March 23, 1954 M. J. SLOVIC 2,672,871

SEPARATING APPARATUS

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FIG. 2

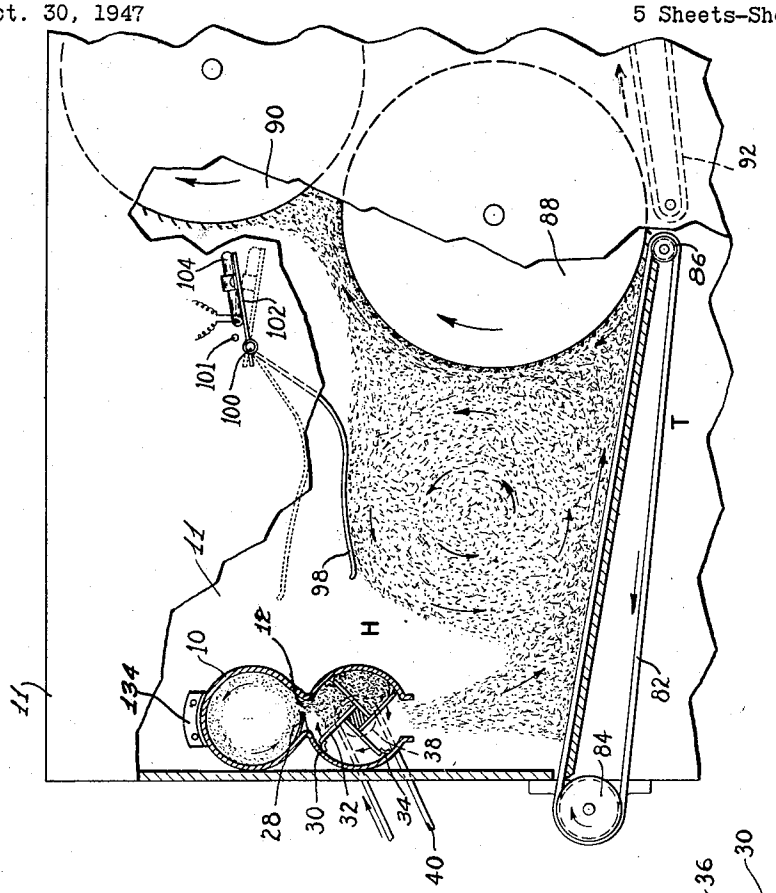
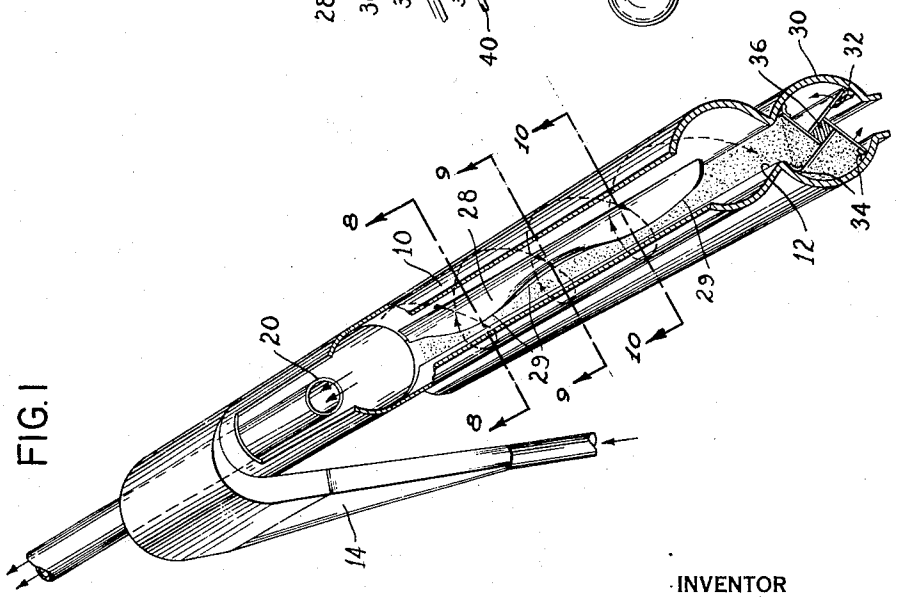


FIG. 1



INVENTOR
MATTHEW J. SLOVIC.
BY Tennes & Erstad
ATTORNEY

March 23, 1954 M. J. SLOVIC 2,672,871

SEPARATING APPARATUS

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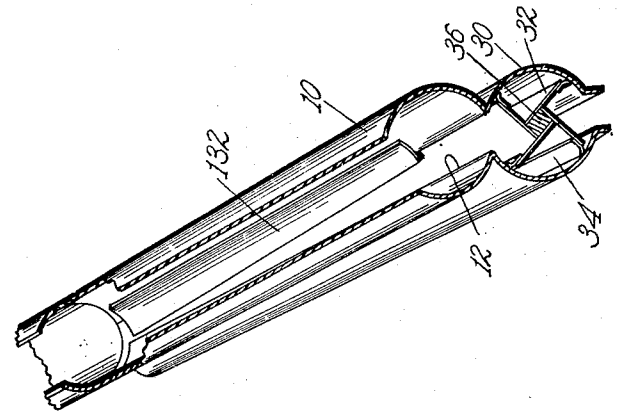

