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PREPARING SHREDDED TOBACCO

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29 Claims.

(Cl. 131—123)

This invention relates to tobacco shredding, more particularly to a novel process and machine for shredding tobacco leaves and winnowing the shredded laminae from stem shreds formed during the shredding operation. The main object of the invention is to prepare shredded tobacco suitable for cigarette manufacture; and to this end the tobacco leaves are fed into a shredder by a shredder of the disk or other desired type to which the leaves may be fed tip first, or in any other suitable manner, and the shredded laminae thus formed are winnowed from the heavier stem fragments also formed in the shredding operation, to provide shredded tobacco suitable for cigarette making.

A further object of the invention is to provide a novel machine for carrying out the process, wherein the stem butts are severed from the leaves before shredding. A further object of the invention is to disentangle and spread out the tobacco leaves before subjecting them to the shredding operation. In this connection it may be noted that shredded tobacco especially suitable for cigarette manufacture may be produced by feeding the outspread tobacco leaves endwise, preferably tip first, into a shredder of the disk type, but it should also be understood that the production of scrap tobacco for cigars is within the scope of this invention.

Another important object of the invention is to provide improved mechanism for feeding tobacco leaves to disk shredders. Hitherto one of the main difficulties in the practical use of the gang disk shredder having interengaging gangs of rotating disks lay in the lack of a satisfactory feed for such shredders. As is well known to those acquainted with such shredders, it is necessary to feed the leaves in thin layers, preferably a leaf at a time, or at least without any considerable number of leaves going through one on top of each other. Also any bunches or knots of tangling leaves fed into the machine will result in a jam or injury to the disks. The latter results in a great deal of delay for the reason that the disks have to be completely disassembled to get at a central disk. At the very least, such irregular feeding of leaves results in frequent stopping of the shredder and consequent loss of output.

One solution of the foregoing difficulties is disclosed in the application for United States patent of Rundell, S. N. 754,496 for “Tobacco leaf handling,” assigned to the assignee of the present application, and the present shredder and feeding mechanism constitutes in a number of respects an improvement on the feeding apparatus of the Rundell application above referred to. In the construction of the Rundell application, the leaves are delivered one by one into position to be gripped individually by grippers which necessarily slows up feeding to some extent and also limits the output to a considerable degree when small leaves are operated upon, such as some grades of cigarette tobacco leaves. In the present arrangement the feeding operation is made continuous and faster by providing means for feeding a continuous mass or layer of leaves sideways to devices which separate the leaves at one end, preferably the butt end. The separated leaf ends are then fed between the jaws of endless traveling sets of grippers arranged to provide substantially continuous grip surfaces so that all leaves will be gripped regardless of their position relative to the faces of the individual grippers and so that two leaves may be gripped at a time by one set of gripper faces. These grippers suspend leaves by their ends so that the leaves are hung as separated by the separating devices and are further shaken and disentangled while suspended, and in addition means may be provided for pneumatically cleaning and spreading and mechanically stroking the leaves so that the leaves are in a cleaned and separated straightened condition, ideal for feeding to the disk shredder.

Another object of the invention is to prevent clogging of the disks by the wide or knotty stem portions and at the same time to decrease the amount of stem material which must be subsequently winnowed from the shredded tobacco. For this purpose a suitable device for cutting off the butts is provided.

With these and other objects not specifically mentioned in view, the invention consists in certain constructions and combinations hereinafter fully described and then specifically set forth in the claims hereunto appended.

