Feb. 17, 1970 D. W. MOLINS 3,495,599

CONTINUOUS ROD CIGARETTE-MAKING MACHINE

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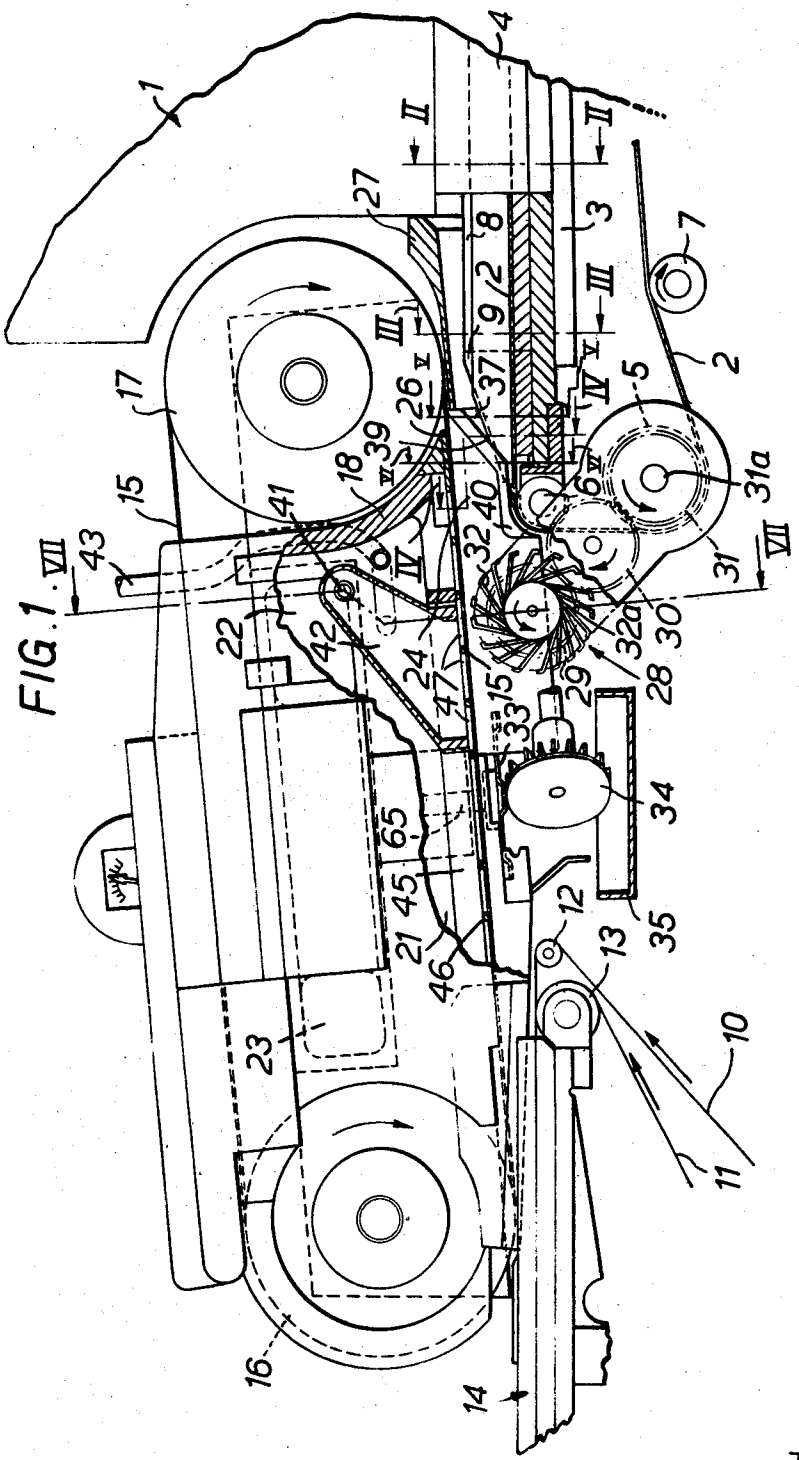


FIG. 1.

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CONTINUOUS ROD CIGARETTE-MAKING MACHINE

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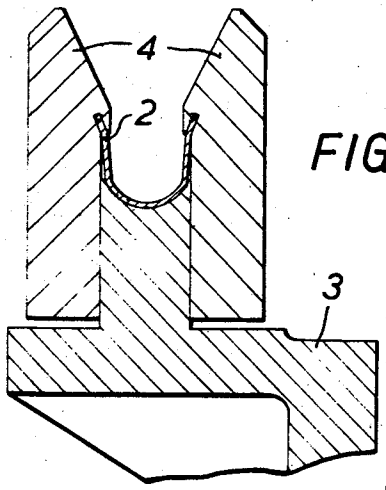


FIG. 2.

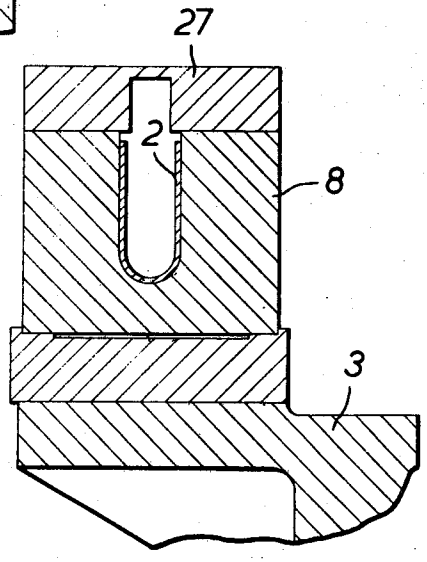


FIG. 3.

