present invention is an improvement and further amplification of my copending application for separating apparatus Serial No. 729,818 filed February 20, 1947, now Patent No. 2,643,768, issued June 30, 1953.

An advantage of my invention is that it can be used to efficiently remove the stem and heavy ribbed portions of tobacco leaves from the leaf lamina of a continuous stream of tobacco leaves and then separate the torn leaf portions at different stations.

Another advantage of my invention is the fact that the tobacco leaves are aligned by my apparatus so that a longitudinal tearing action is obtained when the tobacco leaf lamina is torn from the stem of the leaf.

Another advantage of my invention is the fact that the tobacco leaf lamina is not torn into undesirably small pieces by requiring it to pass between grates or perforated concaves which cause the leaf lamina to be broken into small pieces.

A further advantage of my invention is that it may be readily adapted for reshredding tobacco leaves, which have already been shredded once, to remove any flags or small tobacco leaf laminae still adhering to the stems.

Another advantage of my invention is the fact that the shredded tobacco leaves are thrown upwardly after the shredding operation into a separating air chamber so that a maximum separating action is obtained.

A further advantage of my apparatus is the fact that air is introduced closely to the spiked cylinder to assist in removing leaves from these spikes.

Another advantage of my invention is that it automatically reprocesses any stems which still have lamina adhering thereto after they have gone through the shredding or ripping operation.

A further object is to provide a method of ripping tobacco leaf lamina from the stems of tobacco leaves which will be rapid and very efficient.

Other objects and features of the invention

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

Fig. 1 is a sectional side elevation taken on line 1-1 of Fig. 3 of the combined tobacco ripping and separating unit;

Fig. 2 is a fragmentary sectional plan view as seen from line 2-2 of Fig. 1 showing how the teeth of the combs alternately interpass the teeth of the spiked cylinder and bridge;

Fig. 3 is a front elevation of the combined tobacco ripping and separating unit with parts broken away to show the spiked cylinder and the construction of the air gates; and

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

The combined tobacco leaf ripping and separating unit, I have disclosed in the drawings accompanying this specification, is adapted for receiving a continuous stream of tobacco leaves, tearing and ripping the stem portions of the leaf from the tobacco leaf lamina, and then separating the various component parts of the ripped tobacco at different stations. The apparatus consists of a frame having legs 10, 12, 14 and 16 which support the combined tobacco leaf ripping and separating unit above the floor.

The tobacco leaves to be shredded or ripped are fed on feed belt 18 toward the shredding apparatus. The belt 18 travels in the direction indicated by the arrow over drive roller 20 and idler roller 22. The drive roller 20 is driven by drive pulley 24 through shaft 26. The drive pulley 24 receives driving motion through belt 28 from a pulley 30a mounted on shaft 30b of electric motor 30. Bridge 32, positioned at the delivery end of the feed belt 18, delivers tobacco leaves to be torn into the path of travel of the teeth formed on combs 34 and 36. The combs 34 and 36 are mounted on a hub or lower cylinder means 38 supported on shaft 40.

While I have shown a feed belt 18 and a bridge 32, coacting to deliver tobacco to the teeth of combs 34 and 36, it is also possible to dispense with such structures and employ in lieu thereof a chute which will deliver a continuous stream of tobacco to be ripped and separated to the teeth of combs 34 and 36.

A pulley 42, fixedly mounted on one end of shaft 40, imparts rotary motion as shown by the arrow to the combs 34 and 36. Pulley 42 is driven

by means of belt 44 from suitable pulley 30c, connected to the shaft of electric motor 30. A second pulley 46 is also fixedly mounted on shaft 40 and imparts driving movement through belt 47 to a third pulley 48 which is fixedly mounted on the shaft 50. Also fixedly mounted on the shaft 50 is an upper cylinder 52 which rotates in the direction indicated by the arrow.

The cylinder 52 has a plurality of radiating spikes 54 which act to pull the leaves through the combs 34 and 36 when the cylinder and combs are rotated in the directions indicated by the arrows. A shell or concave 56 surrounds the path of movement of the combs 34 and 36 and also partially surrounds the spiked cylinder 52. A second shell 58 acts a similar manner to partially enclose the path of movement of combs 34 and 36 and the spiked cylinder 52. The shell 56 and the shell 58 forms a funnel-shaped housing 51 which extends along the path of movement of spiked cylinder 52.

The advantage of aligning leaves engaged by combs 34 and 36 is accomplished by having the shell 56 extend around approximately half the path of travel of combs 34 and 36. The tobacco leaves, held by the teeth of combs 34 and 36, align themselves because of centrifugal forces, air currents and friction between the shell 56 and the leaves all acting upon the leaf more or less simultaneously. By the time the leaves come within the range of action of the spiked teeth of cylindrical roller 52, the stems will have been somewhat aligned with one another. When the spiked teeth 54 of cylindrical roller 52 engage with the tobacco leaves carried by the combs 34 and 36, they pull the leaves through the teeth of the comb. Since the leaves have been aligned, this pulling action will have a shearing effect and thus result in ripped pieces of lamina of fairly large size from the stems. In accomplishing this, it will be noted that the spiked roller 52 is designed to rotate at a faster rate than combs 34 and 36.