Referring to the drawings in which like characters of reference indicate the same or like parts:

Fig. 1 is a partial side elevation of a novel machine for shredding tobacco in accordance with the invention;

Fig. 2 is a detail side elevation of the machine illustrated in Fig. 1, on an enlarged scale showing the winnowing chamber thereof;

Fig. 3 is a similar view of the leaf drying chamber;

Fig. 4 is a plan view of the knife which severs the stem butts from the leaves;

Fig. 5 is a detail end view of one type of tobacco shredding device selected for illustration in the machine; and
Fig. 6 is a detail end elevation of parts shown in Fig. 1. In carrying the invention into effect there is provided a novel process comprising cutting unstemmed tobacco leaves into narrow strips of a width suitable for cigarette manufacture and winnowing the shredded laminae from stem fragments thus formed, and the leaves may be spread out and disentangled before shredding. The machine provided for carrying out this process includes means acting to grip the stem butts of the leaves and advance them in pendant position, a shredder, mechanism for disentangling and spreading out the pendant leaves, a set of conveyor belts arranged to admit the pendant leaves therebetween and advance them tip first into the shredder, and a winnowing chamber arranged beneath the shredder to catch the shredded tobacco and winnow the shredded laminae from stem shreds formed in the stemming operation. These various means and parts in the machine may be widely varied in construction within the scope of the claims to the machine, and some of the steps of the process may be omitted, or their sequence may be varied, within the scope of the claims to the process. The invention, therefore, is not to be limited to the particular process and machine described herein.

Referring to Fig. 1, the principal parts of the machine for carrying out my novel process are as follows: A feed belt A which advances the leaves spread thereon by the operator. A threshing mechanism B which clears laminae from the stem butts of the advancing leaves so that the same may be securely gripped. A butt separator C comprising sets of endless belts running at progressively increasing speed, a leaf delivery belt runway D in which the cleared stem butts are swung to vertical position while the leaves are being disentangled, cleaned and spread out by feeder fans E and suction apparatus F. The sets of endless belts of the butt separator receive the butts therebetween and progressively accelerates them to establish the separation thereof and synchronize theade of the linear speed of the gram per chain G and deliver them to the runway D. The endless series of pairs of grippers G which contact to grip the upturned stem butts and carry the leaves in pendant position through the drying chamber H against a knife I which may be provided, if desired, to sever the stems close to their butts. A set of conveyor belts J deliver the leaves to a shredder K. A winnowing chamber L in which the stem fragments are separated from the shredded tobacco and a brush M expels any stem butts that may cling to the gripper jaws, the brush also serving to clean said jaws. The operator unites "hands" of dampened tobacco leaves and spreads them rapidly in a horizontal layer on the belt A (at a position not shown). When the leaves travel to the butt separator C, Fig. 1. As the operation and construction of units C, D, E, F, and G is fully described and illustrated in Patent No. 1,068,086, granted on the application of R. E. Rundell, further description and illustration thereof is omitted in the interest of brevity and clarity, but it may be noted that the units will be lengthened to permit cleaning and spreading out the leaves at higher speeds.

The leaves, after emerging from the suction apparatus F, are advanced towards the drying chamber H by the action of the grippers G which are mounted on a traveling chain and periodically closed to grip the stem butts of the leaves in the manner fully described in the above mentioned patent. The leaves upon passing through a T-shaped opening 28 (Fig. 3) provided in said chamber, are exposed to the drying action of heated air admitted through inlet 21 so that they may be shredded more easily. A blower 22 circulates the air past a heater element 23 adjacent the inlet 21, a small portion of the heated air escaping through the opening 26 but the remainder returns, travels through the outlet 27, and is recirculated. The leaves thus conditioned are carried towards a knife I which cuts the butt stems.

Referring now to Figs. 1 and 4, it will be seen that the knife I is carried by the guides rails 25 and 26 positioned in the path of the oncoming stems. The leaves thus severed from their stem butts are then gripped by the pair of vertically moving belts J which deliver the leaves to the shredding unit K. This shredding unit, Figs. 1 and 5, may consist of two rows of overlapping cutter disks 27 driven in opposite directions by means of a train of gears (not shown). The belts J hold and guide the leaves while inserting them tip first into the shredder.

The shredded tobacco falls from the knives 27 on to a horizontally running belt 28 which discharges the mass of shredded laminae and stem fragments through a channel 29 of 120° which turns down to unit L. A blower 30 in the unit L propels the mass upward against a baffle 31 on which the shreds of tobacco and stem fragments rebound in an upward direction. The heavier stem fragments are not carried to the top of the partition 32 but fall through the outlet 33. The shredded laminae, on the other hand, are blown over the top of partition 32 and emerge from a second outlet 34; the stem fragments being separated in this manner from the shredded laminae which are to be used in the making of cigarettes.