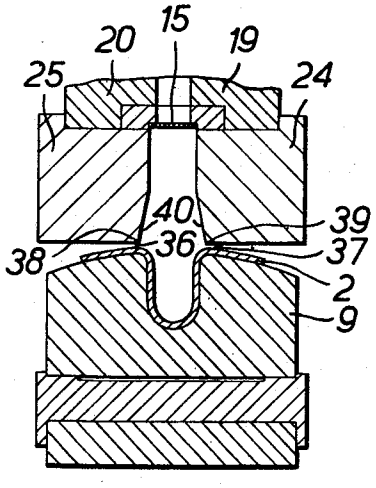


FIG. 4.

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CONTINUOUS ROD CIGARETTE-MAKING MACHINE

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FIG. 5

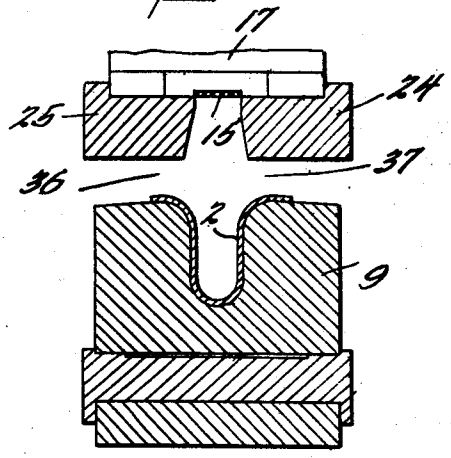
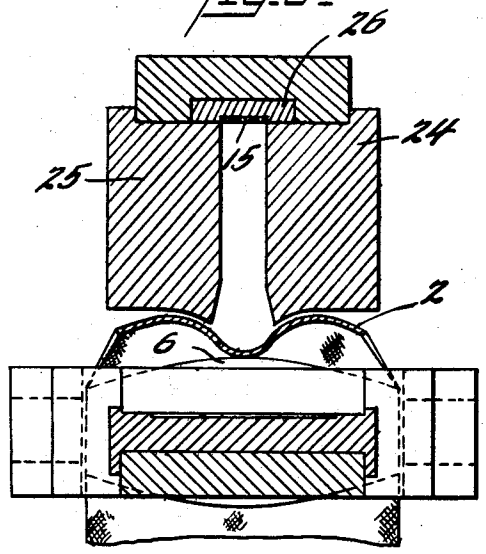


FIG. 6



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CONTINUOUS ROD CIGARETTE-MAKING MACHINE

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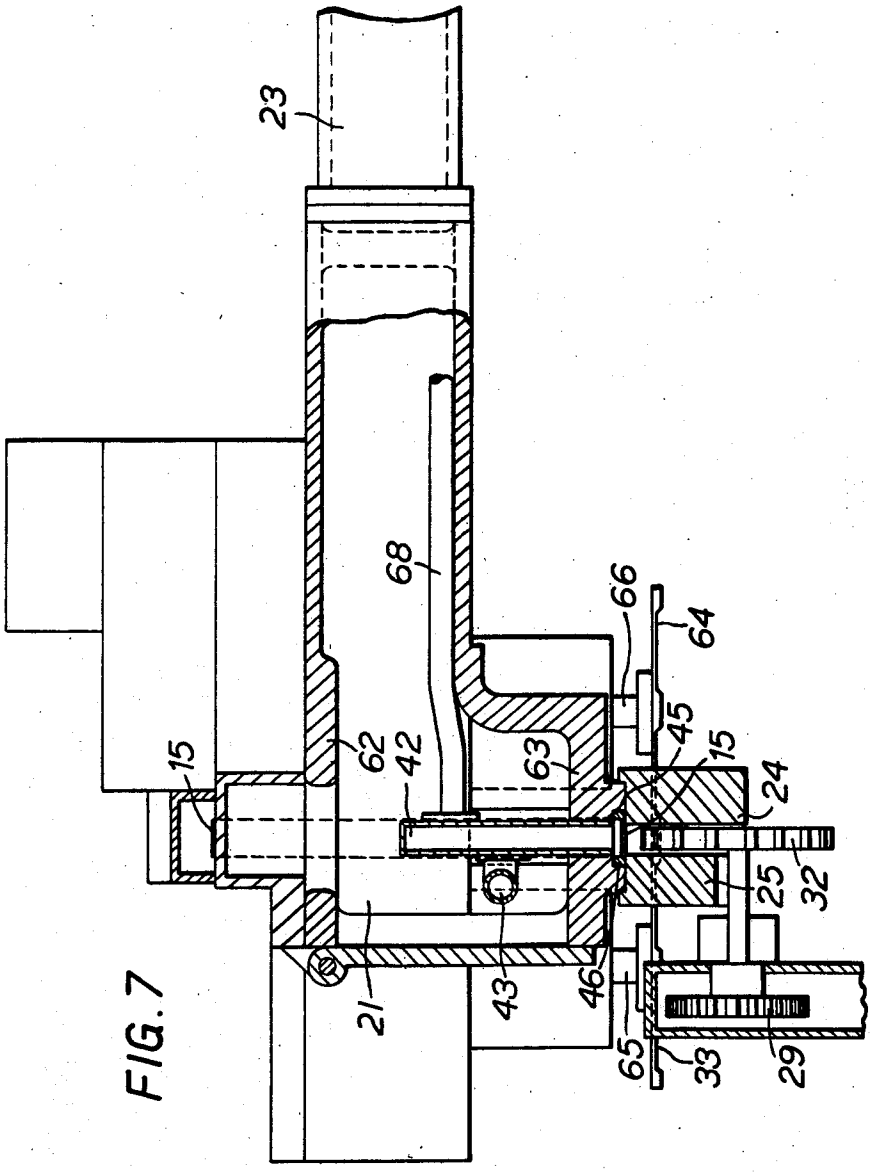


