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TOBACCO SORTING AND SEPARATING MACHINE

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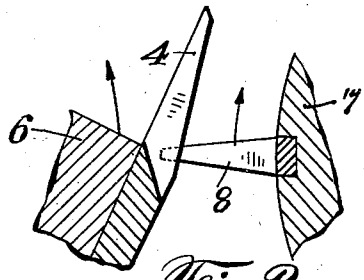


Fig. 2.

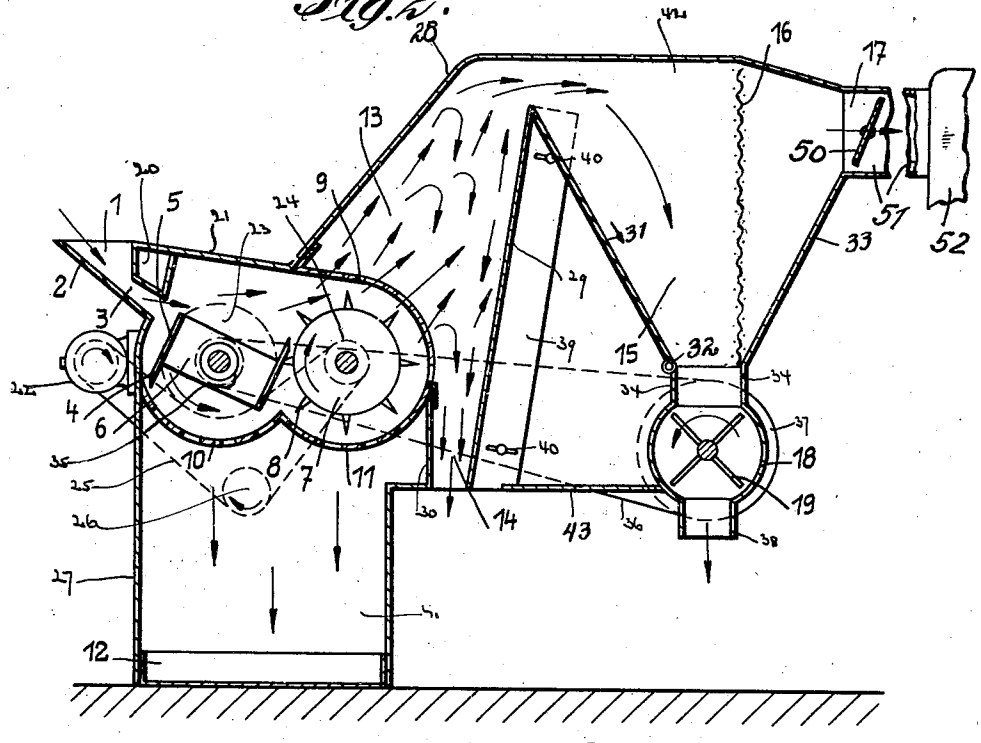


Fig. 1.

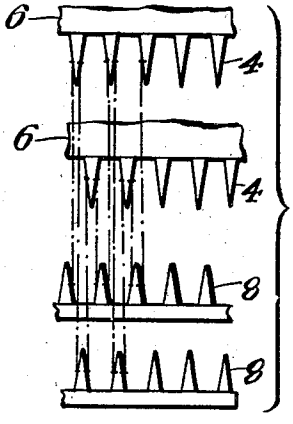


Fig. 3.

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TOBACCO SORTING AND SEPARATING MACHINE

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5 Claims. (Cl. 131—60)

The present invention relates to improvements in a tobacco sorting and separating machine of the type employing an air current.

An object of the present invention is to provide a device for separating heavy particles of tobacco including stems from leaf particles and simultaneously washing the leaf particles in an air stream.

Another object is to combine a coarse sorting device with a separating device and in which the separation is accomplished by means of the relation between the weight of the portions of the tobacco and the velocity of the induced air current.

A further object is to provide a simple and readily constructed unitary machine for use in combination with a tobacco shredding machine to sort and separate the shredded particles.

In contradistinction to the above type of device the present invention aims to separate the heavy portions of tobacco such as the stems from the leaf portions which have been torn from the stems and at the same time to sluice or wash the whole body of tobacco portions in the current of air which effects the separation of the stems from the leaves. Thereafter a further separation of the leaves from the threads, dust, etc., is brought about.

With the foregoing and other objects in view, the invention will be more fully described hereinafter, and will be more particularly pointed out in the claims appended hereto.

In the drawing—

Figure 1 is a longitudinal vertical section taken through a combination tobacco shredder and sorting and separating machine;

Figure 2 is a partial view in section of the portions of the shredder; and

Figure 3 shows the positioning of the teeth of the shredder in respect to each other.

