

March 11, 1969

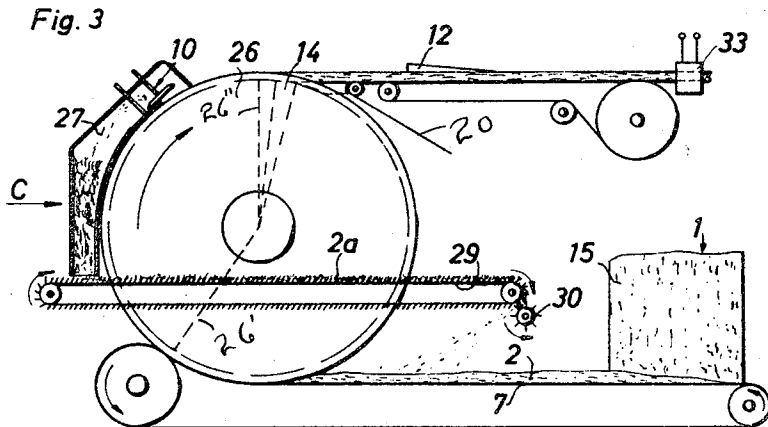
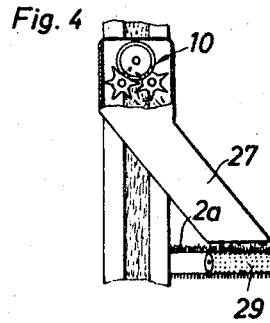
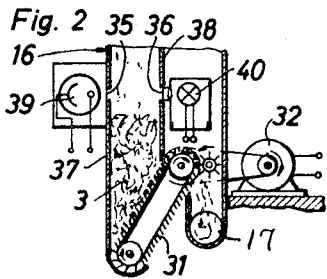
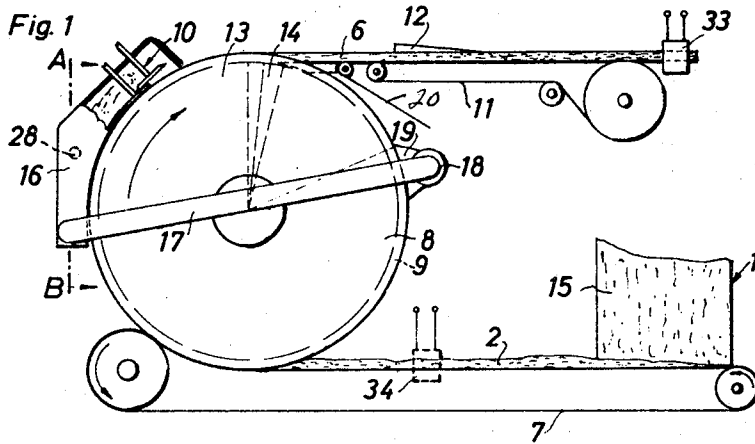
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METHOD OF AND MACHINE FOR PRODUCING A TOBACCO ROD