FIG. 7

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CONTINUOUS ROD CIGARETTE-MAKING MACHINE

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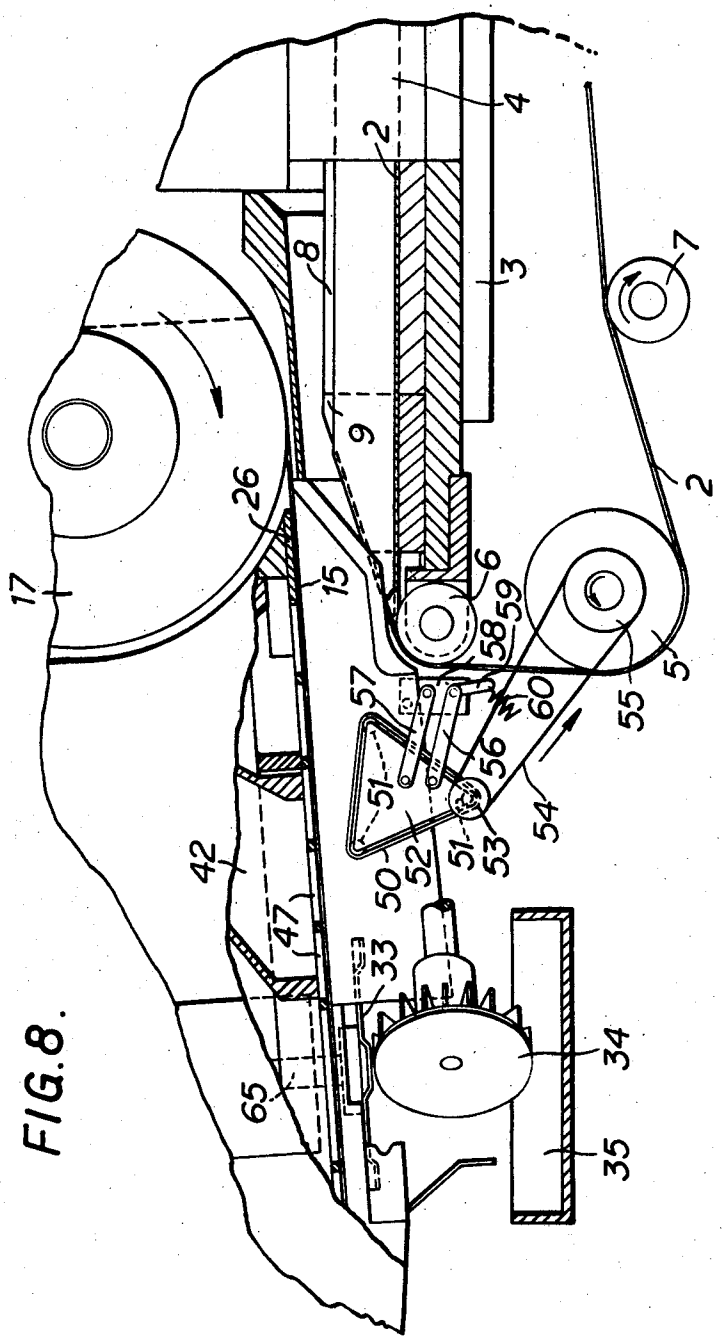


FIG. 8.

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United States Patent Office

3,495,599
Patented Feb. 17, 1970

3,495,599

CONTINUOUS ROD CIGARETTE-MAKING MACHINE

Desmond Walter Molins, 2 Evelyn St., Deptford, London, England

Continuation-in-part of applications Ser. No. 142,199, Oct. 2, 1961, and Ser. No. 494,293, Sept. 15, 1965, which is a continuation of application Ser. No. 381,796, July 10, 1964. This application July 5, 1966, Ser. No. 565,647

Claims priority, application Great Britain, Sept. 7, 1961, 32,113/61, 32,114/61, 32,115/61

Int. Cl. A24c *5/18, 5/32*

U.S. Cl. 131—84

14 Claims

ABSTRACT OF THE DISCLOSURE

A continuous rod cigarette-making machine in which tobacco is showered on to a conveyor to form a continuous stream of tobacco, which in a conventional machine would be wrapped to form the cigarette rod, but which is sucked on to the underside of a suction conveyor and is trimmed before being wrapped to form the continuous cigarette rod. The suction conveyor is spaced from the originally-formed tobacco stream so that this stream is broken up during the transfer and is re-formed on the suction conveyor. The suction conveyor may run faster than the conveyor on which the original stream is formed and the stream on the suction conveyor may be mechanically compressed.

This invention relates to continuous rod cigarette-making machines and more particularly to improvements in the production of a continuous cigarette rod, the present application being a continuation-in-part of my co-pending applications Ser. No. 142,199, filed Oct. 2, 1961 (now abandoned); Ser. No. 494,293, filed Sept. 15, 1965 (now abandoned), which is, in turn, a continuation of application Ser. No. 142,200, filed Oct. 2, 1961 (now abandoned); and Ser. No. 381,796, filed July 10, 1964 (now abandoned), which is, in turn, a continuation of application Ser. No. 217,803, filed Aug. 20, 1962 (now abandoned).

It has been frequently stated that the aim of cigarette-making machines is to produce cigarettes having a maximum degree of uniformity in physical characteristics. Thus, every cigarette of a given type of production should, as nearly as possible have the same quantity of tobacco contained therein and the same density of packing within the surrounding cigarette paper. In addition, these characteristics should be equally uniform along the length of each cigarette. To accomplish this it is obviously necessary for the continuous tobacco rod, from which the individual cigarettes are made, to be as uniform as human ingenuity can make it.