By positioning the spiked roller above the combs 34 and 36, I find that centrifugal forces assist in throwing the torn tobacco leaves into the separating chamber 79. This is of assistance in effecting a high degree of separation of the torn tobacco leaf.

Two sets of air intake gates have been provided to allow air to enter the separating chamber where it will be most effective in separating and segregating the ripped tobacco. One set consists of three flaps 60, 62 and 64; while the other set consists of flaps 66, 68 and 70.

The lower gates 60, 62 and 64 are pivotally mounted at their upper end on a sleeve 72 and a shaft 74. By mounting the gates in this manner, air is introduced at an area closely adjacent to the spikes of the cylinder 52. This air stream assists in engaging and removing torn tobacco leaf from the spikes 54. The flaps 60, 68 and 70 of the upper gates are similarly mounted on a sleeve 67 and a shaft 69. When the machine is in operation an operator can see how the leaves are being separated through the glass window 75 which enables him to adjust the air flow so as to obtain the best separation.

A deflecting and shielding plate 76 having a triangular shape in cross section is positioned above the spiked cylinder 52 and serves the purpose of causing air currents to exist in a separating apparatus which has been found to have an advantageous separating action on the tobacco leaves as they are thrown away and re-

moved from the spikes 54 of the cylinder 52. Bare stems, which had the laminae torn therefrom, travel to the rear wall 78 where they drop down through a chute from which they are collected by a suitable device (not shown). Laminae which are free from stems, are carried upwardly around the passage 84. Leaves that have laminae still adhering to the stems and heavy ribbed portions of the tobacco leaf fall on the near side of the divider 53 which guides them to the spiked cylinder 52 where they are automatically reprocessed between the combs 34 and 36 and the spikes 54 a second time. This avoids in many cases the necessity of separating such partially ripped leaves from separated stems or laminae for further processing or for reprocessing stems and such partially torn leaves a second time. As will be appreciated, this results not only in a saving of time and money but avoids unnecessary reprocessing which sometimes cause tobacco to break up into undesirable small pieces. It will be noted that there is a direct unrestricted passageway between the spikes on the roller 52 and the separating chamber 79.

By arranging the ripping apparatus in the manner I have shown, it is not necessary to employ a grating or perforated shield to assure a complete tearing of the tobacco leaf because any stems or heavy ribbed portions of tobacco which have an appreciable amount of laminae still adhering will fall into the range of action of the spiked roller 52 and are thus immediately reprocessed a second time.

When tobacco leaves which have already been through one shredding operation are to be reprocessed in my apparatus or where smaller leaves are being acted on, it has been found desirable to employ a rake 82. The teeth of this rake allow the spikes 54 of the cylinder 52 to pass between the same. In this operation, the flags still adhering to the tobacco leaf stems are removed. It will be noted that the rake is removably mounted so that, in processing tobacco leaves for the first time, it is not necessary to employ this rake and it may be removed.

The bladed portions of the tobacco leaf, having no stems attached thereto, are carried upwardly around the bend 84 into the pneumatic separating chamber 86. The chamber 86 is enclosed at the top and side by screens 88 and 90 and, on the other side, by an inclined sifting screen or perforated plate 92. The tobacco laden air stream, as it passes around the bend 84, carries with it not only the bladed portions of the tobacco leaves but also sand, lint and tobacco dust.

Due to the sudden lowering of air pressure in chamber 86, the coarser sand falls or dribbles down upon the inclined plate 92 and ultimately passes through the perforations formed in this plate onto the inclined wall 94. From there, it slides into a suitable collecting bag 134. The bladed portions of the tobacco leaves, due to the lowering of air pressure, drop into the pockets of the revolving door 96.

The lowering in the air pressure in chamber 86, 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 88 and 90 which act to remove the lint from the air stream. The tobacco dust and fine sand, on the other hand, pass through the screens 88 and 90 through the openings 98 and 100 formed in the side walls of the tobacco segregating device.

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The revolving door 96 is mounted on a shaft 102 and is rotated in a cylindrical housing 104. The door 96 removes the cleaned blade portions of tobacco leaves that have settled out of the air stream in chamber 86, while maintaining a constant seal against leakage of the outside atmosphere into the chamber 86. The tobacco which has been received in the pockets of the revolving door or gate 96, is deposited on a conveyor belt 106 traveling around roller 108 in the direction indicated by the arrow.

A motor 93, having a shaft 95 to which is fixedly mounted a pulley 97, imparts rotary movement to the shaft 102 through a belt 99 and a pulley 101 fixedly mounted on the shaft 102.

After the tobacco dust laden air has passed through the openings 98 and 100, it enters and passes through the connecting ducts 110 and 112 located on each side of the separating unit (Fig. 3).

Opposite ends of the ducts 110 and 112 are connected through openings 114 to the intake side 116 of a bank of small diameter centrifugal type dust collectors. The intake side of the bank of dust separators is confined by the side walls of the housing, forming the tobacco segregating unit, and by the plates 118 and 120. 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. 1,886,548 issued to Mr. George H. Horne on November 8, 1932, for a more detailed explanation of the operation of this general type of dust collector.