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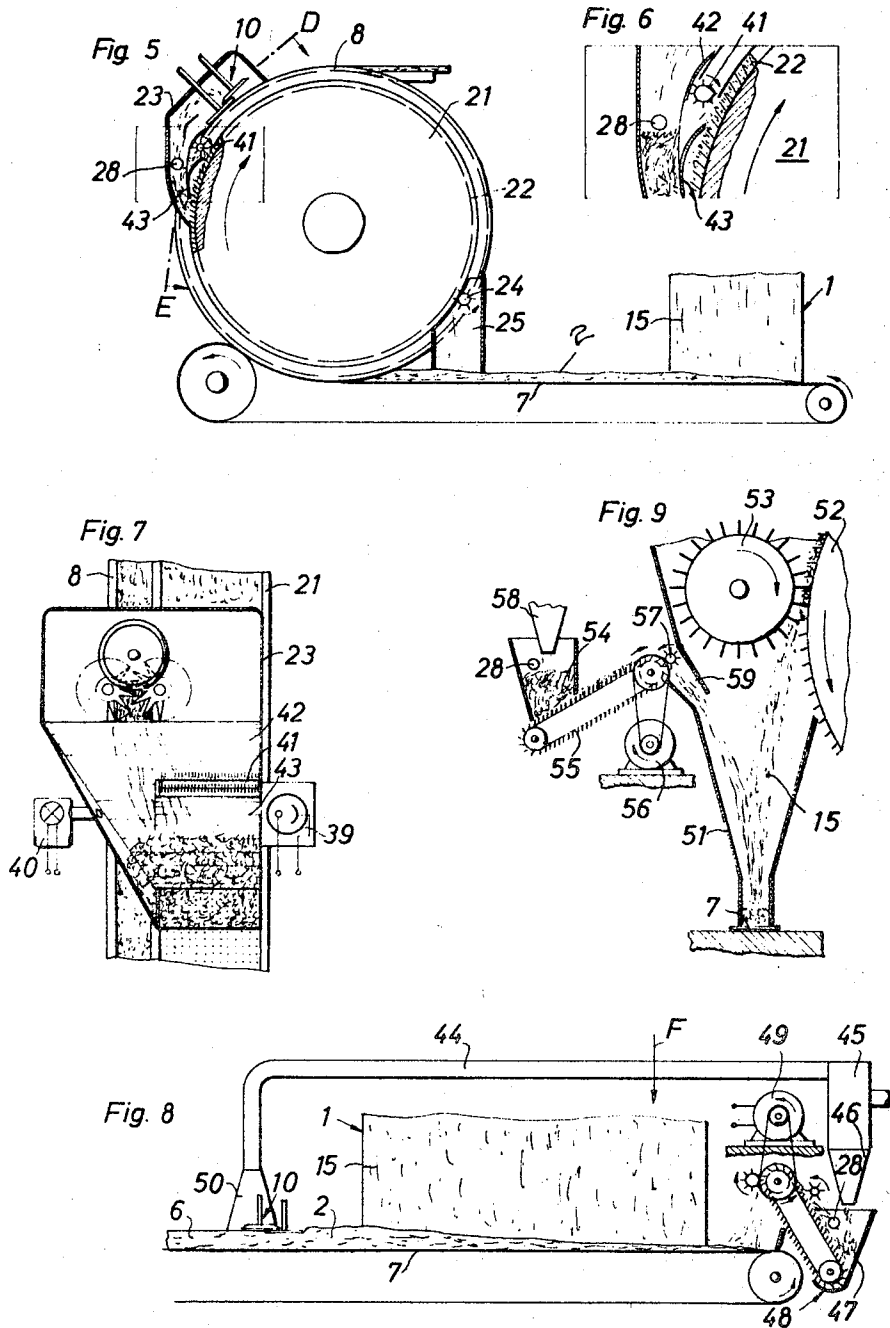
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METHOD OF AND MACHINE FOR PRODUCING A TOBACCO ROD

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**METHOD OF AND MACHINE FOR PRODUCING A TOBACCO ROD**

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18 Claims 10

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The present invention relates to cigarette and cigar manufacture in general, and more particularly to a method of and to a machine for producing a tobacco rod of constant cross section which may assume the form of a cigarette rod or cigar rod.

In the production of a cigarette or cigar rod, certain difficulties are encountered insofar as the production of cigarettes or cigars of constant uniform weight is concerned. According to the present invention, the desired result is obtained in that excess tobacco removed from a tobacco stream as a result of equalization or trimming is collected, and that removal of collected excess tobacco which is to be returned to the non-equalized tobacco stream is effected in accordance with the result of a measurement performed by a test device which measures the tobacco stream or rod. In this manner provision can be made so that the tobacco removed during the equalizing or trimming operation can be collected and stored and the amount stored can be examined and the result of the examination can be used for controlling the tobacco distributor.

It is an object of the invention to provide a machine for carrying out the above method.

The method of my invention comprises the steps of forming a continuous tobacco stream which contains tobacco in excess of that required in the tobacco rod, trimming the surface of the tobacco stream, forming a supply of excess tobacco by collecting excess tobacco removed from said tobacco stream in a container or a similar storing device, withdrawing tobacco from the supply and returning it to the tobacco stream at a point located in advance of the point where the trimming operation is performed, and regulating the amount of tobacco withdrawn from the supply in accordance with the results of measurements performed by a test device operative upon the continuous tobacco stream or tobacco rod at any selected point of its movement.