Other types of shredders may be used to prepare shreds of tobacco suitable for cigarettes or cigars. If desired the tobacco leaves may be disintegrated by advancing them into the range of action of a reciprocating blade which shreds the leaves on a ledger plate.

Referring to Fig. 2, the gripper jaws 40 are opened when their rollers 41 engage a stationary cam 42, the butt stems then falling from the jaws 40, or if they should be struck thereon, a revolving brush 43 sweeps them from said jaws. The brush M, is driven in the same manner as described in the above mentioned patent. The ejected stem butts fall into a suitable chute 44 which guides the stems into a receptacle, not shown. If it is desirable to omit the knife I and dispense with the severing of the stem butts then the cam 42 may be arranged to open the grippers 48 when the tobacco leaves have entered between the belts J. Opposed gripper bars J' on these belts grip the butt ends of the leaves and lower the suspended leaves into the disk shredder.

What is claimed is:
1. The process of shredding tobacco leaves which comprises cutting off the stem butts of unstemmed tobacco leaves while mechanically held in pendant position, removing said butt stems from the stem butts of the grippers G which are mounted on a traveling chain and periodically closed to grip the stem butts of the leaves in the manner fully described in the above mentioned patent.
2. The leaves upon passing through a T-shaped opening 28 (Fig. 3) provided in said chamber, are exposed to the drying action of heated air admitted through inlet 21 so that they may be shredded more easily. A blower 22 circulates the air past a heater element 23 adjacent the inlet 21, a small portion of the heated air escaping through the opening 26 but the remainder returns, travels through the outlet 27, and is recirculated. The leaves thus conditioned are carried towards a knife I which cuts the butt stems.
3. Referring now to Figs. 1 and 4, it will be seen that the knife I is carried by the guide rails 25 and 26 positioned in the path of the oncoming stems. The leaves thus severed from their stem butts are then gripped by the pair of vertically moving belts J which deliver the leaves to the shredding unit K. This shredding unit, Figs. 1 and 5, may consist of two rows of overlapping cutter disks 27 driven in opposite directions by means of a train of gears (not shown). The belts J hold and guide the leaves while inserting them tip first into the shredder.
4. The shredded tobacco falls from the knives 27 on to a horizontally running belt 28 which discharges the mass of shredded laminae and stem fragments through a channel 29 of 120° which turns down to unit L. A blower 30 in the unit L propels the mass upward against a baffle 31 on which the shreds of tobacco and stem fragments rebound in an upward direction. The heavier stem fragments are not carried to the top of the partition 32 but fall through the outlet 33. The shredded laminae, on the other hand, are blown over the top of partition 32 and emerge from a second outlet 34; the stem fragments being separated in this manner from the shredded laminae which are to be used in the making of cigarettes.
5. Other types of shredders may be used to prepare shreds of tobacco suitable for cigarettes or cigars. If desired the tobacco leaves may be disintegrated by advancing them into the range of action of a reciprocating blade which shreds the leaves on a ledger plate.
6. Referring to Fig. 2, the gripper jaws 40 are opened when their rollers 41 engage a stationary cam 42, the butt stems then falling from the jaws 40, or if they should be struck thereon, a revolving brush 43 sweeps them from said jaws. The brush M, is driven in the same manner as described in the above mentioned patent. The ejected stem butts fall into a suitable chute 44 which guides the stems into a receptacle, not shown. If it is desirable to omit the knife I and dispense with the severing of the stem butts then the cam 42 may be arranged to open the grippers 48 when the tobacco leaves have entered between the belts J. Opposed gripper bars J' on these belts grip the butt ends of the leaves and lower the suspended leaves into the disk shredder.