At the present time, cigarette-making machines are of two broad types. In the older machines, tobacco particles are showered onto a narrow conveyor band to form the continuous tobacco stream. Every effort is made to ensure that the showering process, which represents the last step before formation of the actual tobacco rod, is as perfect as it can be made. In the second and more recent class of cigarette-making machines, separated tobacco particles are introduced into an air stream, which

delivers them to an air-pervious conveying surface. The air is sucked through the air-pervious surface and the particles are left adhering in the form of a continuous tobacco stream which is finally trimmed to remove tobacco in excess of that required in the continuous rod.

The continuous tobacco stream produced in the second class of machine has a high degree of uniformity of density, and thus the trimming operation produces a highly uniform rod which, after wrapping, results in cigarettes having the desired physical properties. In the former and older type of machine it is known that, despite all efforts to the contrary, the tobacco stream was subject to local irregularities due possibly to bouncing of the showered particles and other similar effects.

It is the main object of the present invention to produce a cigarette-making machine capable of producing a final continuous tobacco stream having improved uniformity in volume and density compared with the older type of machine, such improvement being achieved by forming a continuous tobacco stream by showering, and then progressively exposing this stream to the action of an air-current, which in a controllable manner breaks up the stream and deposits the tobacco particles on an air-pervious conveying surface, to produce a re-formed stream of improved density, which is then trimmed.

The theory underlying the present invention, in its broadest aspect, may be understood in terms of showering tobacco particles to form a stream having the best possible uniformity but still subject to local irregularities and then re-forming the tobacco particles into a second stream in controllable manner to remove or at least reduce density variations.

One mode of exercising control over the re-formation of the tobacco stream is the selection of the distance the particles are caused to travel from one stream to the other and a further object of the invention is the selection of such a distance that the tobacco particles under the action of the air-current do not attain a high velocity before reaching the conveying surface. The term "high velocity" is used herein to mean a velocity at which tobacco particles impinging on the air-pervious conveying band, rebound.

It is a still further object of the invention to impart to the air current a controlled turbulence, possibly with the formation of vortices, in the immediate vicinity of the continuous tobacco stream so as to assist in separating the tobacco particles one from another as they are transferred between the two streams.

In one preferred embodiment, the machine of this invention is provided with means adapted to effect consolidation of the re-formed continuous tobacco filler stream so as to increase the density of that stream. It will be apparent that the greater the density of the stream, the smaller will be the volume occupied by the stream, and the closer the trimming device can be positioned to the air-pervious conveying surface. This is particularly advantageous where the trimming device is continuously shifted toward and away from the conveying surface in response to detected variations in the density of the tobacco along the length of the stream in order to compensate for such variation, since the extent of movement imparted to the trimmer necessary to compensate for a given variation in density is less for the more compact stream.

A further advantage of the preferred embodiment

occurs in the context of the improvement described and claimed in U.S. Patent 3,089,497, issued to myself and others on May 14, 1962. According to that patent the air permeability of the continuous tobacco filler stream is continuously monitored to give an indication of the quantity of tobacco in that stream. This indication can then be used to control the operation of the trimming device by varying the effective spacing of the device from the conveying surface to give improved uniformity of the stream. The measurement of air permeability is only reliable and practicable over a certain range of tobacco filler densities. When the tobacco filler density is very low or very high, the detection of its air permeability cannot provide a useful control indication for varying the clearance between the trimming device and the air-pervious conveyor surface. The tendency of the density of tobacco filler streams is toward the low side. Thus, the compaction feature of the preferred embodiment can advantageously serve to increase the stream density to a value well within the range at which a reliable correlation between air permeability and stream density exists.

The compaction envisioned by this embodiment of the invention can be achieved by any of various mechanical instrumentalities. For instance, the final stream can be acted upon at a point just upstream of the trimming device or the permeability detection unit, as the case may be, by a paddle wheel consisting of a number of resiilent paddles extending tangentially from a central hub and rotated at a peripheral speed corresponding to the speed of conveyance of the stream. Alternatively, a further conveyor surface can be provided in opposed converging relation to the air-pervious conveying surface supporting the tobacco stream, the opposed surface being spring-loaded to press against the surface of the stream and driven at the speed and in the direction of the stream.

The first tobacco filler stream formed by showering the particles onto the first conveyor contains an amount of tobacco well in excess of that actually required for the wrapped cigarette rod, the excess being removed by the trimming device, as already indicated. In accordance with another preferred embodiment of the present invention, the transfer of the tobacco particles from the first stream to the second stream is caused to take place in such manner the first stream is attenuated, that is, elongated or drawn out by causing the first conveyor to travel at a lower speed than the air-pervious conveying surface. This action tends to result in a reduction in local irregularities in the second stream since they are spread out over a greater length. More importantly, the likelihood of bouncing particles accumulating into hills and dales, similar in principle to the action of drifting snow, during the showering operation, is lessened since the conveyor on to which the tobacco particles are showered to form the first stream is moving slower.

The attenuating effect just described is most readily obtained by utilizing as the air-pervious (second) conveyor surface, a conveyor band driven at a speed in excess of that of the first conveyor band. By appropriate adjustment of the speed ratio of the two bands, the extent of the attenuation can be more or less precisely controlled.

The aforegoing and other features, objects and advantages will be more fully revealed by the following detailed description of certain illustrative embodiments when read in conjunction with the accompanying drawings, in which:

FIGURE 1 is a detailed view, partly in section and partly in side elevation of a portion of a cigarette-making machine incorporating features of the present invention;

FIGURE 2 is an enlarged transverse section taken along line II—II of FIGURE 1;

FIGURE 3 is an enlarged transverse section taken along the line III—III of FIGURE 1;

FIGURE 4 is an enlarged transverse section, taken along the section line IV—IV of FIGURE 1;

FIGURE 5 is an enlarged detail sectional view taken along line V—V of FIGURE 1;

FIGURE 6 is a view similar to FIGURE 5 but taken along line VI—VI of FIGURE 1;

FIGURE 7 is a transverse section view, slightly enlarged, taken along line VII—VII of FIGURE 1; and

FIGURE 8 is a view similar to FIGURE 1 of a modified embodiment of a machine according to the invention.