The dust falls out of the conical openings 122 at the dust discharge end of each dust collector and the clean air passes out through the exhaust tube 124 of each dust filter. The clean air then passes through openings 126 formed on opposite sides of the side walls making up the housing for the tobacco separating unit. These openings 126 are connected by ducts 128 and 129 to the intake side of exhaust fans 130 and 132. The air ejected by the exhaust fans 130 and 132 can be ejected directly into the atmosphere because it has been freed of tobacco dust, 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 Fig. 1, it will be seen that bags 134 and 136 are provided for the dust and sand, removed from the air stream, which has had a washing effect on the tobacco leaves as they passed through the tobacco segregating machine. Bag 134 is used to collect the sand through a tapered chute 137 which extends, at its upper end, across the entire width of the wall 94. The sand, which has passed through the screen or perforated sheet, slides down this inclined wall 94 through the chute 137 into the collecting bag 134. The other bag 136 collects the tobacco dust which is discharged from the conical openings 122 of the dust filters. The dust removed by the dust filters 122 slides along the back separation wall 78 down through the chute 138 into collecting bag 136.

The driving mechanism for my separator is provided by a motor 139 having a shaft 140 which is fixedly secured to a pulley 142. A belt 75

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141 receives driving motion from the driving pulley 142 and imparts this motion to the pulley 143 which is fixedly mounted on the shaft 145. On the shaft 145 are mounted the rotors of the

5 fans 130 and 132.

In Fig. 4, showing a modified form of my invention, tobacco to be ripped is carried on a continuously travelling conveyor belt 144 which discharges the tobacco onto an inclined chute or plate 146. The tobacco so discharged slides down the chute 146 and comes into contact with the traveling combs 148 and 150 which pick up the tobacco and carry it around the concave housing 152 which surrounds the path of travel of the combs for approximately 180°. As the combs travel upwardly with the tobacco, the spikes 154 mounted on the cylinder 156 pass between the teeth of the combs 148 and 150 and remove the tobacco therefrom.

20 Tobacco leaf lamina is partially torn from the stems of tobacco leaves when the spikes 154 engage and remove the tobacco from the combs 148 and 150. When the tobacco removed by the spikes 154 comes into contact with the teeth of a stationary rake 158, a further tearing action takes place loosening more tobacco leaf laminae from the stems and ribbed portion of the tobacco leaves. Rake 158 also helps to loosen tobacco

30 The tobacco is then conveyed around the conveyed around the concave wall 160 to which a plurality of stationary spikes or pins 162 are attached. These spikes 162 are so spaced that the spikes 154 in rotating pass between the stationary spikes 162. As the partially torn tobacco is conveyed by the spikes 154, it engages with the stationary spikes 162 thereby effecting a further tearing of the tobacco leaf laminae from the stems of tobacco leaves.

40 Roller 170 and cylinders 166 and 156 are driven by means of conventional belts and pulleys from a suitable source of power such as motor 168. As shown in Fig. 4, the pulley 180 which is fixedly mounted on the same shaft 169 as cylinder 170 is driven by means of belt 172. The pulley 182 which is fixedly mounted on the same shaft 179 as cylinder 166 and pulley 184 is driven by means of belt 174. The pulley 186 which is fixedly mounted on the same shaft 181 as cylinder 156 is driven by means of belt 176 from the pulley 184. The belts 172 and 174 are driven from the pulley 178 which is fixedly mounted on the driving shaft of a suitable motor 168.

55 The cylinder 156 travels with sufficient speed so as to hurl the torn tobacco into the separating area 164. The stems which were thrown into the separating area 164 have a tendency to travel up against the back wall 188 where they fall downwardly through the chute 190 on to a suitable collecting belt (not shown). The tobacco leaf laminae which is thrown into the area 164 travels upwardly as shown in Fig. 4 around a bend (not shown) similar to 84 shown in Fig. 1. Torn tobacco leaves which still have a portion of the stem adhering thereto, fall from the area 164 in between the spikes 154 and the trough like plate or wall 192 where they are again picked up by the spikes 154 and carried around the passageway formed by the concave wall 160.

65 A confining wall 194 having a configuration such as shown in Fig. 4 which partially restricts the passageway above the area 164 is employed for confining the tobacco to be separated to a predetermined passageway. The upper end of

wall 194 has an adjustable air gate 196 mounted at its upper end which is capable of being swung on its pivot 198 by suitable means not shown so as to regulate the amount of air entering at the upper end of the passageway formed by the wall 194. The air gate 196 has the advantage that it allows air to enter into the system at a point where it helps push tobacco around the bend which is similar to 84 shown in Fig. 1 and also prevents tobacco which is going around this bend from turning back.

An adjustable air gate 200 consisting of a plurality of flaps similar to 60, 62 and 64 shown in Fig. 3 is mounted at the bottom portion of the housing 202 to control the amount of air entering across the entire width of the housing 202. A suitable exhaust fan 204 is employed for causing air to flow through the air passageways in the separator. The remaining parts of the separating device are similar in construction to that shown in Figs. 1 and 2 and operate in a similar manner.

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

Referring to the embodiment of my invention shown in Fig. 1, a continuous stream of tobacco is deposited on the infeed conveyor belt 18 either automatically or by hand. The tobacco so deposited is delivered continuously into the range of action of the combs 34 and 36 which rotate in the direction indicated by the arrow. The teeth of the combs 34 and 36 engage with the tobacco leaves and pull them down through the teeth of the bridge 32 and around the path of travel surrounded by the housing 56. The bridge 32 has long teeth 33 and shorter teeth 31 between the base ends of teeth 33 which assist in the removal of the laminae from the stems. As the tobacco leaves are pulled through the teeth of bridge 32, the short teeth 31 and long teeth 33 effect a tearing of the tobacco leaves. Due to centrifugal action, friction and air currents, the stems of the tobacco leaves have a tendency to automatically align themselves during this period of travel.

