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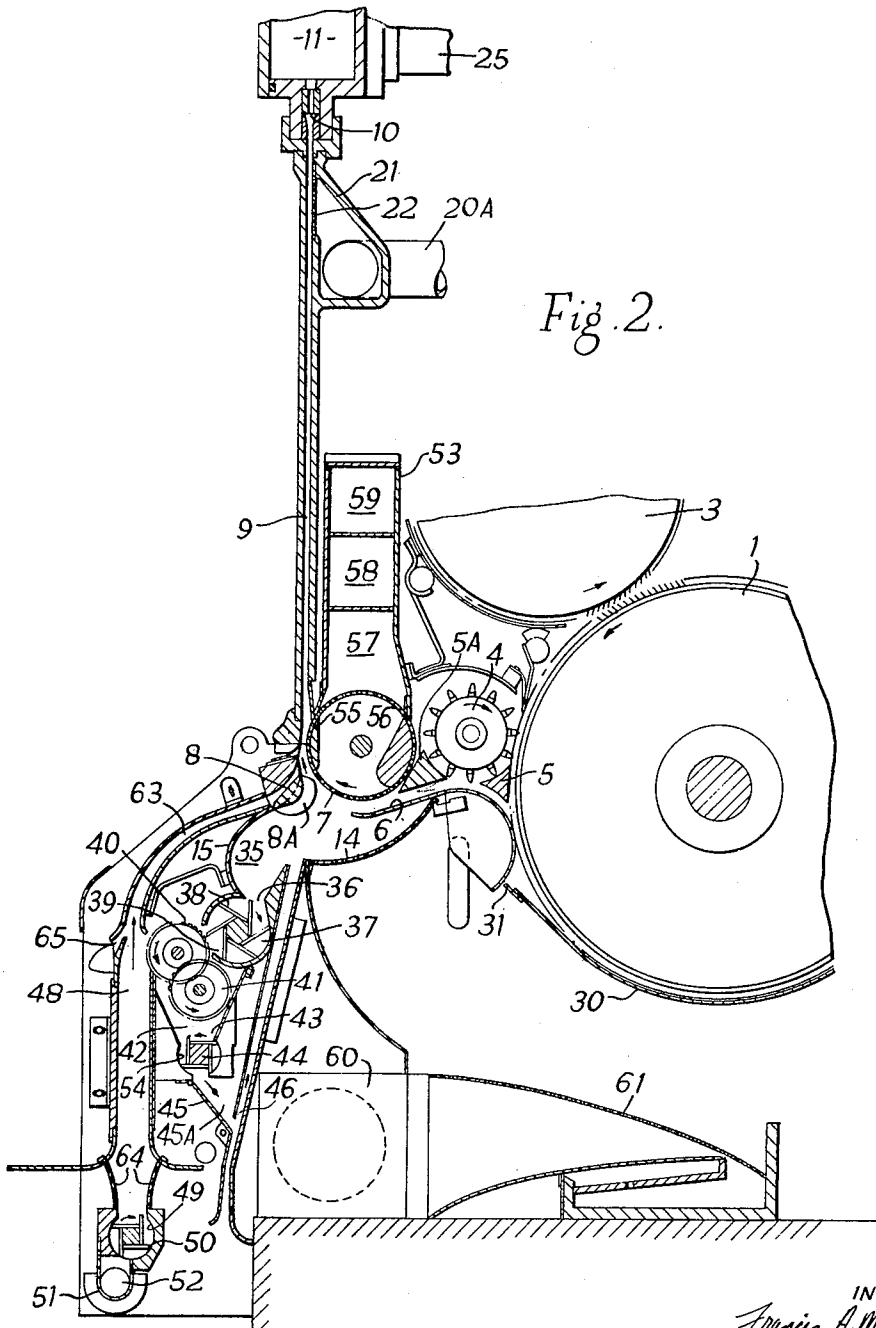
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WINNOWING APPARATUS FOR CIGARETTE-MAKING MACHINES

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WINNOWING APPARATUS FOR CIGARETTE- MAKING MACHINES

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This invention concerns improvements in winnowing apparatus for cigarette-making machines and is particularly suitable for a machine in which cut tobacco is projected upwards by an airstream as a step in the formation of a tobacco filler. For example the apparatus may be used on a machine of the kind described in the specification of U.S. Patent No. 3,030,965, granted April 24, 1962.