FIG. 7

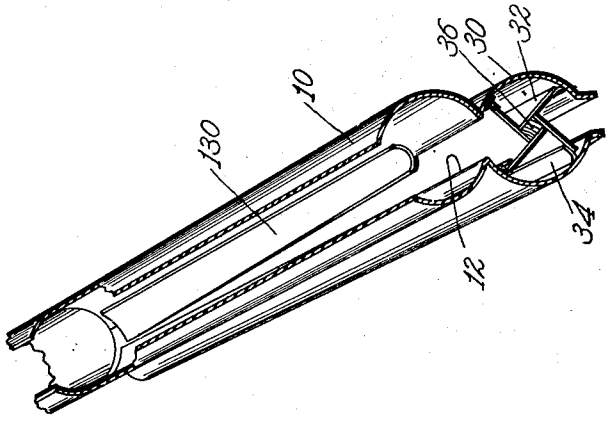

FIG. 6

INVENTOR
MATTHEW J. SLOVIC
BY
Thomas J. Crotal
ATTORNEY

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SEPARATING APPARATUS

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FIG.10

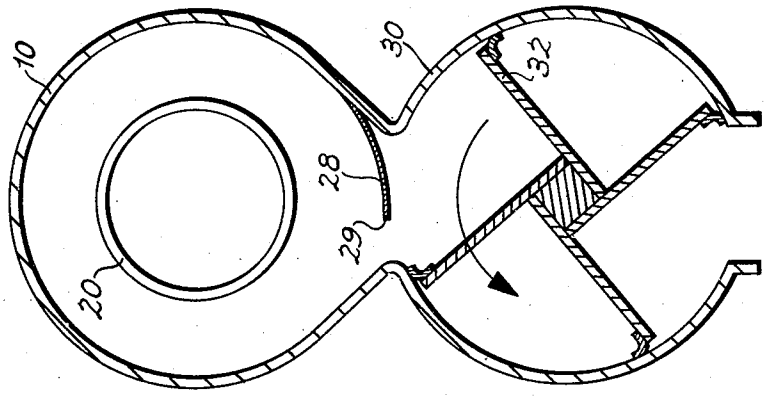


FIG.9

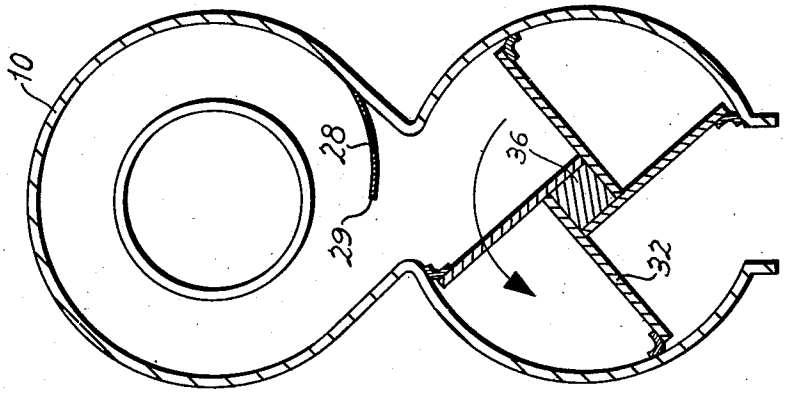
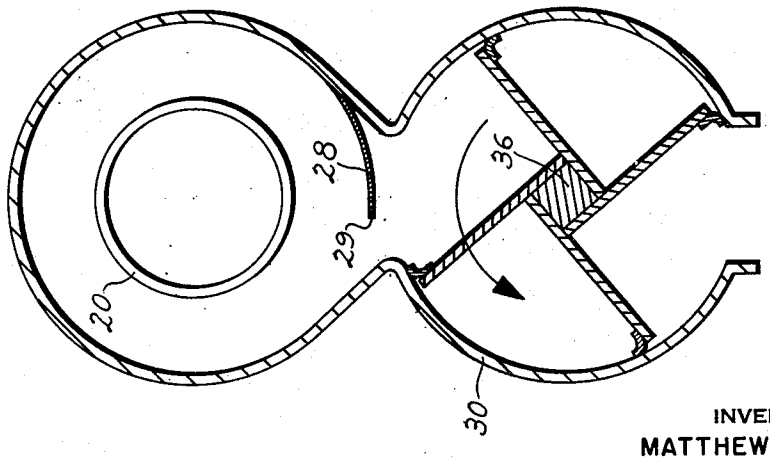


FIG.8



INVENTOR
MATTHEW J. SLOVIC
BY
ATTORNEY

March 23, 1954 M. J. SLOVIC 2,672,871

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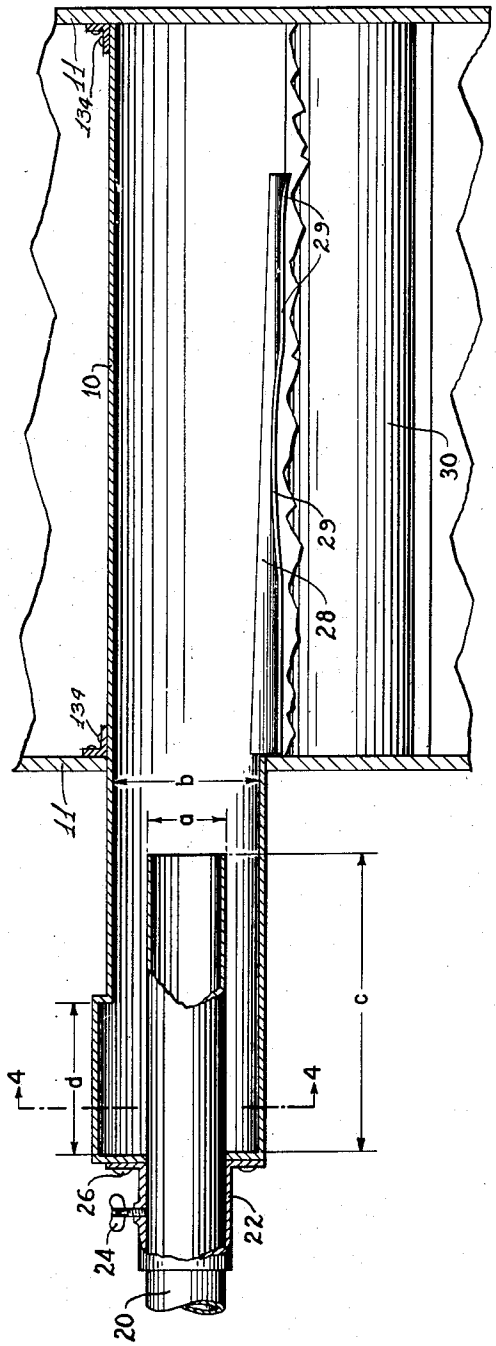