When the leaves have been thus carried to the area where they come into the range of action of the spikes 54, spikes 54 engage with the tobacco leaves and pull them through the teeth of combs 36. Since the leaves have been aligned to some extent in the manner just described, the engagement of the spikes 54 will effect a longitudinal tearing action on the leaf to remove the tobacco leaf lamina from the stem and heavy ribbed portions of the tobacco leaf. The tobacco leaf laminae so removed will be of fairly large size which is desirable in the tobacco preparing industry.

It will be noted that the roller 52, to which the spikes 54 are attached, rotates in a clockwise direction at a higher rate of speed than the combs 34 and 36. When the leaves have been pulled through the combs 34 and 36 by the spikes 54, they will be hurled up through the channel area 77 into the separating chamber 79. The air gates 60, 62 and 64 allow air to come in under the leaves and helps to remove the torn tobacco leaves from the spikes 54.

The heavier leaf portions, consisting of stems and ribbed portions of tobacco leaves, travel up against the back wall 78 and downwardly in the direction indicated by the arrows into the chute 80. Due to the expanded area of the separating chamber 79 there is a slight decrease in air pressure which assists in the separating action. Tobacco leaf laminae having no stems or heavy ribbed leaf portions attached thereto are carried

around the bend 84 in the manner described heretofore. Tobacco leaves that still have tobacco leaf lamina and heavy ribbed portions still adhering to each other fall down between the separator plate 53 and the roller 52. These leaves then travel around with the roller 52 a second time and are thus put through a second shredding or ripping action. This method of shredding or ripping tobacco leaf laminae from the tobacco leaves saves a great deal of time and money because it avoids in many cases the necessity of reshredding tobacco leaf in another shredder to satisfactorily remove all the laminae from the stems of the tobacco leaves.

If small leaf tobacco is being torn or tobacco leaves are being processed a second time after having gone through a previous shredding or ripping process, it is advantageous to attach the rake 82. The leaves which are reprocessed first are pulled through the teeth of rake 82 by the spikes 54 and then are pulled through the teeth of combs 34 and 36.

The leaf lamina which travels up past the member 76 receives a certain amount of air washing which helps to loosen any adhering stems and also acts to open up to a certain extent the blade portions of the leaves so that a separation may then be more readily made.

Air is primarily drawn into the machine through chute 80 and the openings at 60, 62, 64, 66, 68 and 70. Doors or gates 60, 62, 64, 66, 68 and 70 are adjusted to regulate the amount of air passing through the respective openings they cover to secure a controlled distribution of air volume and pressure across the entire width of the separator unit.

When the tobacco leaves pass around the bend 84 into the chamber 86, the air pressure again drops in channel 86 so that the tobacco leaves fall into the pockets of the revolving door or gate 96. The coarser sand also, because of the drop in pressure, falls onto and trickles down the inclined perforated plate 92. When the sand falls through the small mesh openings formed in this screen, it drops onto an inclined wall 94 where it slides into the chute 137 and finally into the sand collecting bag 134.

Lint is separated from the air stream by means of the screens 88 and 90. Removable doors (not shown) are provided, such as shown in my co-pending application S. N. 729,818 to facilitate the removal of dust from the screens. Any fine sand and dust which passes through the screens 88 and 90 passes through the connecting ducts 110 and 112 into the intake side 116 of the bank of small diameter centrifugal dust collectors. As the air is pulled through the intake side of the filters and out through the exhaust tubes 124, it is given a twirling motion which separates the dust by centrifugal force from the air.

The dust is ejected out through the end of the tubes and falls down wall 78 through tapered chute 138 and thence into the dust collecting bag 136. The clean air which is removed through the exhaust ducts of the dust filters 124 and out through the openings 126 through the ducts 128 and 129 is then ejected by the exhaust fans 130 and 132.

In the modified form of my invention shown in Fig. 4 tobacco to be torn is discharged onto the chute 146 which delivers it into the range of action of the combs 148 and 150. Tobacco picked up by the combs 148 and 150 is partially aligned as it is carried around the U-shaped concave wall 152 in the same manner as described

in connection with the apparatus shown in Fig. 1. In this connection it will be noted that the wall 152 surrounding the cylindrical roller 166 has a vertical sectional configuration which is somewhat similar to the shape of the letter U while the walls 169 and 192 surrounding the roller 156 have a vertical sectional configuration which is substantially funnel-shaped, having an opening where tobacco is transferred from the lower roller 166 to the upper roller 156. Both taken together have a configuration in cross section resembling somewhat that of the figure 8 with certain portions omitted.

The spikes 154, which travel at a faster rate of speed than the cylinder 166 pass in between the teeth of combs 148 and 150 and engage and remove the tobacco carried thereby. When the spikes 154 engage with the tobacco, a certain amount of tearing action takes place and some of the tobacco is driven against the toothed rake 153. This results in a further tearing of the lamina from the stems and ribs of the tobacco leaf, as well as a loosening of tobacco leaves that are lumped together.