It is well-known to provide devices, known as winnowers, in cigarette-making machines in order to separate large heavy fragments which are generally objectionable from the tobacco from which cigarettes are to be made. As will be seen later the device provides means for separating heavy particles from light particles but these terms need some qualification as it will be understood that the terms "heavy" and "light" are relative. The main object is to separate pieces of stem and other objectionable heavy fragments from the tobacco destined to form a filler and thus the precise form the separation takes depends on the user's requirements as to quality and economy. Moreover, it is desirable to retain certain particles which are intrinsically heavy but which are small enough in size and of such shape that they can be incorporated into cigarette fillers without detriment. Such particles chiefly resemble a bird's eye, being particles occurring when the stems are sliced transversely during the tobacco cutting operation at angles not far removed from the normal to the stem axis. Such particles occur of course at random during cutting, according to the manner in which a particular leaf is presented to the cutting device. If the angle of presentation is such that a lengthy transverse slice is obtained the slice should be rejected.

The present invention provides a winnowing device arranged to reject stem, lumps, or large transverse slices of stem and means for recovering the bird's eye and like useful particles from the winnowing operation and returning them to the tobacco from which the filler will be formed.

The invention is applied to a cigarette-making machine in which cut tobacco is carried by a first airstream in the formation of a tobacco filler and having winnowing apparatus comprising a picker roller arranged to remove tobacco from a carded roller and throw it into a second airstream whereby light particles are carried away by said second airstream while heavier particles continue to move substantially along their original path to strike against a wall and thereafter to fall by gravity, and consists in a rotatable sifting device arranged to receive the falling particles and separate large pieces of stem or the like and deliver them to an outlet and permit smaller particles to pass through the sifting device to another outlet and means for delivering said smaller particles to the said second airstream which carried the aforesaid light particles.

The means for delivering said smaller particles to the said second airstream may comprise a third airstream converging with said second airstream and in such case the second outlet may comprise a rotatable airlock arranged to close a passage leading to a further passage through which the said third airstream flows. In this way the third airstream is only effective on particles re-

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leased from the second outlet by the rotatable airlock and cannot pass through the sifting device. The airlock serves as a one-way valve, letting tobacco go one way and preventing air from passing through the other way.

Similarly the outlet into which the stem material is delivered by the sifting device may have an airstream, the fourth airstream, flowing through it towards the second airstream, carrying the light particles, to subject the stem and like discarded material to a further winnowing operation to strip any fragments of light material from the discarded material and convey such fragments to the said second airstream. The stem outlet may also have a rotatable airlock arranged at its outer end whereby collected material can be delivered to a conveyor or the like, which is thus isolated from the outlet, and walls defining the stem outlet may have perforated plates, located above the last mentioned airlock, through which the fourth airstream can enter.

As the light material separated by the remaining operations is intended to be incorporated in the filler, the second, third and fourth airstreams flow eventually into the first airstream and it is convenient to cause all airstreams to be subject to a common source of suction. In such case a further rotatable airlock is provided to isolate the sifting device from said second airstream.

Usually the cut tobacco will be carried upward by the first airstream, and in the case of the specification referred to, substantially vertically upward, and thus the second, third and fourth streams will also flow in an upward direction. In said specification the first airstream passes into an upwardly directed passage and in such case guide walls, or equivalent structures forming passages, are provided to confine the airstream, and particles to a path leading into the entry of the passage.

Means may be provided for regulating the size of cross-section of the guide passages to alter the shape and consequently alter the velocity of the air through them.

The invention will be further described by way of example with reference to the accompanying drawings, in which:

FIGURE 1 is a small scale diagrammatic section of a machine embodying apparatus according to the invention; and

FIGURE 2 is an enlarged sectional view of part of FIGURE 1, showing more detail.

Referring to the drawings, a carded roller 1 removes cut tobacco from a supply contained in a reservoir formed between a wall 2, a carded roller 3 and the roller 1. The tobacco is carried out of the reservoir by the roller 1, surplus tobacco above the carding being swept back by the roller 3 which is a brushing or refuser roller. Tobacco is delivered to the reservoir in any suitable way and the invention is not concerned with such delivery. Beneath the roller 1 is a shield 30 with an adjustable end 31, see FIGURE 2. This can be adjusted to leave a small space between it and a plate 6 so that dust and tobacco fragments may be carried upward and over the plate 6 by air passing through said space as described later.

A fast rotating picker roller 4 picks tobacco from the carding of roller 1 in the usual way, the roller operating over a short concave bar 5. The picked tobacco is thrown across the plate 6 towards a rotating roller 7 which is perforated as explained later. The roller in conjunction with a guide member 8 forms the entry to a long narrow vertical passage 9. In order to prevent thrown tobacco from striking the cylindrical surface or wall of the roller a further concave bar 5A functioning as a shield is provided.

The passage 9 is partly stopped at its upper end by a perforated conveyor tape 10 on which a filler is formed in

the manner described in U.S. Patent No. 3,030,965. Above the tape is a suction chamber 11 whereby suction is exerted through the perforations of the tape 10 and thus there is an upward airstream through the passage 9. This airstream, which conveys tobacco for filler formation, is the above mentioned "first" airstream. Details of some of the parts referred to in this paragraph and a full explanation of their functions are given in the specification of the above-mentioned patent.