FIG. 3

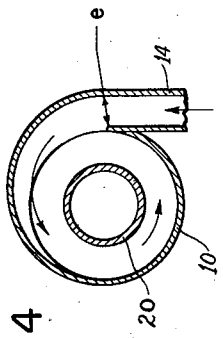

FIG. 4

INVENTOR
MATTHEW J. SLOVIC.
BY Thomas J. Crstad
ATTORNEY

March 23, 1954 M. J. SLOVIC 2,672,871

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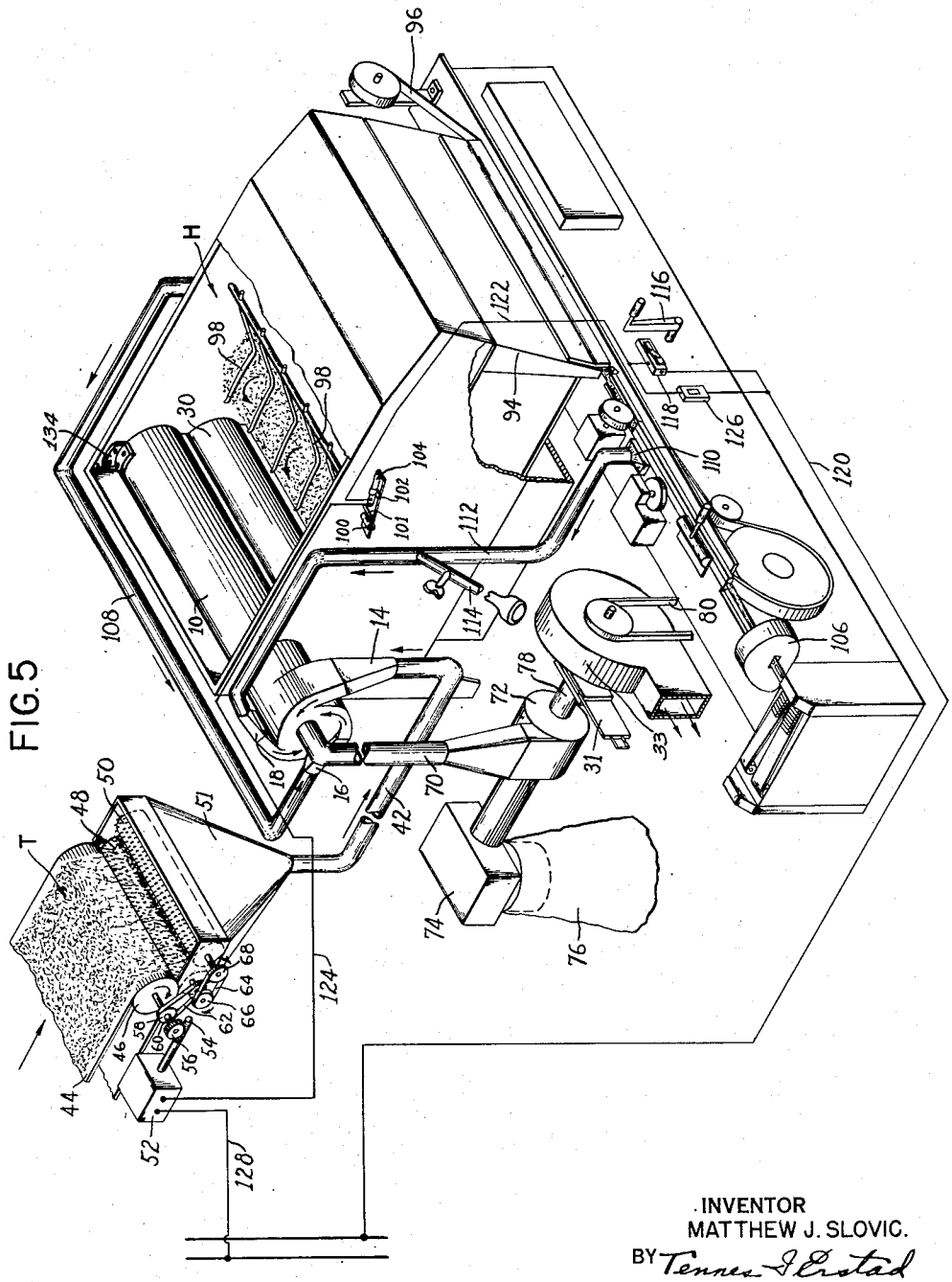

FIG. 5

INVENTOR
MATTHEW J. SLOVIC.
BY Tennes & Erstad
ATTORNEY

Patented Mar. 23, 1954

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UNITED STATES PATENT OFFICE

2,672,871

SEPARATING APPARATUS

Matthew J. Slovic, Hopewell, Va., assignor, by mesne assignments, to American Machine & Foundry Company, a corporation of New Jersey

Application October 30, 1947, Serial No. 783,110

13 Claims. (Cl. 131—21)

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This invention relates to separating apparatus and more particularly to improvements in apparatus for separating suspended material such as tobacco from a gas such as air.

My invention may be used for separating various types of material and is particularly well adapted for separating tobacco from a stream of air which is used for carrying the tobacco from one station to another station. Heretofore various efforts have been made to maintain a uniform quantity of tobacco in the hopper of a cigarette making machine with the idea that by maintaining a fairly constant amount of tobacco in contact with the feed roller, tobacco would be more uniformly fed from the hopper onto the continuous paper tape which is folded and formed into a cigarette rod. Devices developed along these lines up to the present time have had various disadvantages which have limited their use.

It is therefore an object of my invention to provide an automatic feeding apparatus for a cigarette machine which will be capable of being used in factories where the clearance between the cigarette making machine and the ceiling is comparatively small.

Another object of my invention is to provide a separating apparatus which is capable of discharging tobacco into the hopper of a cigarette making machine continuously from a stream of pneumatically conveyed tobacco.

A further object of my invention is to provide a tobacco discharge apparatus which will distribute the tobacco delivered to the hopper of a cigarette making machine uniformly across the width of the entire hopper.

Another object of my invention is to provide apparatus for picking up tobacco which is spilled at different parts of the machine and returning it automatically to the feed hopper of the cigarette making machine.