As the tobacco continues to travel upwardly around the concave 160, it is pulled through the stationary spikes 162 which are so spaced that the spikes 154 pass between the stationary spikes 162, thereby effecting a further tearing of the tobacco leaf lamina from the stems and heavy ribbed portions of the tobacco leaf. The tobacco so torn is then hurled into the area 164. Air passing upwardly from the chute 193 into the area 164 carries with it tobacco leaf lamina. The air gate 195 is so adjusted that a small amount of air is allowed to enter the air passage at this point and thereby help push the stem-free lamina around the bend 84. The stems from which the tobacco leaf lamina has been torn fall downwardly through the chute 193 since the pressure and velocity of the air stream is not sufficient to raise these stems upwardly.

Any stems having an appreciable amount of lamina still attached thereto fall into the area between the wall 192 and the cylinder 156 to be carried around the concave 160 by the spikes 154 thereby effecting a second tearing action on the partially torn tobacco leaves.

It should be mentioned that while in the case described the wall 192 acts to reprocess laminae which still have stems attached thereto, it may be desirable when processing certain types of material to omit this guide wall and merely separate the ripped material without sending any of the ripped material back for reprocessing a second time. In such a case when the wall 192 is removed, the remaining wall 191 will not deflect any falling material to the spikes 154 for retearing.

Air is caused to be drawn into and through the separating unit by means of a suitable fan such as that designated by the numeral 204. The balance of the separating operations is similar to that shown and described in connection with Fig. 1 and also in my copending application S. N. 729,818, now Patent 2,643,768, issued June 30, 1953. It will appear evident from the foregoing that I have provided an apparatus which has the advantage that the tobacco leaf laminae is preserved in large pieces and that there is a free opening between the drum 156 carrying the spikes 154 and the separating area 164.

By eliminating a grating between the spiked roller 156 and the separating area 164 into which

the torn tobacco is discharged, I have found that the leaf laminae produced are preserved in larger pieces. Since there are a certain amount of stems which still have tobacco leaf laminae adhering thereto, I have provided an inclined collecting plate 192, which guides tobacco leaf with lamina back into the range of action of the spikes 154 for a second processing. This process repeats itself until the lamina is separated and is raised upwardly and the stem falls downwardly through chute 193. As will be apparent this has the advantage that a more complete tearing of the laminae from the stems takes place so as to produce clean stems and stem-free lamina discharged from the separator.

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 ripping a continuous stream of tobacco leaves and separating the ripped tobacco pneumatically into different categories, said apparatus having a comb, a device for directing a continuous stream of tobacco to said comb, a curved concave surrounding the path of travel of the comb, said comb having teeth co-acting with said device for penetrating at spaced intervals the continuous stream of tobacco leaves and positively pulling them around said curved concave, a roller positioned above said comb having spikes projecting therefrom passing between the teeth of said comb to engage with tobacco leaves carried by the teeth of said comb and to engage and pull the same through said teeth to thereby sever the laminae from the stems and heavy ribbed portions of the tobacco leaf, a separating chamber, an obstruction-free air passageway connecting the delivery side of said spiked roller to said separating chamber, a blower for causing a continuous stream of air to flow through said separating chamber for removing tobacco leaf laminae and fine particles from the ripped tobacco discharged into said separating chamber, and a dividing wall positioned below said separating chamber for removing cleaned tobacco stems falling from said chamber and for directing tobacco stems and heavy ribbed portions of tobacco having tobacco leaf adhering thereto back into the path of operation of said spiked roller to be reprocessed through the teeth of said comb to effect a further severing of leaf laminae from the stems and heavy ribbed portions of tobacco.

2. Apparatus for ripping a continuous stream of tobacco leaves and separating the ripped tobacco pneumatically into different categories, said apparatus having a comb, a device for directing a continuous stream of tobacco to said comb, a curved concave surrounding the path of travel of the comb, said comb having teeth co-acting with said device for penetrating at spaced intervals the continuous stream of tobacco leaves and positively pulling them around said curved concave, a roller positioned above said comb having spikes projecting therefrom passing between the teeth of said comb to engage with tobacco leaves carried by the teeth of said comb and to pull the same through said teeth to thereby sever the laminae from the stems and heavy ribbed portions of the tobacco leaf, a separating chamber, an obstruction-free areaway connecting the

delivery side of said spiked roller to the separating chamber, a blower for causing a continuous stream of air to flow through said separating chamber for removing tobacco leaf laminae and fine particles from the ripped tobacco discharged into said separating chamber, a dividing wall positioned below said separating chamber for removing cleaned tobacco stems falling from said chamber and for directing tobacco stems and heavy ribbed portions of tobacco having tobacco leaf adhering thereto back into the path of operation of said spiked roller to be reprocessed through the teeth of said comb to effect a further severing of leaf laminae from the stems and heavy ribbed portions of tobacco, and a toothed rake adjoining said dividing wall and the spikes of said roller positioned to allow the spikes of said roller to pass between the teeth of said rake to cause stems and heavy ribbed portions of tobacco leaves to undergo a shredding operation caused by the spikes of the roller interpassing between the teeth of the stationary rake.