Raw leaf tobacco is fed into a hopper 1 which is composed of the sloping bottom plate 2 and the baffle 20. The baffle 20 has a vertical side forming part of the hopper 1 and also a sloping side which forms with the bottom plate 2 a channel 3 which has the effect of compacting the body of leaves fed to the machine. Tobacco passing through said channel 3 enters a shredding chamber which is formed of a top plate 21, curved grating 9 and bottom curved gratings 10 and 11. In this shredding chamber is placed a rotating comb formed by the rotatable block 6 which is journaled in opposite sides of the machine and which has at its opposite edges, comb plates 5 with blades or teeth 4 projecting beyond the edge of the block 6, all of which is shown in Figure 1.

This comb block 6 is rotated in a counter-clockwise direction by the motor 22 which operates on the large pulley 23 at one side of the machine. Alongside of the comb and extending parallel thereto is a cylindrical roller 7 journaled at opposite sides of the machine and having on its face spaced spikes or blades 8 which are located on the roller 7 to fit into the interstices between the blades 4 of the comb block.

From Figure 3, it will be noted that the teeth 4 of each set of comb plates 5 on comb block 6, are arranged in staggered relation to each other or offset in respect to each other in respect to their circular paths of movement. There is a much larger number of blades 8 on the roller 7 than there are blades 4 on comb block 6. The blades 8 in each adjacent pair are so arranged that they are also offset from each other or in a staggered relation in respect to their circular paths of movement. Roller 7 rotates in about twice the speed of rotation as block 6. In view of the staggered relation of the blades 4 with respect to each other and of the pairs of blades 8 with respect to each other, as these blades inter-engage, the blades 8 first move along one side of the blades or teeth 4, and the next set of blades 8 moves along the opposite side of the blades 4. The circular paths of movement of the blades 8 and 4 are so disposed that one side of a blade 8 wipes one side of a blade 4, and then the other side of that same blade 8 wipes the opposite side of the next offset blade 4. By such alternate action, as illustrated in Figure 3, an efficient cleaning off or elimination of such substances as would otherwise accumulate, results. Raw tobacco contains a certain amount of moisture which, with portions of the leaves and stems, accumulates in a gummed state, and which condition is obviated by the aforesaid described arrangement of blades, and as clearly shown in Figure 3.

The roller 7 is rotated in a clockwise direction by the motor 22 which turns the small pulley 24 located in the plane of the large pulley 23 and driven from the motor by the belt 25. Below the pulleys 23 and 24 on the side of the machine is placed an idler 26 for the purpose of keeping the belt 25 taut. The whole shredder assembly is supported upon a box structure 27 which is hollow and forms a receiving hopper for certain of the materials, to be described hereafter. In the bottom of this box 27 is placed a removable tray 12 for the above purpose.

Raw tobacco leaves fed in the hopper 1 pass through the channel 3 and are caught by blades 4 of the rotating comb block and carried down against the grating 10 which is concentric with the arc of the comb. The leaves so carried are freed from a great many impurities, such as sand, and the like, and such impurities fall through the openings in the grating 10 and are collected upon the removable tray 12. The leaves themselves are carried around to a position at which the more rapidly spinning blades 8 can shred them from the stems. The stems and leaves are thrown up through the openings in the grating 9 into the separating device to be described below. Such of the particles as are not thrown clear of the blades 8 through the grating 9 are carried below and thrown against the grating 11 which is concentric with the roller 7 and are freed of a great quantity of their entrained impurities and dust. By friction, particles caught against the grating 11 will be eventually picked up and thrown through the grating 9 into the separator and sorter. In the lower part of the space 13, these particles are subjected to a whirling motion which serves to clean the same.

The separator and sorter consist in a hood 28 which extends upward over the grating 9 for a distance and then extends horizontally and is attached to a pipe 17 which is used to draw out air from the separator and sorter. A suction wheel 52 or the like, draws air through the apparatus, which air enters at the channel 14. Under the hood 28 is placed a partition 29 which extends substantially vertically and to which is opposed below the grating 9 the short vertical wall 30 of the supporting box 27. Partition 29 together with the vertical wall 30 forms a trap for the heavy stems of tobacco projected through grating 9. Such stems fall between the members 29 and 30 in the channel 14 and are collected in a suitable container placed therebeneath. Between the partition and the grating 9, is an expandible space and the velocity of air flow is decreased in this space which permits the relatively heavy stems to fall by gravity. Such particles consist mainly in stems which may have very small particles of leaf still attached. The height of the partition 29 as well as the height of the hood 28, is governed by the force of the air flow used, the weight of the tobacco, the degree to which it is shredded and other factors which are apparent to those employing this type of device. Or, the air blast and its intensity can be regulated by a suitable valve or regulator, as 50. Thereby the suction or induced air flow at 51 may be regulated. Special importance is placed upon this suction action in contrast to the old use of compressed air. Beneath the hood 28 at a point beyond the top of the partition 29, is located a tapering receptacle having a wall 31 hinged at 32 and leaning against the top of partition 29. The opposite wall 33 is connected to the exhaust pipe 17. The pivot 32 and the lower end of the plate or wall 33 are connected to a trough 34 which runs transversely of the machine and is open at the top and bottom. Below the trough 34 is located an enlarged chamber 18 containing the rotating vanes 19 driven at low speed from the pulley 35 on the end of the rotating comb block 6, by means of a connecting belt 36 which passes over the pulley 37. The vanes 19 serve to keep the bottom of the conical receptacle clear and to prevent clogging by tobacco particles in the trough 34. The vanes 19 propel the tobacco particles downward through the chute 38 below which is placed a suitable receptacle. Extending transversely of the tapering receptacle and connected at the top to the hood 28 and at the bottom to the trough 34 is a screen or sieve 16 which extends completely across the tapering rceptacle.