Suction in the passage 9 and through the tape 10 is created by a fan or the like 12, and exhaust from the fan passes to a group of cyclone separators 13 so that tobacco dust in the airflow from the fan may be removed before the air is discharged, for example, to the exterior of the building containing the machine.

A perforated plate 14, made for example of expanded slit or slotted sheet metal as described in the specification of the above-mentioned patent is provided, and air passing upward through the perforations, due to the aforesaid suction, will constitute the said second airstream and pass across the path of the thrown tobacco and carry upward into the passage 9 the majority of the shreds of tobacco which the second airstream is capable of lifting. The remaining thrown tobacco, chiefly stem material, continues substantially on its path to strike against a wall 15 from which it falls downwardly into a chamber 35 having an opening 36 formed at the bottom. The opening leads into a circular chamber 37 closed by the rotatable airlock 38 so that fragments of tobacco material falling into the chamber are periodically moved out through an outlet 39 as the airlock rotates.

Material so removed is delivered on to a sifting device comprising two rows of discs 40 and 41 having serrated edges or teeth. The discs are intercalated as shown in FIGURE 2 wherein the discs of one row are inserted alternately between the discs of the other row. The discs are spaced apart sufficiently to permit desirable pieces of material to slide through them. Larger pieces are carried upward and away from the aperture 39 by the teeth of the discs 40 which have their radial edges arranged to effect this movement. Material which passes between the assemblage of serrated discs is discharged by them into a further chamber 42 having an outlet 43 leading into a circular chamber 54 closed by a rotatable airlock 44. As the airlock 44 rotates, material in the circular chamber is removed therefrom to slide down a plate 45 forming a wall of a passage 45A and towards a narrow passage 46 leading back to the chamber 35 so that material carried up the passage 46 by a third airstream, also caused by the suction at 11, can join the light particles moving with the second airstream towards the passage 9.

Any material carried over from the chamber 37 by the row of discs 40 falls from them into a passage 43 constituting a further outlet. At the base of the passage 48 is a circular chamber 49 closed by a rotatable airlock 50.

Beneath the airlock 50 is a channel 51, running at right angles to the plane of the paper and inside the channel is a worm or other conveyor 52 by which material rejected from the machine may be conveyed to any desired point.

As in U.S. Patent No. 3,019,793, granted February 6, 1962 the suction in the passage 9, due to the fan 12, is augmented as explained later by a further fan or the like 19 which is connected by a pipe 20 and branch 20A to a box 21 opening into the passage 9 through a grille, screen, or the like 22, constructed as described in the specification of the above-mentioned patent. In the pipe 20 there is a dust separator 23 and the outlet of this device is connected by a pipe 24 to a pipe 25 which leads from the suction chamber 11 to the fan 12, a valve 26 being provided to control flow from the separator to the pipe 25. In this way dust or fragments of tobacco known as shorts, which may have passed through the screen 22 may be separated from the air by the device 23 or, if separation is not complete, further separation may take place in the cyclones 13. As in U.S. Patent No. 3,019,-

793 the fan 19 may be arranged to cause the major part of the airflow up the passage 9 as far as the screen 22.

Most of the remaining parts, shown in FIGURE 2, are substantially the same in function as in the patent first referred to and a brief description will suffice. An air duct 53 having the perforated rotatable cylinder 7 at its inlet and closely fitting said inlet has two fixed members 55 and 56 in its interior so that air can only enter the duct 53 through the cylinder wall and between the members 55 and 56. The cylinder is also in close contact with the entrance to the passage 9, which passage is substantially the length of the carded roller 1 as considered at right angles to the plane of the paper. The duct 53 is divided into three sections 57, 58 and 59 by partitions which curve upwards from its inlet, then run horizontally as shown and are arranged with a passage means whereby air from the cylinder 7 may flow to the pipe 20. Briefly the rotatable cylinder 7 and the airflow therethrough assist in directing airborne tobacco to the passage 9. All these devices are explained at great length and in detail in the patent first referred to, to which reference may be made for further information.

The first airstream, moving upwardly in passage 9, is as previously mentioned caused partly by suction through the perforated tape 10 by the fan 12. The fan 19 causes a circulation of air through the perforated cylinder 7, shown in FIGURE 2, and the duct 53 to the pipe 20 and fan 19 which discharges the air through a pipe 28, into a box 60 having a perforated screen 61, for example of expanded slit or slotted metal, as its outlet. The circulation in this system is therefore to some extent closed but the air from (the second airstream) which has to pass through the perforated plate 14 to reach the cylinder 7 helps to draw light particles towards the inlet to the passage 9 and some of the air will pass up the passage by suction through the branch 20A and to that extent augments the other airflow up the passage.