3. The method of removing stems from tobacco leaves which comprises delivering a continuous stream of tobacco to a leaf ripping device, throwing ripped tobacco leaves upwardly at an inclined angle into a pneumatic separating chamber; separating bare tobacco leaf laminae from the ripped tobacco thrown into said separating chamber by lifting the same upwardly by means of an air stream; regulating the pressure and velocity of said air stream to allow stems having substantially no laminae attached thereto to fall downwardly to be separated from said separating chamber; and then deflecting falling stems having substantial amounts of laminae still attached thereto directly in a downward direction back to said leaf ripping device for reprocessing.

4. Apparatus for ripping stems from tobacco leaf laminae comprising; a rotating spiked member; a concave member surrounding said rotating member for approximately 180 degrees of its path of travel; a funnel-shaped member positioned above one side of said concave where tobacco is discharged from said concave; a pneumatic separating chamber; a second rotating spiked member for receiving tobacco from said first member and throwing it along one side of said funnel-shaped member into said pneumatic separating chamber; the other side of said funnel-shaped member being so constructed and arranged as to remove from the separating chamber stems having portions of tobacco leaf laminae still adhering thereto and directing them back into the range of action of said second member; and mechanism for rotating said second member at a faster rate of travel than said first mentioned rotating spiked member.

5. A device for ripping stems from tobacco leaves comprising two horizontal rollers having parallel axes which are positioned at two horizontal planes superimposed over each other; a housing for said rollers having a cross sectional configuration resembling the figure 8 wherein a part of the upper, center and bottom portions of the figure 8 have been cut away to allow tobacco to be delivered at the bottom cut away portion to the bottom roller and to allow tobacco to be transferred from one roller to the other roller at the center portion of said cut away housing and to allow ripped tobacco to be thrown out by said other roller along one side of the upper cut away portion of the figure 8; a separation chamber for receiving ripped tobacco thrown out by said

other roller, and the other side of the upper cut-away portion extending under said separating chamber to catch and guide tobacco leaves having stems attached thereto back into the range of action of the upper roller.

6. Apparatus for removing and separating the blade portions from the stem portions of tobacco leaves comprising a pair of upper and lower rotating members having horizontal and parallel axes of rotation, elements projecting from each of said members a distance sufficient to cause said elements to interfinger when said members are rotated to tear and transfer tobacco leaves from the elements of one member to the elements of the other member, a funnel-shaped housing having an opening where tobacco is transferred from the lower member to the upper member, means for supporting said housing to surround a portion of the path of travel of said upper member, a separating chamber into which tobacco is discharged directly from said upper rotating member, and a plurality of stationary elements projecting from said housing between which the elements on the upper rotating member pass to retear any partially torn tobacco leaves that have not been completely separated in the separating chamber, said stationary elements being mounted at an area adjacent the point where the projecting elements interpass one another.

7. The method of ripping and separating tobacco leaf lamina from the stems of tobacco leaves which comprises passing a continuous stream of tobacco through a tobacco ripping device, throwing said ripped tobacco upwardly at an oblique angle into a separating chamber; passing a stream of air upwardly through said separating chamber to remove tobacco leaf lamina which is free from tobacco stems; collecting stems which are substantially free from lamina that fall downwardly from said separating chamber and deflecting falling stems which have tobacco leaf laminae adhering thereto back from the separating chamber which fall downwardly into the range of action of the ripping device for further ripping.

8. The method of separating tobacco leaf laminae from the stems of tobacco leaves which comprises ripping and tearing a continuous stream of tobacco leaves, throwing said torn tobacco leaves upwardly at an oblique angle into a separating chamber having an up draft, removing in an upward direction stemless tobacco leaf laminae from the separating chamber, deflecting falling stems having substantial amounts of laminae attached thereto downwardly and directly back into the range of the ripping and tearing apparatus, and removing falling bare stems from said separating chamber.

9. Apparatus for tearing tobacco leaf lamina from the stems of tobacco leaves comprising, a rotating cylinder, toothed combs mounted on the circumference of said rotating cylinder, a tobacco supplying device for delivering tobacco leaves to be torn into the range of action of said combs, a second cylinder positioned so that a portion of the second cylinder is in the same vertical plane as a portion of said first named cylinder, a plurality of projecting members extending from the circumference of the second cylinder which are adapted and arranged to pass between the teeth of said combs to remove tobacco therefrom which passes between the cylinders, apparatus for rotating said second cylinder at a faster rate than said first cylinder in opposite directions, a sepa-

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rating chamber directly connected with said second cylinder for receiving tobacco thrown from the projecting members mounted on said second cylinder, and apparatus for causing a stream of air to flow through said separating chamber to separate the tobacco leaf laminae from the stems of tobacco leaves.