Another object is to provide a device which can be used for blending different types of tobacco in the hopper of a cigarette making machine.

A still further object of my invention is to provide a method and an automatic tobacco feed for a cigarette making machine which will enable tobacco dust and sand to be removed from the shredded tobacco as it is delivered to the feed hopper of an automatic cigarette making machine.

Another object also is to provide a centrifugal tube type of separator which will discharge material along an elongated opening.

A further object is to provide a centrifugal tube type of separator which may be used for discharging material in a sheet which sheet can have a uniform or non-uniform quantity along its entire width.

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Another object is to provide an improved method for removing material from an air stream in which it is carried.

Other objects and features of the invention 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 the accompanying drawings:

Fig. 1 is an isometric view, showing certain parts in section, of my tobacco distributing apparatus;

Fig. 2 is a sectional end elevation of my tobacco distributing apparatus associated with the feed hopper of a cigarette making machine;

Fig. 3 is a sectional side elevation of the distributing and discharge apparatus;

Fig. 4 is a sectional end elevation of the distributing apparatus as seen from line 4—4 of Fig. 3;

Fig. 5 is a schematic illustration of a modification of my discharge apparatus, associated with a cigarette making machine and tobacco feeding device;

Figure 6 is an isometric view of my tobacco distributing apparatus showing a modification of the tobacco spreading plate; and

Figure 7 is an isometric view of my tobacco distributing apparatus showing another modification of the tobacco spreading plate.

My invention is adaptable for separating any kind of suspended material that may be separated under centrifugal force from a gaseous carrier. For purposes of illustration I have shown how my separating and distributing apparatus may be connected to feed and distribute tobacco in the hopper of a cigarette making machine such as shown in U. S. Patent 2,175,404 granted to J. W. Leary on October 10, 1939.

The invention consists of an elongated tubular housing 10 secured to the sidewalls of the hopper by a pair of suitable brackets 134 and has an elongated discharge opening 12 formed lengthwise along its underside as shown in Fig. 1. The opening 12 extends across the entire width of the hopper H of a cigarette making machine. A funnel shaped intake duct 14 (Fig. 1) is connected at a tangent to the tubular housing 10 for delivering an air stream carrying shredded tobacco into the housing 10.

An inner tube 20, projects inside of the housing 10 and is adjustably supported in a tubular collar 22. By loosening a winged bolt 24, the tubular member 20 may be moved in or out to secure the proper segregation of tobacco or other material to be separated. The tubular collar 22 has a flange 26 which is secured to the outer housing 10 by riveting or other suitable means. By sucking air out through the inner tube 20 as shown in Figs. 1 and 3 tobacco laden air will be drawn in through the intake funnel or duct 14. Tobacco may be delivered to the air stream traveling into the duct 14 by suitable tobacco supplying apparatus such as that which I have hereinafter described in connection with a modified form of my invention shown in Fig. 5.

Since the funnel 14 is connected at a tangent to the housing 10, the tobacco laden air stream is given a spinning or twirling effect inside of the annular passage formed between the outer tube 10 and the inner tube 20. The circulatory movement of the air stream in traveling around the inside of tubular housing 10 causes the shredded tobacco to move toward the inside wall of the tubular housing 10 and be separated from the air stream by centrifugal force. The tobacco that is separated forms a ribbon or belt and travels in the direction indicated by the arrows in Fig. 1.

Air, from which the shredded tobacco has been removed, spirals around the annular passage formed between the outer tube 10 and the inner tube 20 until it reaches the end of the inner tube 20 through which it is drawn out. The momentum imparted to the shredded tobacco in this annular passage is sufficient to cause the tobacco to keep spiraling in a belt along the length of the inside wall of the outer tube 10 as shown in Figs. 1 and 2. The amount of air drawn through the tobacco discharge apparatus may be regulated either by the speed of a suitable exhaust fan such as 33 shown in Fig. 5 or by means of a suitable valve such as 31 shown in Fig. 5 which is mounted in the duct connecting the fan with the inner tube 20.

In the apparatus I have described, the inner duct 20 has a diameter "*a*" of approximately 4 inches while the outer housing 10 has a diameter "*b*" of approximately 8 inches. The inner tube 20 is adjusted with respect to the outer housing 10 by means of adjusting bolt 24 so that it projects from the end of the outer housing 10 inwardly for a distance "*c*" of approximately 15½ inches. The intake duct 14 has a width "*d*" of approximately 8 inches and the distance "*e*" measures approximately 2½ inches. Air is pulled through the discharge apparatus at the rate of between 300 and 400 cubic feet per minute. It should be understood that the above dimensions are for shredded tobacco and some variations from these dimensions will be made for other types of material to take into account the condition and type of material being employed. These variations, to take care of different kinds of material, are best determined by making adjustments of the inner tube 20 and regulating the amount of air passing through the inner tube when the apparatus is in operation.

Associated with the elongated opening 12 formed at the bottom of outer housing 10 is an elongated plate 28 which has a slight twist as shown in Fig. 1.

The plate 28 prevents the belt or ribbon of tobacco to which I have referred from being all discharged at the end of the slot 12 closest to the exhaust tube 20 and instead allows only part of the belt or ribbon to be discharged through the slot 12 each time it spirals so as to obtain an equal distribution along the length of the slot 12. The closeness of the edges of the spiraling ribbon will depend upon the width of the ribbon and the suction pulling the ribbon into the housing 10. By having the width of the ribbon and the suction properly set, the edges of the spiraling ribbon will be substantially adjacent each other so that an equal distribution will be obtained when the tobacco is discharged along the length of the slot 12.

The contour of the projecting edge 29 of plate 28 is shaped as shown in Fig. 1 so that it will be partially transverse to the path of travel of the tobacco ribbon. This allows only part of the tobacco ribbon to be discharged while guiding and directing the balance of the ribbon to rotate further around the inside of the tube 10. The plate 28 does not extend all the way to the far end of tube 10 and that part of the ribbon which reaches the far end of tube 10 is all discharged through the slot 12 as shown in Fig. 1.