It will, therefore, be apparent that the particles of tobacco thrown through the grating 9 are caught in the air stream flowing between the shredder and the pipe 17. Such particles as are of relatively great weight will not be able to climb over the partition 29 and so must fall through the channel 14 into a receptacle. Certain of the particles as are sufficiently light to climb over the partition 29 on the air stream will be thrown against the transverse screen 16 and others will descend into trough 34, while others will pass through the screen. The particles which are thrown against the screen 15 will be held there for a short space of time and will be blown clean of practically all of the loose dust and other impurities carried thereby. Such impurities are carried out of the device through the pipe 17.

The angularity of the partition 29 is adjustable by supporting the partition upon side plates 39 which are connected to the opposite sides of the machine by means of clamping bolts 40 passing through slots in the side plates 39. As the side plates and the partition are adjusted the hinged wall 31 of the conical receptacle swings about its pivot 32 to follow the top of the baffle 29. This adjustment of the partition 29 serves to change the size of the channel 14 and also to some extent the height of the partition.

Of course, all of the tobacco thrown into the air screen from the shredder 7 will be washed or sluiced by the current of air flowing through the device and the stems due to their heavier weight will descend into the channel 14. The lighter tobacco leaves are drawn by the air current, and due to the relatively extensive shape of the interior of the apparatus between the portions designated by reference characters 28 and 17 and the decrease in the velocity of the air current, will cause the leaves by their weight to descend into the trough 34. Certain other foreign matter as, for instance, feathers, parts of packing, string, etc., are impacted against the screen 16, which, however, permits the still light particles such as dust and the like to pass through the interstices into pipe 17. These operations depend upon the relation of the air flow to the weight of the respective constituents. Of course, the screen 16 may be cleaned from time to time. The leaves are not impacted against screen 16. Also it will be noted that the space generally indicated by 13, is such as to reduce the velocity, which enables the stems to drop into space 14. The stems do not impact upon partition 29. In the lower constricted portion a current of air may take place permitting the stems to drop but the leaves would be drawn upwardly.

While the figures of the drawing show only a longitudinal section of the device it is to be understood that the box 27 supporting the shredder has as side plate 41 and a corresponding opposite side plate which has been removed for the purpose of illustration. The roller 7 and block 6 are journaled in these opposite side plates. Similarly the chamber of the sorting and separating device is provided with a side plate 42 and a like opposite side plate not shown. It is to these opposite side plates that the plates 39 of the partition 29 are attached, likewise the vanes 19 are journaled in the opposite side plates.

The size of the chamber, height of the partition, mesh of the screen 16 and strength of the induced air current are proportioned to permit the machine to operate as described.

Between the bottom of the partition 29 and the side of the chamber 18, containing the vanes 19, is located a bracing plate 43 which is fastened to the opposite side plates 42 and which serves to reinforce the device and strengthen the structure including the chamber 18. This plate is cut away at the end nearest the partition 29 to permit adjustment of this member to vary the size of the channel 14.

It will be seen that by the induced air flow into the separator and sorter and due to the relationship of velocity to weight, separation is brought about.

Reference is made to my co-pending application, Serial No. 98,917, filed September 1, 1936, for Separating devices.

It is obvious that various changes and modifications may be made in the details of construction and design of the above specifically described embodiment of this invention without departing from the spirit thereof, such changes and modifications being restricted only by the scope of the following claims.