The quantity of tobacco in the container is measured by a control device and this control device adjusts the customary distributor which delivers the bulk of tobacco into the path of the tobacco stream.

In the drawing which illustrates five embodiments of the invention,

FIG. 1 is a partly elevational and partly sectional view of a cigarette rod machine which comprises a low-level tobacco distributor and a feed wheel rotating about a horizontal axis in a vertical plane, and in which the transfer conveyor means for the trimmed-off tobacco includes a pneumatic pipeline;

FIG. 2 is a larger-scale transverse vertical section through a collecting container with the discharge and control device, the section being taken along the line A-B of FIG. 1;

FIG. 3 is a partly elevational and partly sectional view of a similar cigarette rod machine in which the transfer conveyor means comprises a spiked belt;

FIG. 4 is a fragmentary end view of the cigarette rod machine as seen in the direction of the arrow C in FIG. 3;

FIG. 5 is a partly elevational and partly sectional view

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of a third cigarette rod machine wherein the transfer conveyor means assumes the form of a spiked wheel;

FIG. 6 is an enlarged sectional view of a detail of the collecting funnel which is enclosed in FIG. 5 by a rectangle;

FIG. 7 is an enlarged transverse section as seen in the direction of arrows from the line D-E of FIG. 5,

FIG. 8 is a partly elevational and partly sectional view of a fourth cigarette rod machine; and

FIG. 9 is a fragmentary sectional view of a fifth cigarette rod machine.

FIGS. 1 and 2 illustrate a cigarette rod machine including a first conveyor in the form of a feed wheel 8 which rotates in a vertical plane, an endless horizontal tobacco conveyor belt 7, a trimming or equalizing device 10 adjacent the upper portion of the feed wheel 8, and a third conveyor here shown as an endless forming belt 11 which supports a cigarette paper strip 20 and the tobacco stream thereon when the latter is discharged from the upper portion of the feed wheel 8 and then passes through the rod-forming mechanism 12. The periphery of the feed wheel 8 is provided with a perforated bottom wall to form a suction groove 9 which communicates with a stationary suction chamber 13 arranged within the feed wheel 8. A stationary compressed air chamber 14 is provided to assist the discharge of the tobacco rod 6 from the groove 9 for transfer onto the paper strip 20. A tobacco shower 15 discharged by an adjustable tobacco distributor 1 is supplied to the upper stretch of the tobacco conveyor belt 7.

A tobacco filler stream 2 formed on the tobacco conveyor belt 7 is conveyed to the lower portion of the feed wheel 8 and is pressed into its groove 9 wherein it is held by suction. Any outwardly projecting particles of excess tobacco are trimmed off by the trimming device 10 which operates in a predetermined trimming plane and the remaining tobacco stream, now having a uniform cross section throughout, is passed onward and transferred to the cigarette paper strip 20 which is then drawn through the rod-forming mechanism 12 by the forming belt 11.

Excess tobacco removed by the trimming device 10 is conveyed into a storing device here shown as a funnel-like container 16 which is connected with a pneumatic pipeline 17. Such excess tobacco is collected in this container 16 and is delivered from the latter by the pipeline 17 and by means of a delivery feed member 18 arranged at right angles to the tobacco stream to be equalized and thence by a nozzle 19 into the empty portion of the groove 9 before the tobacco stream 2 is pressed into the same in the lower portion of the wheel 8.

The trimmed off excess tobacco thus enters the groove 9 for the second time and, during its second passage through the trimming zone, such excess tobacco is distant from the trimming device 10 so that it must form part of the tobacco rod 6 and of the cigarette rod. In this manner there is little danger that any particles of tobacco will remain continuously in the trimming path.