While the contour of the plate 28 which I have shown provides for an equal distribution of the material discharged along the entire length of the solt 12, it should be understood that baffle plates of a different contour could be employed instead of plate 28 so as to cause an unequal distribution of material to be discharged along the length of the slot 12. For certain types of material a baffle plate 130, which is uniform along its entire length and which has a twist as shown in Fig. 6 may be employed. For other types of material a tapered plate 132 having no twist positioned along the slot 12 as shown in Figure 7 may be employed to obtain the type of distribution desired. The exact type of plate to be used will depend upon the result desired and the type of material being handled by my separating apparatus.

Mounted along and underneath the elongated discharge opening 12 is a revolving valve gate consisting of a cylindrical member 30 and revolving blades 32 having rubber or fabric 34 mounted on the outer edges of the blades 32 which rub against and engage with the insides of cylindrical member 30 as shown by the arrows in Fig. 1. An effective air lock is therefore maintained at all times by the blades 32 and the cylindrical housing 30 so that tobacco may be continuously discharged as shown in Fig. 2 from the cylindrical housing 10 and at the same time any material amount of air is prevented from leaking into the pneumatic system at this discharge outlet.

The four blades 32 are mounted on a shaft 36 which is supported in suitable bearings (not shown) attached to each side of the hopper H. A pulley 38 is mounted on one end of the shaft 36 and is driven from a suitable source of power by a belt 40 as shown in Fig. 2. The cylindrical housings 10 and 30 are connected to and supported by the side walls 11 of the hopper H at either end. Tobacco is discharged from the revolving gate 32 into the hopper H of a cigarette making machine, such as shown in U. S. Patent 2,175,404 mentioned above, and a suitable feed belt 82 traveling over the pulleys 84 and 86 in the direction indicated by the arrows shown in Fig. 2, forwards the tobacco so received towards the carded feed drum 88.

The feed drum 88 rotating in the direction indicated by the arrow, removes tobacco from the hopper H. The refuser drum 90 rotating in the direction indicated by the arrow shown in

Fig. 2 pushes back excess tobacco elevated by the feeding drum 88 and allows only a predetermined uniform quantity of tobacco to be removed from the hopper H by the feed drum 88. The tobacco so removed by the feed drum 88 is deposited on a delivery belt 92 which travels in the direction shown by the arrow in Fig. 2, after which the tobacco is delivered through cigarette rod forming apparatus of the type fully described in U. S. Patent 2,175,404.

As the tobacco supply reaches a predetermined level in the hopper H it causes the feeler arms 98 to be elevated. The feeler arms 98 are fixedly mounted on the shaft 100 which is rotatably supported at either end by the side walls of the hopper H. Also fixedly mounted on the shaft 100 is a supporting bar 102 to which is secured a conventional mercury switch 104. When the feeler arms 98 are in lowered position as shown in Fig. 2 the mercury switch will be so tilted by the shaft 100 as to close its contacts which allows the feeding belt 44 to operate. The distance the arms 98 can swing downwardly is limited by a suitable stop 101. When the feeler arms 98 have been elevated by the tobacco T in the hopper H to the dotted position shown in Fig. 2, the mercury switch 104 will be so tilted that the electrical circuit will be broken thereby preventing the motor 52 from operating the feed belt 44.

After the tobacco has been deposited on the paper tape 96 it is forwarded through suitable rod forming devices such as those shown schematically in Fig. 5 to a cigarette rod cut off 106 which severs the cigarette rod into cigarettes.

In Fig. 5, I have shown a modified form of my invention which enables it to be used as a device for blending and mixing several types of tobacco together. In this illustration one type of shredded or cut tobacco is continuously delivered from a suitable source of supply to the intake funnel 14 through a suitable duct 42, while another type of tobacco is fed through duct 108 from another suitable source of supply. The two tobaccos are delivered simultaneously into the intake ducts extending tangentially from the cylindrical housing 10.

For purposes of illustration I have shown this source of supply to be a continuously driven conveyor belt 44 on which is placed, either by hand or automatically, shredded tobacco T of the type used in making cigarettes. The conveyor belt 44 is driven in the direction indicated by the arrow shown in Fig. 5, by means of roller 46, and delivers the shredded tobacco continuously to a pair of carded rollers 48 and 50. Shaft 60, on which the roller 46 is mounted, is driven by a motor 52 through a worm 54 and a worm gear 56.

Pulley 58, mounted on shaft 60, imparts driving movement to the pulleys 66 and 68 through belts 62 and 64. The carded rollers 48 and 50 which are mounted on the same shafts as the pulleys 66 and 68 are driven in the direction indicated by the arrows.

The inner tube 20 connects with duct 70 which in turn is connected to a small diameter dust separator 72 which may be of the type shown in U. S. Patent 2,281,610 issued to J. E. Watson et al., on May 5, 1942. The discharge end of the small diameter cyclone separator 72 has a chamber 74 to which is attached a dust collecting bag 76. The exhaust end of the separator 72 is connected to the exhaust fan 29 by means of a duct 78 which has interposed therein a suitable gate valve 31 for regulating the amount of air passing through the duct 78. The fan 29 is driven from a suitable source of power such as an electric motor by means of belt 80.

The tangential connection of the intake funnels 14 and 16 causes a whirling motion to be imparted to the pneumatically carried tobacco as it enters the passageway located between the inner tube 20 and the outer tube 10. This whirling motion causes the tobacco to be separated from the air stream carrier in the manner hereinbefore described. As hereinbefore brought out, the tobacco is given sufficient momentum to cause it to revolve one or more times as it travels along the inside walls of outer tube 10, while the air stream from which the tobacco has been removed is drawn out through the inner tube 20. The mixed or blended tobacco is discharged along the entire length of the slotted opening 12 in the same manner as that described with respect to the apparatus shown in Figs. 1 and 2.

In the manufacture of cigarettes by an automatic cigarette making machine, there are certain areas in some machines where tobacco has a tendency to spill out such as along the rod forming mechanism shown schematically in Fig. 5. My apparatus is adapted to automatically pick up and return any such spilled tobacco to the hopper of a cigarette making machine. This is accomplished by mounting a suitable housing 110 over the area where tobacco is normally spilled so that suction will pick up tobacco at this area through the housing 110 and deliver it via duct 112 to the intake funnel 18. In some cases tobacco spills over several locations on a cigarette making machine and to take care of this situation a flexible duct such as 114 may be employed which will enable an operator to pick up tobacco at various stations along the machine which has spilled out and which will automatically return the tobacco so spilled to the hopper of the machine.