10. Apparatus for continuously ripping and tearing the tobacco leaf lamina from the ribs and stems of the tobacco, said apparatus having, a conveyor for delivering a continuous stream of tobacco to be ripped, into said apparatus, a rotating comb having teeth adapted and arranged to engage with tobacco leaves delivered into the path of operation of said teeth, an imperforate concave surrounding the path of travel of said comb for approximately 180°, said concave serving to assist in aligning the stems of tobacco leaves as they are pulled around the concave by the teeth of said comb, a roller, having spikes, positioned above said toothed comb for engaging with tobacco leaves carried by the teeth of said comb and pulling said tobacco leaves through the teeth of the comb to separate the leaf lamina from the stem and heavy ribbed portions of tobacco leaves by a shearing action, a device for introducing a stream of air closely adjacent to the spikes of said roller to assist in removing the torn tobacco leaves therefrom, a pneumatic separating chamber, an air shaft connected directly to the portion of the spiked roller where said tobacco leaves are delivered therefrom for conveying said torn tobacco to said pneumatic separating chamber, a chute associated with said tobacco leaf separating chamber for receiving stem portions of tobacco leaves separated in said chamber, and mechanism for imparting movement to a stream of air through said air shaft and chamber for removing tobacco leaf lamina separated in said chamber.

11. Apparatus for continuously ripping and tearing the tobacco leaf lamina from the ribs and stems of the tobacco leaves, said apparatus having, a conveyor for delivering a continuous stream of tobacco leaves to be ripped, into said apparatus, a rotating comb having teeth adapted and arranged to engage with tobacco leaves delivered into the path of operation of said teeth, an impervious concave surrounding the path of travel of said comb for approximately 180°, said concave serving to assist in aligning the stems of tobacco leaves as they are pulled around the concave by the teeth of said comb, a roller, having spikes, positioned above said toothed member for engaging with tobacco leaves carried by the teeth of said comb and pulling said tobacco leaves through the teeth of the comb to separate the leaf lamina from the stem and heavy ribbed portions of tobacco leaves by a shearing action, a device for introducing a stream of air closely adjacent to the teeth of said roller to assist in removing the torn tobacco leaves therefrom, a pneumatic separating chamber, an air passageway connected directly with the spiked roller where said tobacco leaves are delivered therefrom for conveying said torn tobacco to said pneumatic separating chamber, a chute associated with said tobacco leaf separating chamber for receiving stem portions of tobacco leaves separated in said chamber, mechanism for imparting movement to a stream of air through said passageway and chamber for removing tobacco leaf laminae separated in said chamber, and a second chute connected to said tobacco leaf chamber for deflecting stems having tobacco leaf laminae still ad-

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hering thereto directly back into the range of action of the spiked roller to be return.

12. A combined apparatus for ripping a continuous stream of tobacco leaves and separating the ripped tobacco leaves into separate categories of stems, tobacco leaf laminae having stems adhering thereto, tobacco laminae, sand, lint and tobacco dust, said apparatus having, a source of supply of tobacco leaves, a continuously rotating comb positioned adjacent said source of supply for engaging with the tobacco leaves fed into the path of operation of said comb, a rotating roller having spikes positioned above said comb, said spikes being adapted and arranged to interpass between the teeth of the comb to thereby engage and pull the tobacco leaves held by the teeth of said comb through the teeth of the comb to thereby rip the tobacco leaf laminae from the stems and heavy ribbed portions of the tobacco leaf, an impervious concave surrounding the path of travel of said comb for confining tobacco leaves carried by the comb to a predetermined path of travel, a separating chamber having an unobstructed passageway connecting said roller directly with said separating chamber, a dividing wall positioned below said separating area for separating falling stems having tobacco leaf lamina adhering thereto from the cleaned stems and heavy ribbed portions of tobacco and guiding the falling stems with tobacco leaf laminae back into the path of operation of the spikes of said roller for retearing, and a device for removing the cleaned stems and heavy ribbed portions of tobacco from the apparatus.

13. Apparatus for tearing tobacco leaf laminae from the stems of tobacco leaves comprising; a pair of cylinders, one located above the other; driving means for rotating the upper cylinder at a faster rate than the lower cylinder to throw torn tobacco leaves upwardly, spaced spikes extending from the circumference of each of said cylinders; said spikes being so constructed and arranged that the spikes of one cylinder will pass in between the spikes of the opposing cylinder when said cylinders are rotated; apparatus for directing tobacco into the range of action of the spikes on the lower cylinder; a separating chamber located at an area spaced from said second cylinder; a slide positioned below said chamber for deflecting falling tobacco stems having laminae attached thereto back into the range of action of the spikes of said second cylinder for retearing; and apparatus for causing a stream of air to flow through said separating chamber to remove and separate tobacco leaf laminae from the substantially clean stems.

14. The method of ripping and tearing tobacco leaf lamina from the stems of tobacco leaves which comprises; delivering a continuous stream of tobacco to apparatus for ripping and tearing tobacco leaf laminae from the stems of tobacco leaves, throwing said ripped and torn tobacco upwardly into a pneumatic separating chamber, removing in an upward direction stemless tobacco leaf laminae from the separating chamber; removing falling bare stems from the separating chamber, and deflecting falling stems having substantial amounts of tobacco leaf laminae still attached back from the pneumatic separating chamber directly in a generally downward direction to the apparatus for further ripping and tearing.