What is claimed is:
1. The process of shredding tobacco leaves which comprises cutting off the stem butts of unstemmed tobacco leaves while mechanically held in pendant position, removing said butt stems from the stem butts of the grippers G which are mounted on a traveling chain and periodically closed to grip the stem butts of the leaves in the manner fully described in the above mentioned patent.
2. The leaves upon passing through a T-shaped opening 28 (Fig. 3) provided in said chamber, are exposed to the drying action of heated air admitted through inlet 21 so that they may be shredded more easily. A blower 22 circulates the air past a heater element 23 adjacent the inlet 21, a small portion of the heated air escaping through the opening 26 but the remainder returns, travels through the outlet 27, and is recirculated. The leaves thus conditioned are carried towards a knife I which cuts the butt stems.
3. Referring now to Figs. 1 and 4, it will be seen that the knife I is carried by the guide rails 25 and 26 positioned in the path of the oncoming stems. The leaves thus severed from their stem butts are then gripped by the pair of vertically moving belts J which deliver the leaves to the shredding unit K. This shredding unit, Figs. 1 and 5, may consist of two rows of overlapping cutter disks 27 driven in opposite directions by means of a train of gears (not shown). The belts J hold and guide the leaves while inserting them tip first into the shredder.
4. The shredded tobacco falls from the knives 27 on to a horizontally running belt 28 which discharges the mass of shredded laminae and stem fragments through a channel 29 of 120° which turns down to unit L. A blower 30 in the unit L propels the mass upward against a baffle 31 on which the shreds of tobacco and stem fragments rebound in an upward direction. The heavier stem fragments are not carried to the top of the partition 32 but fall through the outlet 33. The shredded laminae, on the other hand, are blown over the top of partition 32 and emerge from a second outlet 34; the stem fragments being separated in this manner from the shredded laminae which are to be used in the making of cigarettes.
5. Other types of shredders may be used to prepare shreds of tobacco suitable for cigarettes or cigars. If desired the tobacco leaves may be disintegrated by advancing them into the range of action of a reciprocating blade which shreds the leaves on a ledger plate.
6. Referring to Fig. 2, the gripper jaws 40 are opened when their rollers 41 engage a stationary cam 42, the butt stems then falling from the jaws 40, or if they should be struck thereon, a revolving brush 43 sweeps them from said jaws. The brush M, is driven in the same manner as described in the above mentioned patent. The ejected stem butts fall into a suitable chute 44 which guides the stems into a receptacle, not shown. If it is desirable to omit the knife I and dispense with the severing of the stem butts then the cam 42 may be arranged to open the grippers 48 when the tobacco leaves have entered between the belts J. Opposed gripper bars J' on these belts grip the butt ends of the leaves and lower the suspended leaves into the disk shredder.
winnowing the shredded laminae from stem shreds formed during the shredding operation.

2. The process of shredding tobacco leaves, as claimed in claim 1, which comprises spreading out the tobacco leaves and gripping the butts, while continuously feeding the leaves, and, after removing the butts from their butts and then feeding the tobacco leaves tip first into said shredder to cut them into narrow strips of a width suitable for cigarette manufacture, and winnowing the shredded laminae from stem shreds formed during the shredding operation.

3. The process of shredding tobacco leaves which comprises feeding tobacco leaves into the proximity of a disk shredder, in pendant position suspended from their butts, spreading out the leaves while they are being fed in pendant position, of a disk shredder, and winnowing the shredded laminae from the stem shreds formed during the shredding operation.

4. The process of shredding tobacco leaves which comprises feeding tobacco leaves into the proximity of a disk shredder, in pendant position suspended from their butts, severing the stem butts from the pendant leaves, feeding the severed leaves into the shredder, and winnowing the shredded laminae from the stem shreds formed during the shredding operation.

5. In a machine for shredding tobacco leaves, the combination with a drying chamber, of means for carrying the leaves through said drying chamber to condition them, a device for cutting the stem butts from the conditioned leaves in pendant position, a shredder for disintegrating the leaves after the stem butts have been cut therefrom, and a winnower for separating the tobacco shreds from stem fragments formed during the shredding operation.