I have shown in Fig. 5 the electrical wiring hookup for controlling the operation of my automatic feeding apparatus for a cigarette making machine. To start the cigarette making machine, the operator pushes the lever 116 to the position shown in Fig. 5. This causes the switch 118 to close thus supplying electrical current through wires 120, 122, mercury switch 104 and wires 124 to the motor 52. When the feed belt 44 is driven by motor 52 it causes tobacco to be fed to the tobacco discharge apparatus 10 which in turn delivers tobacco to the hopper H of an automatic cigarette making machine.

When starting a cigarette making machine up when the hopper H is empty, as might be the case at the beginning of the week following a shutdown over the weekend, the operator can push a switch 126 which shunts the switch 118 thereby allowing electrical current to pass through wires 120 and switch 126, wires 122, mercury switch 104, wires 124 and motor 52 which operates the conveyor belt 44. This will permit the tobacco feeding apparatus to function to place cigarette tobacco in the hopper H before the cigarette making machine is started in operation. When a sufficient quantity of tobacco is placed in the hopper, the operator then turns the starting handle 116 to start the machine in operation.

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

When the hopper H of the cigarette making machine is empty the operator starts the driving

mechanism which operates the fan 29 and also closes the switch 126 thereby causing the motor 52 to be driven by electrical current flowing through wires 120, switch 126, wire 122, mercury switch 104, wire 124 and wire 128. This causes the conveyor belt 44 to deliver shredded tobacco T to the rotating rollers 48 and 50. The carded rollers 48 and 50 may be driven in directions opposite to that shown in Fig. 5 if desired by merely crossing belt 64. The shredded tobacco received from the belt 44 is broken up by the carded rollers 48 and 50 and dropped into the funnel 51. Suction generated by the fan 29 causes the tobacco to travel through duct 42 and intake funnel 14 into the cylindrical housing 10. The air pulled through the cylindrical housing 10 has such velocity that it causes the shredded tobacco, delivered at a tangent to the cylindrical housing, to be given a spiral circulatory motion as shown in Figs. 1 and 2. Centrifugal forces acting on the whirling air stream separates the tobacco therefrom by causing it to move towards and along the inside of cylindrical housing 10. The tobacco so separated forms into a continuous ribbon and has sufficient momentum to cause it to make several revolutions along the inside of the housing 10 in a direction away from the intake funnel 14.

As the tobacco ribbon travels around the inside of the circular tube 10 in the manner described some of it passes out through the elongated slot 12 formed along the bottom of the tube 10 each time the ribbon revolves past this slot. The twisted elongated plate 28, which is positioned along the elongated opening 12 formed at the bottom of the tubular member 10, prevents all of the tobacco from being discharged through the area of the slotted opening immediately adjacent to the intake funnel 14 and instead produces a wide sheet of tobacco being discharged along the entire length of opening 12.

As shown in Figs. 1 and 2 the twisted plate 28 which has more of a twist immediately adjacent to the intake funnel 14 than at the end of the housing 10 which is spaced from the intake funnel 14 allows some of the tobacco to be discharged at that portion of the opening 12 which adjoins the intake funnel 14. However, it causes most of the tobacco to revolve one or more times along the inside of the housing 10 before it escapes through the opening 12. By changing the contour and shape of baffle plate 28, the amount of tobacco distributed along the opening 12 can be varied.

The air stream which has had the tobacco removed therefrom by centrifugal force, also contains tobacco dust and sand which was not separated from the air stream by the centrifugal force acting on the tobacco, this air stream containing sand and dust is drawn out through the inner tube 20 and may be conducted through duct 70 into a small diameter cyclone filter 72 such as shown in Fig. 5 which may be of the type described in U. S. Patent 2,281,610 mentioned above. The small diameter cyclone filter removes dust and sand from the air stream and the clean air passes through duct 78 and valve 30 to the exhaust fan 29 which ejects the clean air into the surrounding atmosphere as shown in Fig. 5. It is particularly desirable to remove dust and sand from the shredded tobacco just prior to its delivery in the hopper of a cigarette making machine because a certain amount of dust and sand which was not loosened from the shredded tobacco prior to this time has now become loosened thus enabling it to be removed from the shredded tobacco before it is made into cigarettes. The consumer thus receives a finished product which is substantially free of sand and dust.

The gate valve 32 by revolving, as shown in Figs. 1 and 2, removes tobacco discharged from the cylinder 10 but prevents air from entering the cylinder from the outside atmosphere. It is understood that if the hopper H were to be sealed against the outside atmosphere it would not be necessary to employ the gate valve 32 in conjunction with my tobacco discharge apparatus. It will thus be seen that I have provided a simple type of feeding apparatus for delivering a uniform quantity of tobacco from a pneumatic conveyor system continuously to the hopper of an automatic cigarette making machine.

It will also be noted that by distributing tobacco in a wide sheet across the entire width of the cigarette making machine, the tobacco is evenly distributed in the hopper of the cigarette making machine thus facilitating the production of uniform cigarettes since a uniform quantity of tobacco will come in contact with the feed roller 88 which removes tobacco from the hopper of a cigarette making machine.

After some shredded cigarette tobacco has ben deposited in the hopper H in the manner just described the operator pushes the lever 116 to the position shown in Fig. 3 to start the cigarette making machine. This closes the circuit which operates the motor 52. The motor 52 and conveyor belt 44 are adjusted to overfeed slightly so that when a predetermined quantity of tobacco has been discharged in the hopper H, the feeler arms 98 will be elevated by the slowly revolving tobacco mass to the position shown in dotted outline in Fig. 2. This causes mercury switch 104 to open thereby breaking the circuit just described causing the motor 52 which operates the conveyor belt 44 to stop. As the tobacco in the hopper H is used up the feeler arms will be gradually lowered again until the mercury switch is again closed. This will restart the motor 52 and cause the conveyor belt 44 to feed more tobacco.