The effect of the additional suction in the passage 9 caused by the fan 19 is to increase the velocity of the airflow in the passage over that given to the air by the fan 12 and the airborne shreds of tobacco, due to their velocity, pass up to the tape and do not, in any material degree, attempt to pass through the screen 22.

The upward airstream (the first airstream) in the passage 9 also causes a fourth airstream to pass upwardly through the outlet 48 which is connected to the mouth of the passage 9 by a passage 63, which passes through a duct in guide member 8. Air enters the outlet 48 through perforated plates 64 near the chamber 49 and additional air can enter through an adjustable aperture 65. The third and fourth airstreams have a common source of air which enters the housing containing the rotary airlocks and airstream ducts by means (not shown) situated near the bottom of the housing.

The member 8 previously mentioned is a long structure, as long as the passage 9 considered at right-angles to the plane of the paper and has a number of curved flange-like guides or vanes 8A along its length. These guides give the air a component of movement in the direction of movement of the tape 10. The vertical walls (not shown) located at both ends of the passage 9 are set at an appropriate angle of inclination to the length of tape 10 to allow for this forward component of movement of the ascending airstream. The arrangement is fully described in the specification first referred to. Air flows round the structure and between the guides and the shape of the surface of 8 around which the air flows may be of a curvature found most efficient in practice. A chain line, shown in FIGURE 2, indicates a possible different curvature. A wall of the outlet 48 and a wall of the passage 63 are adjustable and the member 8 is adjustable by pivotal movement on its axis. It will be seen that the size and position of the air passages can be regulated to a fine degree. Because of the fourth airstream passing up the outlet 48 the airlock 38 is provided

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to isolate the chamber 35 from said outlet so that the fourth airstream must go through passage 63. Similarly the airlock 44 isolates the chamber 42 and compels air drawn into the passage 46 at its lower end, to constitute the third airstream, to continue to move up the passage to the chamber 35. In view of the suction drawing air up through the perforated plate 14, some air will flow between 6 and 31 as previously mentioned and take up the shorts.

It will be seen that the apparatus described is capable of winnowing the tobacco very effectively and can be adjusted to suit any given requirements as to the extent of the separation desired.

The particles of material falling through outlet 48 all fall at substantially the same rate against the directly opposed fourth airstream and thus the action of the fourth airstream will result in practically total removal of all particles which can be airborne so that discarded material contains no desirable material. By increasing the force of the airstreams by conventional fan speed, or passage adjustment, particles which would otherwise be rejected as heavy will be carried into the first airstream and help to form the filler.

The selection of bird's eye particles and the like for return to the second airstream may be regulated by conventional means, by altering the spacing between the discs of the sifting device or altering the speed of rotation of the discs to give small pieces more opportunity to fall between the discs.

What I claim as my invention and desire to secure by Letters Patent is:

1. In a cigarette-making machine of the kind in which cut tobacco is carried by a first airstream in the formation of a tobacco filler, and having winnowing apparatus comprising a picker roller arranged to remove tobacco from a carded roller and throw it into a second airstream whereby light particles are carried away by said second airstream while heavier particles continue to move substantially along their original path to strike against a wall and thereafter to fall by gravity; a rotatable sifting device arranged to receive the falling particles and separate large particles and deliver them to a first outlet and permit smaller particles to pass through said sifting device to a

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second outlet and means for delivering said smaller particles to said second airstream which carries the aforesaid light particles.

2. Apparatus as claimed in claim 1 in which the means for delivering said smaller particles to said second airstream comprises a third airstream converging with said second airstream.

3. Apparatus as claimed in claim 2 wherein said second outlet comprises a rotatable airlock arranged to close an entry leading to a passage through which said third airstream flows whereby said third airstream is only effective on particles released from said second outlet by the said rotatable airlock and cannot pass through the sifting device.

4. Apparatus as claimed in claim 1 wherein the outlet into which said large particles are delivered by said sifting device has a fourth airstream flowing past it towards said second airstream carrying the light particles to subject said large particles to a further winnowing operation to strip any fragments of light material from said large particles and convey said fragments to said second airstream, allowing said large particles to pass to a third outlet.

5. Apparatus as claimed in claim 4 wherein said third outlet is defined by walls and has a rotatable airlock arranged at its outer end whereby said large particles can be delivered to a conveyor, which is thus isolated from said third outlet, and the walls defining the said third outlet having perforated plates through which said fourth airstream can enter.

6. Apparatus as claimed in claim 4 comprising common sources of suction for all four airstreams and a rotatable airlock to isolate said sifting device from said second airstream.

References Cited in the file of this patent

UNITED STATES PATENTS

1,952,336	Schneider	Mar. 17, 1934
2,932,300	Dearsley	Apr. 12, 1960

FOREIGN PATENTS

378,143	Great Britain	Aug. 11, 1932
764,551	Great Britain	Dec. 28, 1956