6. In a machine for shredding tobacco leaves, the combination with a feed belt arranged to advance a layer of leaves horizontally side by side, of a butt separator arranged to receive the leaves from said feed belt and separate their stem butts, means arranged to receive the stem butts of the leaves after the same have been separated and turn them into a vertical position, an endless series of pairs of traveling grippers coacting to seize the upturned stem butts and advance the leaves in pendant position, a set of conveyor belts disposed to admit the pendant leaves theretofore while they are being advanced by said grippers, a shredder below said conveyor belts, a stationary knife arranged to sever the stems of the pendant leaves close to their butts while the leaves are between said conveyor belts and the stem butts are gripped by said grippers, whereupon the conveyor belts will advance the leaves tip first into said shredder, and a winnowing chamber disposed below said shredder to catch and separate the tobacco shreds from stem fragments formed during the shredding operation.

7. The combination with a disk shredder comprising gongs of interengaging disks, of traveling grippers arranged to grip tobacco leaves at an end thereof and lower them into said shredder.

8. The combination with an endless series of pairs of traveling grippers coacting to grip the stem butts of tobacco leaves and advance them in pendant position, of a set of conveyor belts arranged to admit the pendant leaves therebetween while they are being advanced by said grippers, a shredder underlying said conveyor belts, a knife arranged to sever the stems of the pendant leaves close to their butts while the leaves are between said conveyor belts and the stem butts are gripped by said grippers, whereupon the conveyor belts will advance the leaves tip first into said shredder, and a winnowing chamber disposed below said shredder to catch and separate the tobacco shreds from stem fragments formed during the shredding operation.

9. The combination with continuously traveling means acting to grip the stem butts of tobacco leaves and advance them in pendant position, of a shredder, mechanism for disentangling and spreading out the pendant leaves, traveling members arranged to receive the pendant leaves and feed them into said shredder, and a windowing chamber arranged to receive and separate tobacco shreds from stem fragments formed during the shredding operation.

10. The combination with continuously traveling means acting to grip the stem butts of tobacco leaves and advance them in pendant position, of a shredder, mechanism for disentangling and spreading out the pendant leaves, traveling members arranged to receive the pendant leaves and feed them into said shredder, and a windowing chamber arranged to receive and separate tobacco shreds from stem fragments formed during the shredding operation.

11. The combination with means acting to grip the stem butts of tobacco leaves and advance them in pendant position, of a disk shredder, and mechanism arranged to receive the pendant leaves and feed them vertically tip first into said shredder.

12. The combination with continuously traveling means acting to grip the stem butts of tobacco leaves and feed them in pendant position, of a shredder, and mechanism arranged to receive the unstemmed pendant leaves directly from said gripping means and feed them vertically into said shredder.

13. The combination with a cigarette tobacco shredder, of mechanism for suspending tobacco leaves from an end portion thereof, and means coacting with said mechanism for lowering the leaves while still suspended into said shredder.

14. The combination with a cigarette tobacco shredder, of mechanism for suspending tobacco leaves from an end portion thereof, and means coacting with said mechanism for lowering the leaves while still suspended into said shredder, said mechanism including cooperating gripping elements carried in a generally vertical path by said lowering means.

15. The combination with a disk shredder, of means for lowering tip first into said shredder a tobacco leaf suspended by its butt.

16. The combination with a disk shredder comprising gongs of interengaging disks, of traveling grippers arranged to grip tobacco leaves at an end thereof and lower them into said shredder.

17. The combination with a disk shredder comprising gongs of interengaging disks, of traveling grippers arranged to grip tobacco leaves at an end thereof and lower them into said shredder, endless flexible members having opposed runs, said traveling grippers comprising opposed gripper bars on said endless members arranged to grip the leaves between them.

18. The combination with a cigarette tobacco shredder, of means for supplying tobacco leaves in a continuous sidewise motive layer, of tobacco leaf feeding means for separating the leaves of
sawdust and delivering them in pendant position to said shredder, said feeding means including a plurality of continuously traveling grippers arranged for movement in an endless path with the grippers in side by side relation to provide a substantially continuous gripping surface.