When my separating and distributing apparatus is to be used for blending tobacco in the hopper of a cigarette making machine, a second funnel 16 is connected at a tangent to one end of the cylindrical tubing 10. Tobacco from a second source of supply is then delivered into the duct 108 in a manner similar to the way tobacco is delivered by duct 42 into the tubing 10. The percentage of each type of tobacco used in the blend is controlled by regulating the amount of tobacco delivered to each duct.

When shredded or cut tobacco undergoes handling, the short particles of tobacco have a tendency to become separated from the longer shreds of tobacco. My invention can be advantageously employed for solving this problem by feeding "shorts" through one duct and "longs" through another duct into the cylindrical tube 10 in a manner similar to that described for blending tobacco. By combining the "longs" and "shorts" as it is delivered into the hopper of the cigarette making machine the chance of them becoming separated before being deposited onto the paper tape 96 is greatly diminished.

Since tobacco has a tendency to spill out at certain rod forming stations in some cigarette making machines, a pickup housing 110 may be positioned over or adjacent to the station where such spilling occurs to return such tobacco automatically to the feeding hopper of a cigarette

making machine. Similarly a flexible tube 114 having a suitable nozzle 114a may be employed to enable the operator to pick up spilled tobacco from different parts of the machine. The tobacco so picked up will be returned via duct 112 to the intake funnel 18 which is tangentially connected to the tubular housing 10. It will therefore be evident that I have provided an improved device for feeding tobacco automatically to the hopper of a cigarette making machine which can also be used for blending tobacco, for mixing "shorts" with "long" shredded tobacco and for picking up tobacco which may be spilled out of the cigarette making machine.

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. In a cigarette making machine, a pneumatic device for delivering tobacco into the hopper of the cigarette making machine comprising, a source of supply of shredded cigarette tobacco; a pneumatic pipe line for carrying said tobacco from said source of supply; a primary cylindrical tube, having a slot formed along the length thereof, associated with the feed hopper of a cigarette making machine; a funnel, tangentially connected to one end of said primary cylindrical tube, for receiving tobacco from said pipe line and discharging it into said primary cylindrical tube with sufficient velocity to cause it to circle around the inside wall of said primary cylindrical tube; an inner tube positioned inside of said primary cylindrical tube for removing air from the center part of said tube and terminating approximately where said slot begins at a position spaced from said funnel; and an exhaust fan for causing a continuous stream of air to be pulled through said pipe line and cylindrical tube to thereby permit tobacco carried by said air stream to be discharged through said slot across the width of the hopper of the automatic cigarette making machine.

2. A tobacco discharge device for delivering a continuous stream of tobacco shreds to the hopper of an automatic cigarette making machine comprising, a cylindrical tube having a slot formed along the length thereof positioned inside the hopper of a cigarette making machine, a duct for delivering a tobacco laden air stream tangentially at one end of said tube, an inner tube extending from one end inside said cylindrical tube and terminating approximately where said slot begins for removing air received from said duct from the center portion of said cylindrical tube, and apparatus for causing air to flow through said duct and cylindrical tube to deliver a continuous stream of tobacco to said cylindrical tube for discharge across the width of said hopper through said slot.

3. A tobacco discharge device for delivering a continuous stream of tobacco to the hopper of an automatic cigarette making machine comprising, a cylindrical tube having a slot formed lengthwise along the bottom thereof, means for mounting said tube within the hopper of a cigarette making machine, a gate valve associated with said slot for removing tobacco received through said slot and discharging said tobacco across the width of the hopper of a cigarette making machine while maintaining said slot sealed against air entering said slot from the outside atmosphere, a duct for delivering a stream of air carrying tobacco to one end of said tube at a tangent transverse to the longitudinal axis of said tube, an inner tube extending inside and along the center of said cylindrical tube for removing air from the center portion thereof, and apparatus for causing a continuous stream of air to flow through said duct and tubes.

4. A tobacco discharge device for delivering tobacco to the hopper of an automatic cigarette making machine comprising, an elongated cylindrical shell having a slot extending along the length thereof, means for mounting said shell inside the hopper of a cigarette making machine, an inner shell extending inside of said cylindrical shell, a mounting for enabling the distance said inner shell extends inside of said cylindrical shell to be varied, a duct for delivering a stream of air carrying tobacco inside of said cylindrical shell at a tangent to the longitudinal axis thereof to cause the tobacco to whirl in a spiral along the inside wall of said cylindrical shell, a twisted member extending along said slot for deflecting some of said tobacco away from said slot and to travel around the inside of said cylindrical shell several times before passing out through some portion of said slot, and a housing for sealing off said slot from the outside atmosphere.

5. A device for discharging tobacco continuously into the hopper of a cigarette making machine comprising, an elongated tube having a diameter of approximately 8 inches for delivering a continuous stream of tobacco into the hopper of a cigarette making machine, an inner tube projecting from one end approximately 15½ inches inside of said elongated tube for removing air from the center portion of said tube, said inner tube having a diameter of approximately 4 inches, a duct extending from the end of said elongated tube along the length thereof for approximately 8 inches, said duct being connected to said elongated tube at a tangent to the periphery thereof, and apparatus for causing a stream of air carrying shredded tobacco to be delivered through said duct into said elongated tube to separate tobacco from said air stream by centrifugal forces acting on the tobacco as it is whirled around the inside of said elongated tube due to said tangential connection.

6. A device for discharging tobacco continuously into the hopper of a cigarette making machine, an elongated tube extending across the hopper of a cigarette making machine, said tube having a slotted opening extending along a portion of the length of said tube for the discharge of tobacco therefrom, a revolving gate member adjoining said opening for removing tobacco received through said slotted opening while maintaining said opening sealed off from the outside atmosphere, an inner tube projecting inside of said elongated tube for removing air from the center portion thereof, a duct tangentially connected at one end of said elongated tube for delivering a continuous stream of tobacco laden air to the inside of said elongated tube, a source of supply for delivering tobacco laden air to said duct, and apparatus for causing a stream of air to flow through said duct, elongated tube and inner tube to cause tobacco to be separated from said air stream in said elongated tube, and be discharged through said slotted opening and gate member across the width of the hopper of a cigarette making machine.