I claim:

1. In a tobacco sorting and separating device for shredded tobacco, comprising a housing having a front wall, a partition arranged transversely in said housing and extending from the lower part of the housing towards the upper part thereof in an unbroken wall and converging to the said front housing wall to form a compartment, the uppermost end of the partition forming with the uppermost wall of the housing a narrow channel, an air inlet at one end of the said compartment for the entrance of air to said compartment, said air inlet being arranged in proximity to the lower end of the partition and serving to admit air and as a discharge for heavy tobacco particles, a conduit having its lower end in registration with such air inlet, said conduit being formed by said partition, the walls of the housing and a separate wall, the partition and the front wall of the housing forming the compartment converging in respect to each other towards the narrow channel to enable streams of air of different velocities to be formed in the compartment, an air outlet at the other end of the housing, means at said outlet end for producing induced streams of air through said compartment beginning at the air inlet of the conduit, means for supplying shredded particles of tobacco into the induced air streams of said compartment, and means for removing the particles discharged into said narrow channel, whereby the tobacco particles in the compartment heavier than those capable of being drawn upwardly over the partition descend through said air inlet and out of the conduit, other particles in the compartment are subjected to various air velocities, and those particles capable of being drawn up by the induced air over the partition descend to the removing means thereof.

2. In a tobacco sorting and separating device for shredded tobacco, comprising a housing having a front wall, a partition arranged transversely in said housing and extending from the lower part of the housing towards the upper part thereof in an unbroken wall dividing the housing into two compartments, said partition being upwardly and rearwardly inclined, the uppermost end of the partition forming with the uppermost wall of the housing a narrow channel, an air inlet in one compartment at one end of the housing for supplying air to said compartment, said air inlet being arranged in proximity to the lower end of the partition and serving to admit air and as a discharge for heavy tobacco particles, a conduit having its lower end in registration with such air inlet, said conduit being formed by said partition, the walls of the housing and a separate wall, the partition and the front wall of the housing forming the first compartment converging in respect to each other towards the narrow channel to enable streams of air of different velocities to be formed in the first compartment, an air outlet at the other end of the housing and in the second compartment, means at said outlet end for producing induced streams of air through both compartments beginning at the air inlet of the conduit, means for throwing shredded particles of tobacco into the induced air streams, said means having its discharge above the air inlet channel, and means in the second compartment for removing the particles entering into said compartment, whereby the tobacco particles in the first compartment heavier than those capable of being drawn upwardly over the partition descend through said air inlet and out of the conduit, other particles in the first compartment are subjected to various air velocities, and those particles capable of being drawn up by the induced air over the partition enter the second compartment and descend to the removing means thereof.

3. In a tobacco machine, a shredder for leaf tobacco, a sorting and separating device for the shredded tobacco, said shredder comprising a rotatable comb, a shredding roller rotatable in the opposite direction from the comb and having spikes fitting between the teeth of said comb and having wiping engagement therewith, said comb being adapted to hold a tobacco leaf and said shredding roller being adapted to tear the leaf so held, a grating over said shredding roller extending between said shredder and said sorting and separating device so that rotation of said roller throws shredded tobacco into said device, a grating beneath said comb and shredding roller to permit passage of dust and impurities from the tobacco being shredded to a position outside of the shredder, said sorting and separating device having a chamber, means for producing a stream of air flowing through the chamber from end to end, said grating over the shredding roller being at the intake end of said stream of air, means in the chamber for sorting out heavier shredded tobacco thrown thereinto by said shredding roller, and means in the chamber for separating lighter shredded tobacco from the stream of air.

4. In a shredded tobacco sorting and separating device, the combination of a member with blades thereon, said blades being in offset relation to each other in their circular path of movement, and a second member with spikes thereon, said spikes being in offset relation to each other in their circular path of movement whereby upon the rotation of said members, a wiping interengagement of both blades and spikes takes place by which the shredded tobacco between said spikes and blades is separated and cleaned from the same, the circular paths of movement of the blades and spikes being so disposed that one side of a blade wipes one side of a spike, and then the other side of that blade wipes the opposite side of a next offset spike.

5. In a tobacco sorting and separating device

for shredded tobacco, having a housing, a separated tobacco discharge means, and an induced air means for said housing, the combination of two walls, an outer and an inner wall, forming part of said housing, said outer and inner walls converging towards each other to form a narrow channel at their upper ends, and said outer and inner walls diverging from each other to form at their lower ends furthest spaced from each other, a wide opening, a third wall spaced from the lower end of the inner wall, the lower end of the said third wall forming with the lower end of the inner wall an air inlet, and a tobacco supply means bridging the lower end of the outer wall and the upper end of the third wall, at the widest distance of the diverging outer and inner walls, whereby upon air being drawn through the air inlet and through the tobacco supply means by induced air in the narrow channel, air streams of different velocities are induced between the outer and inner walls, and particles heavier than those capable of being drawn upwardly descend along the inner wall, while those sufficiently light are drawn along by their respective velocities to and through the narrow channel.

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