19. The combination with a disk shredder having interengaging gangs of disks, of means for feeding unstemmed tobacco leaves to said shredder including a horizontal feed belt for receiving a layer of tobacco leaves arranged crosswise thereof and advancing said leaves sidewise, means for separating end portions of said leaves from one another, and continuously traveling means for gripping the separated end portions and delivering said leaves in separated condition to said shredder.

20. The combination with a disk shredder having interengaging gangs of disks, of means for feeding unstemmed tobacco leaves to said shredder including a horizontal feed belt for receiving a layer of tobacco leaves arranged crosswise thereof and advancing said leaves sidewise, means for separating end portions of said leaves from one another, continuously traveling means for gripping the separated end portions and delivering said leaves in separated condition to said shredder, and pneumatic cleaning means arranged to act on the leaves in said gripping means.

21. The combination with a disk shredder having interengaging gangs of disks, of means for feeding unstemmed tobacco leaves to said shredder including a horizontal feed belt for receiving a layer of tobacco leaves arranged crosswise thereof and advancing said leaves sidewise, means for separating end portions of said leaves from one another, continuously traveling means for gripping the separated end portions and delivering said leaves in separated condition to said shredder, and leaf spreading means acting on the leaves in said gripping means.

22. In a machine for shredding cigarette tobacco, the combination with a cigarette tobacco shredder, of a leaf feed for receiving a layer of tobacco leaves arranged with their butts extending in one direction and acting to advance said layer sidewise, of a butt separator, continuously traveling gripping means for gripping the separated butts, and means actuating with said gripping means to deliver the tobacco leaves in pendant position to said shredder.

23. In a machine for shredding cigarette tobacco, the combination with a cigarette tobacco shredder, of a leaf feed for receiving a layer of tobacco leaves arranged with their butts extending in one direction and acting to advance said layer sidewise, of a butt separator, continuously traveling gripping means for gripping the separated butts, and means actuating with said gripping means to deliver the tobacco leaves in pendant position to said shredder, said gripping means comprising a plurality of gripper jaws arranged in alignment to and traveling in an endless path to provide substantially continuous opposed gripping surfaces for engaging the butts in a position relative to the individual gripping faces.

24. The combination with a tobacco shredder, of means for feeding tobacco leaves to said shredder, said means including traveling devices gripping the leaves near one end to hold the tobacco suspended and acting to deliver the tobacco while still suspended into said shredder, and a pneumatic cleaner arranged to act on the suspended leaves.

25. The combination with a tobacco shredder, of means for feeding tobacco leaves to said shredder, said means including traveling devices gripping the leaves near one end to hold the tobacco suspended and acting to deliver the tobacco while still suspended into said shredder, and leaf spreading instrumentalities arranged to act on the suspended leaves.

26. The process of preparing shredded tobacco for use in the manufacturing of smoking articles which comprises cutting off the butt portions of the tobacco leaves while mechanically held in pendant position, shredding the remaining portion of the tobacco leaves including the stems, and winnowing out the shredded stem portions.

27. The process of preparing tobacco for the manufacture of smoking articles which consists in cutting off the butt portions of the tobacco leaves while mechanically held in pendant position, pneumatically cleaning the tobacco leaves, shredding the remaining portion of the tobacco leaves, and winnowing out the shredded stem portions.

28. The combination with a tobacco shredder, of means for feeding unstemmed tobacco leaves in pendant position into the range of action of said shredder, butting mechanism cooperating to cut off the leaf butts prior to delivery of the remaining portion of said leaves to said shredder, and a winnower arranged to receive the shreds from said shredder and winnow the stem shreds from the laminie shreds.

29. The combination with a gang disk tobacco shredder arranged to shred leaves into narrow shreds suitable for cigarette manufacture, of means for feeding unstemmed tobacco leaves in pendant position into the range of action of said shredder, butting mechanism cooperating to cut off the leaf butts prior to delivery of the remaining portion of said leaves to said shredder, and a winnower for receiving the shreds from said shredder and winnowing out the stem shreds.

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