7. Apparatus for blending shredded cigarette

tobacco in the hopper of a cigarette making machine comprising, an elongated cylindrical tube, mounted horizontally in said hopper and having a slot extending along one side thereof a plurality of ducts extending tangentially from one end of said cylindrical tube for directing streams of air carrying tobacco transversely against the inside wall of said cylindrical tube, sources of tobacco supply for delivering a different kind of tobacco to each of said ducts, an inner tube extending lengthwise along the center of said cylindrical tube for a distance beyond the area where said ducts extend tangentially from said cylindrical tube for removing air from the center part of said cylindrical tube, and apparatus for sucking a tobacco laden air stream from each of said sources of supply through said ducts with sufficient velocity to cause said tobacco to be separated from said air stream by centrifugal force thereby blending different kinds of tobacco received from said sources of supply as it is discharged through said slot.

8. In a cigarette making machine, apparatus for delivering tobacco to the feed hopper of a cigarette making machine comprising, a hollow cylindrical member mounted horizontally in said hopper and having a slot formed along the length thereof for discharging tobacco into and uniformly across the width of the hopper of a cigarette making machine, a plurality of intake ducts tangentially connected to one end of said cylindrical member for delivering tobacco laden air along the inside periphery of said cylindrical member to cause the tobacco carried by the air stream to separate therefrom by revolving around the inside of said cylindrical member, an exhaust tube extending longitudinally inside the center of said cylindrical tube for a distance beyond the area where said intake ducts are connected to said cylindrical member, a source of supply for delivering short particles of tobacco to one of said intake ducts, a second source of supply for delivering normal size shreds of tobacco to another of said intake ducts, and suction creating apparatus for causing the tobacco laden air streams to travel through said ducts into said cylindrical member to combine said short and normal tobacco as it is discharged into said hopper through said slot.

9. Apparatus for delivering tobacco to the hopper of a cigarette making machine comprising a cylindrical hollow tube mounted horizontally inside the hopper of a cigarette making machine and having a slot formed along the length thereof, a baffle plate positioned adjacent said slot for causing tobacco to pass out evenly throughout the length of the slot, a plurality of ducts tangentially connected to one end of said hollow tube for conducting streams of air having entrained tobacco into transverse engagement with the inside of said hollow tube to cause said air stream and tobacco to circle around the inside wall of said tube and thereby separate the tobacco from said air stream by centrifugal force acting on the tobacco, a source of tobacco supply connected to one of said ducts for delivering shredded tobacco to a stream of air passing therethrough, a nozzle for picking up tobacco which spills out of the machine in the process of making cigarettes, a conduit connecting said nozzle with one of said ducts for sucking in any tobacco spilled out of the machine and conveying it to said last mentioned duct for delivery into said hollow tube, and apparatus for removing air from the center part of said tube to permit tobacco to be delivered through said ducts into said hollow tube for discharge uniformly along the length of said slot into said hopper.

10. In a cigarette making machine having a feed hopper, apparatus for separating tobacco from a stream of pneumatically conveyed tobacco and discharging the same in a continuous stream across the width of said hopper comprising, an outer tube mounted horizontally in said hopper having a slot formed along the length thereof, an inner tube projecting through the other end of said outer tube inside and along the center of said outer tube, a duct transversely connected at a tangent to said outer tube for delivering a stream of pneumatically conveyed tobacco to a passage between said inner and outer tubes, apparatus for causing a stream of air to flow through said duct into said passage and out through said inner tube to spiral tobacco around the inside of said tube a plurality of times, mechanism for delivering a stream of tobacco to said stream of air prior to its entry into said duct, a member for removing a substantially equal portion of said tobacco out through said slot each time said tobacco spirals past said slot, measuring apparatus for determining the amount of tobacco in said hopper, and connections between said measuring apparatus and said mechanism for starting and stopping the delivery of tobacco to said stream to maintain a substantially constant quantity of tobacco in said hopper.

11. The method of feeding tobacco in a cigarette making machine which comprises conveying tobacco pneumatically in a narrow stream to the hopper of a cigarette making machine, spiraling said tobacco a plurality of times around the inside of a horizontally arranged cyclone separating cylinder, removing a substantially equal portion of said stream each time it spirals around the inside of said cylinder to deposit the same in a wide sheet across the width of the hopper of the cigarette making machine, and forwarding said sheet of material into contact with the carded members removing tobacco from the hopper of a cigarette making machine.

12. The method of feeding tobacco in a cigarette making machine which comprises conveying relatively long shreds of tobacco pneumatically in a narrow stream to the hopper of a cigarette making machine, spiralling said narrow stream of tobacco a plurality of times around the inside of a horizontally arranged cyclone separating cylinder, mixing tobacco shreds of relatively short length with the relatively long length tobacco shreds prior to spiralling the tobacco around the inside of said separating cylinder, and removing a substantially equal portion of said stream each time it spirals around the inside of said cylinder to deposit the same in a wide sheet across the width of the hopper of a cigarette making machine.

13. A tobacco discharge device for delivering tobacco to the hopper of an automatic cigarette making machine comprising an elongated, cylindrical shell having a slot extending along the length thereof, means for mounting said shell inside the hopper of a cigarette making machine, an inner shell extending inside of said cylindrical shell for exhausting air from the central axis of said cylindrical shell, a duct for delivering a stream of air carrying tobacco inside of said cylindrical shell at a tangent to the longitudinal axis thereof to cause the tobacco to whirl in a spiral along the length of the inside wall of said

cylindrical shell, a tapered member extending along said slot and spaced from the opposite wall of said slot a varying distance to limit the quantity of tobacco that can pass out of said slot each time said tobacco spirals past said slot thereby causing said tobacco to spiral around the inside of said cylindrical shell several times before passing out through some portion of said slot, and a housing for sealing off said slot from the outside atmosphere.

MATTHEW J. SLOVIC.

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