Referring first to FIGURE 1, there is shown in this figure a general arrangement of a portion of a continuous rod cigarette-making machine embodying the concept of this invention. Tobacco particles are showered by any conventional means, not shown, in a tobacco hopper, seen partially in this figure and designated **1**, so as to fall by gravity on an endless conveying band **2**. The band **2** passes through a trough comprising a base **3** and two side guides **4**. In FIGURE 2 it will be seen that the base **3** and the side guides **4** are shaped so as to bend the band **2** into generally U-shaped configuration.

Band **2** passes around a driving pulley **5**, with its horizontal run through the trough determined by a head pulley **6** and a tail pulley, not shown. Tension in the band **2** is controlled by a tensioning pulley **7** and the band **2** is driven in the direction indicated by an arrow shown on the driving pulley **5**. Abutting the left hand end of the side guides **4** is a compression block **8** and abutting the compression block **8** is a shoe **9**. The arrangement of these components is such that the band **2** passes between the two side guides **4** (FIGURE 2), to the compression block **8** (FIGURE 3), then through the shoe **9** (FIGURE 4), and finally over the head pulley **6**.

A paper web **10** passes around an idler roller **12** and enters a garniture **14** in contact with a garniture tape **11** which runs over a further idler roller **13**. In the garniture **14** the paper web **10** is wrapped around the tobacco to form a continuous cigarette rod which is sealed with adhesive and then cut to form individual cigarettes, all these operations being carried out in a known manner. An air-pervious conveying surface, in this case an endless metal perforated band **15**, extends over the adjacent end of the band **2** and the garniture tape **11** and is driven by a drive roll **16** and passes around a tail roll **17**. The perforated band **15** is of known design and is provided with a multiplicity of small holes, approximately 0.75 mm. in diameter. A suction chamber **21** is situated between and bottom runs of the perforated band **15**, and is contained within walls. One end wall **18** is shown in FIGURE 1 and two side wall **19** and **20** are shown in FIGURE 4. The top and bottom walls **62** and **63** respectively, are shown in FIGURE 7. The chamber **21** communicates through openings **22** and **23** with a suction source which is not shown.

In the bottom of chamber **21** is a narrow opening or slot **45** (see FIGURE 7) extending lengthwise of the apparatus into which slot is fitted a plate **46**. This plate is provided with slits **47** cut centrally across most of its width. The perforated band **15** runs against the underside of plate **46** which functions in the nature of a grate to support the lower run of band **15** while allowing suction applied in chamber **20** to be communicated to the lower run of the band.

Side guides **24** and **25** (FIGURES 1 and 4) are provided below the perforated band **15**. An insert **26** blocks off that portion of the perforated band **15** immediately in front of the tail roll **17** from the suction chamber **21**. A plate **27** (FIGURES 1 and 3) fits over the compression block **8** and part of the shoe **9** and abuts against the up stream ends of the side guides **24** and **25**.

Where the tobacco stream on perforated band **15** is to be compacted or densified in accordance with a preferred aspect of the invention, there can be provided just downstream of the delivery end of band **2** a paddle wheel **28**. Wheel **28** is driven in the direction shown by the arrow in FIGURE 1 by means of gears **29** and **30** from a gear **31** mounted on a shaft **31***a* to which is also attached the driving pulley **5** for band **2**. The speed of the paddle wheel **28** is such that the linear speed of

the tips of paddles **32** is equal to that of the perforated band **15**. Paddles **32** are flexible, i.e. resilient, being constructed, for example, of spring steel, about .008"–.010" thick, and extend tangentially from a hub **32***a*.

A trimming device comprising a pair of overlapping rotary discs, **33** and **64** carried on vertical spindles **65** and **66** respectively is located downstream of the paddle wheel **28**. A tobacco removing wheel **34** rotates against the bottom of the overlapping rotary discs, removing surplus tobacco and allowing it to fall on a vibratory conveyor **35** which conveys it back to the hopper **1**.

Over most of the length of the suction chamber **21** air is sucked vertically upwards and through the perforated band **15** but in the region immediately downstream of the insert **26** the air flow is restricted. The plate **27** prevents air from being sucked in around the periphery of the tail roll **17** while a close fit between the shaped sides of the side guides **24** and **25** with the head pulley **6** restricts air flow to a minimum. The greater portion of the air making up to air current immediately adjacent to the insert **26** enters in spaces **36** and **37** between the side guides **24** and **25** and the shoe **9** (see FIGURE 4). The side guides **24** and **25** are provided with sharp edges, **38** and **39**, which prevent streamline flow and assist in forming vortices in the spaces between chamfered sides **40** of the side guides **24** and **25**.

Within the suction chamber **21** is a sensing chamber **42** having substantially the same width as perforated band **15**. Suction is applied to the sensing chamber **42** through opening **41** which communicates with suction chamber **21** (FIGURE 1) or through pipe **68** connected to opening **41**, the pipe **68** terminating well down stream of the conduit **23** (FIGURE 7). From the sensing chamber **42**, a conduit **43** leads to a hydraulic amplifier, not shown. This arrangement enables any variation in the air permeability of tobacco held to the band **15** to be reflected by small variations in the airflow through the tobacco stream. These variations lead to a change in the pressure differential between the outside of the sensing chamber and the pressure inside and this in turn is amplified in the hydraulic amplifier and the resulting pressure difference may be used to regulate the quantity of tobacco delivered in the hopper **1** or to move the trimming discs toward and away from the preforated band **15** to regulate the quantity of tobacco remaining in the trimmed tobacco filler stream. A complete dislosure of the apparatus which responds to the pressure changes in the chamber **42** is made in the afore-mentioned Molins et al. U.S. Patent No. 3,089,497.