In accordance with the present invention the container 16 is divided into two adjacent vertical sections and an adjustable transfer member here shown as an elevator conveyor 31 is provided in that section of the container 16 which supplies excess tobacco to the inlet nozzle of the pneumatic pipeline 17. An adjustable motor 32 drives the adjustable tobacco elevator 31 in accordance with the measurement of the tobacco stream carried out by a test device 33 located at the outlet of the cigarette rod forming mechanism 12. The test device 33 may be mounted adjacent to the tobacco conveyor belt 7 as indicated in dotted lines at 34 in FIG. 1. The parts 1, 16, 17, 18, 31 together form a device for producing a tobacco stream containing tobacco in excess of that required in the to-

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bacco rod 6, and the parts 17, 18, 31 together form a transfer device for delivering tobacco from the storing device 16 into the path of the tobacco stream.

In order to maintain the tobacco supply approximately constant, a control means here shown as a photo-electric test device 28 (FIG. 1) is provided in the region of apertures 35, 36 provided in the walls 37, 38 of one section of the collecting container 16. The photo-electric test device 28 comprises a photo-electric cell 39 and a light source 40 (FIG. 2) and this device measures the quantity of tobacco in the left hand section of the collecting funnel 16 in a well known manner in order to control the adjustable tobacco distributor 1 in accordance with the measured result.

The collecting container 16 is divided into two sections by the vertical wall 38 and forms two compartments, the left hand compartment 3 serving as a storage vessel wherein the level of tobacco rises or falls depending on the amount of excess tobacco received from the trimming device. Tobacco is removed from the bottom portion of this compartment 3 by means of the elevator 31 and is delivered to the pneumatic pipeline 17 under the control of the test device 33. If, however, too much tobacco is collected in the compartment 3, the light beam between the source 40 and the photo-electric cell 39 is obstructed whereby the control device causes the tobacco distributor 1 to reduce the amount of tobacco delivered to the belt 7.

In the embodiment shown in FIGS. 3 and 4 the parts corresponding to those shown in FIG. 1 are designated by the same reference numerals. However, the suction chamber 26 within the feed wheel 8 extends along a substantially smaller circumferential portion of this feed wheel, as indicated by the dotted radial lines 26' and 26'', namely, from the point where the tobacco stream is received from the conveyor belt 7 and up to the delivery point at the top of the feed wheel where the tobacco rod is removed and passes toward the cigarette paper strip and the forming belt 11. Below the trimming device 10 there is provided a collecting funnel 27 into which the excess tobacco is discharged and accumulated to a predetermined level. The collecting container 27 extends laterally away from the plane of the feed wheel as shown in FIG. 4 and a modified member in the form of a spiked conveyor belt 29 is provided beneath the delivery end thereof to receive a uniform tobacco layer 2a from the supply of excess tobacco accumulated in the collecting container 27. This layer tobacco 2a is then showered onto the tobacco stream 2 to be equalized by means of a combing roller 30.

The control of the amount of tobacco in the collecting container 27 and the control of the spiked belt 29 are effected in the same way as in FIG. 2 as applied to the collecting container 16 and the elevator conveyor 31.

The embodiment of FIGS. 5 to 7 differs from those shown in FIGS. 1 to 4 in that a wheel 21 having a circumferential groove 22 with a spiked bottom wall is arranged adjacent and concentrically with the feed wheel 8. The groove 22 receives excess tobacco removed from the collecting container 23 as a result of the trimming operation. To remove the tobacco from the spiked bottom wall in the groove 22 of the wheel 21, a beater roller 24 is provided and is operative in the groove 22 and a guide duct 25 is provided beneath the beater roller 24 for conducting excess tobacco to the surface of the tobacco stream 2 on the conveyor belt 7. The level of the supply of tobacco in the collecting container 23 is measured by a photo-electric control device 28 in the same way as in the machine of FIGS. 1 and 2.

In order to insure that the quantity of tobacco withdrawn from the collecting container 23 remains constant, a beater roller 41 engages the spikes on the bottom wall of the groove 22 as shown in FIG. 6 and combs off tobacco above the desired level.

FIG. 7 shows the details of construction of the collecting container 23 as well as the control device which

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comprises a light source 40 and a photo-electric cell 39. The guide wall 42 is shown on a larger scale in FIG. 6 and is interrupted beneath the beater wheel 41 and is continued in the form of a guide wall 43.