15. Apparatus for tearing tobacco leaf laminae from the stems of tobacco leaves comprising; a device having spike like members projecting

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from its surface; mechanism for rotating said device at a fixed rate; a second device positioned above said first device and having spike like members projecting from its surface positioned so that the members of the second device pass partially in between the members of the first device; mechanism for rotating said second device in a direction opposite to that of the first device and at a rate of speed faster than that of the first device; stationary projecting members coacting with the members on said second device for holding back tobacco leaves carried by the members on said second device to thereby effect a separation of the laminae from the stems of the tobacco leaves; a separating chamber connected directly with the discharge side of said second device into which torn tobacco leaves are thrown by the rotation of said second device; means for causing a stream of air to flow through said chamber to remove therefrom tobacco leaf laminae from which the stems have been torn; a chute positioned below and slightly to one side of said separating chamber for receiving stems falling from said separating chamber, and a guide projecting partially under said separating chamber from the side closest to said second device to guide falling tobacco leaf laminae having stems still attached thereto back in a downward direction into the range of action of the projecting members mounted on said second device to thereby put said laminae and stems through another leaf tearing cycle.

16. Apparatus for removing stems from tobacco leaves which comprises; a pair of coacting members rotating on horizontal parallel axes one above the other; elements projecting from each of said rotating members for tearing and throwing tobacco in an upward direction, said elements being of sufficient length to interpass between each other when said members are rotated; driving mechanism for rotating said upper member at a faster rate of speed than said lower member; apparatus for delivering a continuous stream of tobacco to said lower member; stationary elements positioned adjacent to said upper member at an area adjacent the point where the elements of said rotating members interpass with each other to allow the projecting elements of said upper member to pass therebetween when rotating to thereby effect a tearing action on the tobacco leaves carried by the elements of said upper member; a separating chamber connected directly to the location where said rotating members interpass with each other to receive torn tobacco leaves which are discharged from said upper member and apparatus for separating and removing tobacco leaf laminae and stems as they are discharged into said separating chamber and deflecting stems with laminae directly back in a downward direction to said projecting members for retearing.

17. Apparatus for removing stems from tobacco leaves which comprises a pair of coacting members rotating on horizontal, parallel axes one above the other, elements projecting from each of said rotating members for tearing and throwing tobacco in an upward direction, said elements being of sufficient length to interpass between each other when said members are rotated, driving mechanism for rotating said upper member at a faster rate of speed than said lower member, apparatus for delivering a continuous stream of tobacco to said lower member, stationary elements positioned adjacent to said upper member at an area adjacent the point where the elements of said rotating members interpass with each

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other to allow the projecting element of said upper member to pass therebetween when rotating to thereby effect a tearing action on the tobacco leaves carried by the elements of said upper member, a separating chamber connected directly to the area from which torn tobacco leaves are discharged from said upper member, an air gate for introducing air closely adjacent the upper member to assist in elevating ripped tobacco leaves into the separating chamber, a channel confining said tobacco leaf laminae to an upward path of travel; a second separating chamber, the upper end of said channel being connected to the second separating chamber at an angle transverse to the direction of travel of the air in said channel, and a second separate source of supply of air located in said first separating chamber at the upper end of said channel for pushing tobacco leaf laminae carried in said channel toward said second separating chamber, and apparatus for separating and removing tobacco laminae and stems as they are discharged into said separating chamber and directing stems with laminae directly back in a downward direction to said projecting members for retearing.

18. A device for ripping stems from tobacco leaves comprising; a spiked bottom roller for receiving a continuous stream of tobacco to be ripped; a pneumatic separating chamber; a second spiked roller adjoining said first spiked roller for receiving and removing tobacco carried by said first spiked roller and discharging said tobacco into said separating chamber; a housing, funnel-shaped in cross section, surrounding said second spiked roller wherein the open end of said housing is connected to said pneumatic separating chamber; the bottom portion of said funnel-shaped housing having an opening through which tobacco is delivered from said first roller to said second spiked roller; and mechanism for driving said rollers to cause a continuous stream of tobacco to be delivered by the second roller along one side of said funnel-shaped housing into said separating chamber; and the other side of said funnel-shaped member being constructed and arranged to project partially into said separating chamber to receive and guide tobacco leaf laminae still having stems attached thereto back to said second roller for additional ripping.

19. Apparatus as provided for in claim 1, a bridge having aligned spikes positioned across and forming an extension of the delivery end of said device for receiving the continuous stream of tobacco, the teeth of said comb passing between the spikes of said bridge, projections shorter than the length of said spikes formed between the base ends of the aligned spikes of said bridge for holding back the tobacco leaves as they are pulled through the teeth of said bridge by said comb, and mechanism for rotating said roller at a faster rate of travel than said comb.

20. Apparatus as provided for in claim 1, a bridge having teeth forming an extension of said device for receiving tobacco delivered from said device, the teeth of said comb passing between the teeth of said toothed bridge for engaging with tobacco leaves and pulling them through the teeth of said bridge before positively pulling them around said curved concave to longitudinally align the tobacco leaves.

21. Apparatus as provided for in claim 1, a bridge having a plurality of teeth forming an extension of said device, the teeth of said comb pass-

ing between the teeth of said bridge, a drive for said device to move tobacco leaves into the path of operation of said toothed comb, said curved concave surrounding said comb for approximately 180 degrees of its path of travel, a funnel-shaped member positioned above said concave where tobacco is discharged from said concave and along one side of which said roller throws tobacco into said separating chamber, the other side of said funnel-shaped member being so constructed and arranged as to remove from the separating chamber stems having portions of tobacco leaf laminae still adhering thereto and directing them back into the range of action of said roller, and mechanism for rotating roller at a faster rate of travel than said comb.

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