Preferably, the length of the sensing chamber is approximately the same as, or shorter than, the length of one cigarette. In lieu of the communication with the suction chamber via opening **41**, the sensing chamber can have suction applied to it directly from a separate suction generating means, not shown.

The operation of the first embodiment of apparatus just described will be explained. Cut tobacco particles, contained in a tobacco hopper **1** of known design, are showered on the band **2**, which moves in the direction indicated by the arrow shown in FIGURE 1 on the driving pulley **5**. The band **2** is constrained (bent) between the side guides **4** (see FIGURE 2) into the shape of a U in cross section in which the showered tobacco particles are held. As the band **2** moves to the left, as seen when looking at FIGURE 1, the lateral dimension or width of the U shape progressively narrows. FIGURES 3 and 4 show this effect. The narrowing of the U-shaped band **2** serves to compress the tobacco and forms it into a continuous tobacco stream.

As the band **2** moves away from the compression block **8** into the shoe **9**, two things happen which affect the continuous tobacco stream. Firstly, due to the shape of the top of the shoe **9**, the height of the U section of the band **2**, and therefore the support given to the continuous tobacco stream, is constantly decreasing until the tape assumes a completely flat condition when it passes around the head pulley **6**. Secondly, the air current enters between the spaces **36** and **37** and passes between the chamfered sides **40** of the guides **24** and **25**. Thus, as the band **2** ceases to enclose the sides of the continuous tobacco stream, being progressively peeled away laterally and downwardly, the gradually exposed portion of the continuous tobacco stream is sucked away by the air current due to the formation of a partial vacuum above the tobacco stream. The chamfered sides **40** of the side guides **24** and **25** help the air current to depart from streamline flow possibly with the formation of vortices between the chamfered sides **40**. The turbulent flow is in the immediate vicinity of the exposed portion of the continuous tobacco stream, which is thereby assisted in being separated into its component tobacco particles and in being carried upwards. The air current, with the entrained tobacco particles, is sucked upwards due to the action of the suction chamber **21**. The air passes through the perforations of the band **15** and the tobacco particles are deposited on its underside to reform into a new or secondary continuous tobacco stream.

The distance between the top of the continuous tobacco stream and the underside of the perforated band **15** is confined to a maximum of 3 cm. This distance determines the distance through which the tobacco particles are moved by the air current, and is too small to allow them to be accelerated to a high speed. The comparatively low speed at which the particles impinge on the perforated band **15**, prevents excessive rebounding which might upset the regularity of formation of the further continuous tobacco stream.

The re-formed continuous tobacco stream is carried along by band **15** until it encounters the flexible paddles **32** of paddle wheel **28**. The distance between the band **15** and the closest point of the tips of the paddles is set at, say approximately 5 mm., which is considerably less than the desired depth of the secondary filler stream on band **15**. As already indicated, paddle wheel **28** is driven at a speed such that the linear speed of the tips of the paddles is the same as that of band **15**. Consequently, as the secondary stream moves past the paddle wheel, the tobacco thereof is compressed against the band by the resiliency of the paddle blades without being unduly disturbed or disarranged.

By varying the resiliency of the paddles, through, for instance, selection of a suitable thickness for the material thereof, any desired average density of the secondary tobacco stream can be achieved so as to permit more reliable detection of changes in the air permeability of the tobacco in the secondary stream by the sensing chamber. Such detection provides an indication of the density and mass per unit length of the tobacco stream and can be utilised to control some operation of the machine, such as the quantity of tobacco delivered by the hopper or the position of the trimmer relative to the perforated band, so as to maintain substantially constant the quantity of tobacco contained in the cigarette filler per unit of time.

A further result of the stream compaction is to reduce the extent of the movement that must be imparted to the trimming blades to effect removal of a specified quantity of tobacco from the stream.

In the modified arrangement of FIGURE 8 wherein all parts common with the other figures are designated with the same numerals, an endless compression band **50** moves along a path defined by three rolls **51** of small diameter, each roll **51** being located at one corner of a triangular plate **52**. The roll **51** at the lowest corner of plate **52** is keyed to a drive pulley **53** which is driven from an endless belt **54** which in its turn passes over a further pulley **55** keyed to the tape drive roll **5**. The triangular plate **52** is carried at the ends of arms **56** and **57**, the other ends of which are pivoted on a plate **58**, the arrangement being such that the triangular plate **52** moves upward with parallel motion when the crank extension

59 of the arm 56 is acted on by a spring 60 in tension. By making the spring 60 a constant tension spring the band 50 will compress the secondary tobacco stream at constant pressure, thus achieving the desired result.

It will be apparent from FIGURE 1 that the relative delivery speeds of the band 2 and the perforated band 15 (plus the garniture tape and paper web) are subject to variation, if desired. If the speed of the perforated band exceeds that of the band 2, the secondary tobacco filler stream will be formed on the perforated band 15 at a lower average mass per unit length than that of the original filler stream on the band 2. The effect of this action will be to attenuate or elongate the secondary stream, as compared to the original stream, but without impairing the regularity of its formation. The particular ratio of speeds employed can range widely, dependent upon the extent of attenuation desired, provided, of course, that an excess of tobacco beyond that required for the cigarette rod is delivered to the trimming device. By way of illustration, one suitable ratio is 1.25/1.

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

1. In a continuous rod cigarette-making machine including a horizontal elongated belt conveyor, a tobacco hopper to shower a carpet of tobacco containing tobacco in excess of that required in said rod on to said conveyor to form a first narrow continuous tobacco filler stream on the upper surface thereof, the width of the showered carpet extending in the direction of the length of the elongated belt conveyor, a second air-pervious conveyor with the longitudinal axis thereof located spaced from said first conveyor in substantially the same vertical plane with one portion thereof at least adjacent to a terminal portion of said first conveyor, at least said adjacent portion of said second conveyor moving generally in the same direction as the terminal portion of said first conbeing substantially the same, a suction chamber located above and backing the second conveyor so that tobacco on the upper surface of the first conveyor can be transferred to the lower surface of the second conveyor and be held thereon under the influence of the suction as a further narrow continuous tobacco filler stream of the same order of mass per unit length as that of the first narrow continuous tobacco filler stream a trimming device to separate and remove surplus tobacco from the tobacco stream on the second conveyor, and rod-forming means to receive the trimmed tobacco stream from the second conveyor and to wrap a continuous paper wrapper about the trimmed tobacco stream to form the continuous cigarette rod, the improvement wherein the adjacent portion of said second conveyor is spaced apart from and above the upper surface of the first conveyor a distance in excess of the height of the tobacco stream on the first conveyor so that the air drawn through the second conveyor into the suction chamber acts to break up the first tobacco stream on the first conveyor and as the tobacco is transferred to the second conveyor and re-form the tobacco into said further continuous tobacco filler stream on the second conveyor.

2. The apparatus as in claim 1 including means adjacent the terminal portion of said first conveyor for directing the air against the tobacco of the filler stream on said terminal portion, said means being so shaped as to promote turbulent flow in said air to increase the action of said first air in breaking up said tobacco stream.

3. The apparatus as inclaim 1 including means positioned adjacent said second conveyor upstream of said trimming device for sensing variations in the air permeability of said further tobacco filler stream and means resiliently urged towards the lower face of said second conveyor upstream of said sensing means for compressing to a predetermined degree said further tobacco filler stream against said face to obtain a desired average density whereby more reliable detection of changes in the air permeability of said tobacco filler stream is obtained by said sensing means.

4. Apparatus as claimed in claim 3, wherein said compression means comprises resilient paddles extending tangentially from a rotatable boss.

5. Apparatus as claimed in claim 4, including means for driving said paddles at a peripheral speed substantially the same as the linear speed of said second conveyor.

6. Apparatus as claimed in claim 3, wherein said compression means comprises an endless conveying band moving along a path having a portion converging with said adjacent portion of said second conveyor, at least said converging portion travelling at the same speed and in the same direction as said second conveyor.

7. The apparatus of claim 1 including means for driving said second conveyor at a speed faster than that of said first conveyor whereby said re-formed further filler stream is conveyed at a faster rate than the delivery rate of the original filler stream to increase the disruptive effect of the air in transferring the tobacco particles from said first stream to said further stream.

8. A continuous rod cigarette-making machine comprising a tobacco feed hopper for showering tobacco to form a continuous tobacco filler stream; a conveyor advancing the thus-formed filler in the direction of its length; a second air-pervious conveyor partially overlapping with the first, at least the overlapping portion of said second conveyor moving in generally the same direction as the first and extending in spaced generally parallel relationship thereto, the spacing therebetween being in excess of the height of the filler on said first conveyor; spaced, parallel walls extending downwardly from the sides of said second conveyor toward said first conveyor along at least the terminal region of said overlapping portion, the vertical extent of said side walls being in excess of the clearance between said second conveyor and the surface of the filler on said first conveyor, said side walls and second conveyor defining in said region an inverted channel into which at least an upper portion of the filler stream enters; means for creating a flow of air in said channel and through said second conveyor of such force as to transfer tobacco from said filler stream to said second conveyor to form a fresh filler stream thereon; and a trimmer downstream of said side walls to remove that portion of said fresh filler in excess of that required for the continuous rod.

9. The apparatus as in claim 8 including compression means for applying against said fresh filler stream in advance of said trimmer compressive forces resiliently urging said stream against said second conveyor.

10. The apparatus as in claim 8 including means for driving said second conveyor at a speed exceeding that of said first conveyor whereby said fresh filler stream is attenuated relative to said original filler stream.

11. In a continuous rod cigarette-making machine including a horizontal elongated belt conveyor, a tobacco hopper to shower a carpet of tobacco containing tobacco in excess of that required in said rod on to said conveyor to form a first narrow continuous tobacco filler stream on the upper surface thereof, the width of the showered carpet extending in the direction of the length of the elongated belt conveyor, a second air-pervious conveyor with the longitudinal axis thereof located spaced from said first conveyor in substantially the same vertical plane with one portion thereof at least adjacent to a terminal portion of said first conveyor, at least said adjacent portion of said second conveyor moving generally in the same direction as the terminal portion of said first conveyor, the transverse dimensions of said two conveyors being substantially the same, a suction chamber located above and backing the second conveyor so that tobacco on the upper surface of the first conveyor can be transferred to the lower surface of the second conveyor and be held thereon under the influence of the suction as a further narrow

continuous tobacco filler stream, a trimming device to separate and remove surplus tobacco from the tobacco stream on the second conveyor, rod-forming means to receive the trimmed tobacco stream from the second conveyor and to wrap a continuous paper wrapper about the trimmed tobacco stream to form the continuous cigarette rod, the improvement wherein the adjacent portion of said second conveyor being spaced apart from and above the upper surface of the first conveyor a distance in excess of the height of the tobacco stream on the first conveyor so that the air drawn through the second conveyor into the suction chamber acts to break up the first tobacco stream on the first conveyor and as the tobacco is transferred to the second conveyor and re-form the tobacco into said further continuous tobacco filler stream on the second conveyor, and means defining a transition passage between the first and second conveyors comprising lower block means located at the terminal portion of the first conveyor for supporting the belt thereof and bending the same into an axially arranged, upwardly open, progressively narrowing and deepening U-shaped trough having opposite longitudinal edges, said block means having sidewalls terminating in declining surfaces leading away from said opposite edges of said trough, and an upper guide member arranged above said block means, said guide member having an axially arranged passage having an open lower end slightly wider than the upper open end of said block means and spaced slightly thereabove and having flat generally downwardly facing surfaces extending on opposite sides of said passage, the space between each flat lower surface of the upper member and the corresponding declining surface of said block means forming a converging passage adapted to cause an air stream drawn into the suction chamber to be accelerated in a generally horizontal direction of movement above said first tobacco stream on the first belt and cause a partial vacuum thereover such that tobacco on the first conveyor will be progressively removed therefrom from the upper surface thereof.

12. In a continuous rod cigarette-making machine including a horizontal elongated belt conveyor, a tobacco hopper to shower a carpet of tobacco containing tobacco in excess of that required in said rod on to said conveyor to form a first narrow continuous tobacco filler stream on the upper surface thereof, the width of the showered carpet extending in the direction of the length of the elongated belt conveyor, a second air-pervious conveyor with the longitudinal axis thereof located spaced from said first conveyor in substantially the same vertical plane with one portion thereof at least adjacent to a terminal portion of said first conveyor, at least said adjacent portion of said second conveyor moving generally in the same direction as the terminal portion of said first conveyor, the transverse dimensions of said two conveyors being substantially the same, a suction chamber located above and backing the second conveyor so that tobacco on the upper surface of the first conveyor can be transferred to the lower surface of the second conveyor and be held thereon under the influence of the suction as a further narrow continuous tobacco filler stream, a trimming device to separate and remove surplus tobacco from the tobacco stream on the second conveyor, rod-forming means to receive the trimmed tobacco stream from the second conveyor and to wrap a continuous paper wrapper about the trimmed tobacco stream to form the continuous cigarette rod, the improvement wherein the adjacent portion of said second conveyor being spaced apart from and above the upper surface of the first conveyor a distance in excess of the height of the tobacco stream on the first conveyor so that the air drawn through the second conveyor into the suction chamber acts to break up the first tobacco stream on the first conveyor and as the tobacco is transferred to the second conveyor and re-form the tobacco into said further continuous tobacco filler stream on the second conveyor, and means defining a transition passage between the first and second conveyors comprising lower block means located at the terminal portion of the first conveyor, said block means being so shaped as to constrain the conveyor belt into an axially arranged, upwardly open, narrowing and deepening U-shaped trough, having opposite longitudinal edges, said block means having declining surfaces leading away from said opposite edges of said trough, and an upper member arranged above said block means, said upper member having side walls extending downwardly on both sides of the lower surface of the second conveyor and terminating in slightly spaced apart relationship to the declining surfaces of said block means so as to define transverse passages on either side of the filler stream, whereby air may be drawn into the suction chamber through said passages, and may be accelerated in a vertical direction above tobacco on the first belt and cause a partial vacuum thereover such that tobacco on the first conveyor will be progressively removed from the upper surface thereof.

13. In a continuous rod cigarette-making machine including a horizontal elongated belt conveyor, a tobacco hopper to shower a carpet of tobacco containing tobacco in excess of that required in said rod on to said conveyor to form a first narrow continuous tobacco filler stream on the upper surface thereof, the width of the showered carpet extending in the direction of the length of the elongated belt conveyor, a second air-pervious conveyor with the longitudinal axis thereof located spaced from said first conveyor in substantially the same vertical plane with one portion thereof at least adjacent to a terminal portion of said first conveyor, at least said adjacent portion of said second conveyor moving generally in the same direction as the terminal portion of said first conveyor, the transverse dimensions of said two conveyors being substantially the same, a suction chamber located above and backing the second conveyor so that tobacco on the upper surface of the first conveyor can be transferred to the lower surface of the second conveyor and be held thereon under the influence of the suction as a further narrow continuous tobacco filler stream, a trimming device to separate and remove surplus tobacco from the tobacco stream on the second conveyor, rod-forming means to receive the trimmed tobacco stream from the second conveyor and to wrap a continuous paper wrapper about the trimmed tobacco stream to form the continuous cigarette rod, the improvement wherein the adjacent portion of said second conveyor being spaced apart from and above the upper surface of the first conveyor a distance in excess of the height of the tobacco stream on the first conveyor so that the air drawn through the second conveyor into the suction chamber acts to break up the first tobacco stream on the first conveyor and as the tobacco is transferred to the second conveyor and re-form the tobacco into said further continuous tobacco filler stream on the second conveyor, and means defining a transition passage between the two conveyors and through which the tobacco passes from the first to the second conveyor, said means comprising side walls to confine laterally the tobacco stream on the first conveyor, the height of the side walls being progressively reduced adjacent the terminal portion of said first conveyor, in the direction of travel thereof, whereby only the tobacco in the stream on the first conveyor which is above the walls is exposed to the air drawn through the second conveyor into the suction chamber and the exposed tobacco is progressively stripped from the upper surface of the first stream and carried to the second conveyor, the stream on the first conveyor thus being progressively disrupted and re-formed on the second conveyor by the action of the air drawn through the second conveyor.

14. The apparatus as in claim **11** wherein the side walls of the upper member each has a downstream portion extending lengthwise of said conveyor downstream of the terminal portion of the first conveyor, and further

including compression means situated between the downstream portions of the side walls and upstream of the trimming means, and resiliently urged towards the second conveyor to compress said further tobacco filler stream against the second conveyor.

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