Excess tobacco removed by the trimming device 10 drops into the collecting container 23 and is withdrawn therefrom by means of the spiked bottom wall in the groove 22. The rotation of the spiked wheel 21 is controlled by means of a test device in the same way as that of the spiked belt 29 (FIGS. 3 and 4) or the elevator conveyor 31 (FIGS. 1 and 2).

FIGS. 8 and 9 illustrate similar parts of two cigarette rod machines of the straight-line tobacco stream or rod forming type. Referring particularly to FIG. 8, the adjustable tobacco distributor 1 supplies a tobacco shower 15 onto the endless horizontal conveyor belt 7 to form thereon a tobacco stream 2 which is equalized by the trimming device 10. A pneumatic pipeline 44 serves as a conveyor for excess tobacco trimmed off by the device 10, this pipeline terminating in a receiving member 45 having a hopper 46 arranged above the supply container 47, the latter being associated with a small elevator conveyor 48. A photo-electric control or detecting device 28 is provided in the supply container 47. The discharge end of the elevator conveyor 48 is located above the forward end portion of the tobacco conveyor belt 7 which in this case extends rearwardly of the distributor 1 a slight distance. The elevator conveyor 48 is driven by a variable speed motor 49 to operate in the same way as the elevating conveyor 31 of FIG. 1.

Excess tobacco removed from the tobacco stream 2 during the equalizing step is sucked up by the entry nozzle 50 of the pneumatic pipeline 44 and is conveyed into the receiving member 45 to descend through the hopper 46 into the supply container 47 containing the elevator 48. Excess tobacco is spread on the tobacco conveyor belt 7 by the discharge end of the elevator 48. Then the tobacco showered by the distributor 1 drops onto the tobacco conveyor belt 7 which carries a minor quantity of excess tobacco supplied by the elevator 48. The speed of the spiked belt of the elevator 48 is controlled by a test device similar to the device 33 of FIG. 1.

It is not absolutely necessary that the conveyor belt 7 extend rearwardly of the distributor 1. Excess tobacco collected as a result of the trimming operation can also be introduced into the tobacco shower 15 as shown in FIG. 9. The point of introduction would then lie at the forward end of the distributor approximately as indicated by the arrow F in FIG. 8.

FIG. 9 shows the tobacco distributor 1 in section; it comprises a chute 51 into which a tobacco feeder drum 52 projects. The drum 52 cooperates with a beater roller 53. The horizontal conveyor belt 7 travels beneath the lower end of the chute 51. The device for introducing excess tobacco collected during the trimming operation is similar to that shown in FIG. 8. It consists of a supply container 54, a spiked elevator belt 55, a variable speed motor 56, a photo-electric control or detecting device 28 for measuring the level of the supply of excess tobacco in the container 54 and a beater roller 57 for removing tobacco from the spiked belt 55 and for showering such tobacco through a duct 59 in the side wall of the chute 51. The collecting container receives excess tobacco from a discharge funnel 58 which in turn is supplied with tobacco by a cell wheel feeder or other equivalent means corresponding to that shown in FIG. 8 at 45.

The tobacco supplied to the container 54 is withdrawn by the spiked belt 55 and the tobacco removed from the latter by the beater roller 57 is discharged into the chute 51 through the duct 59 to descend onto the conveyor belt 7 together with the main part of the tobacco shower 15. Since the device shown in FIG. 9 is located at the point F in FIG. 8, it will be understood that excess tobacco supplied by the duct 59 will form the lower part of the tobacco stream on the belt 7 and

will not be removed later by the trimming device 10.

The test device 33 may be a C4 Accuracy Cigarettes Gage Controller as manufactured by Industrial Nucleonics Corp., Columbus, Ohio, U.S.A., or any similar type of test device comprising a power source for producing a light beam, i.e., Strontium 90, received by an ionization chamber for measuring, the ionization chamber transmitting the measured result to an amplifier, the latter operating an integrator which controls a relay arranged to adjust the transfer device.

What I claim is:

1. A machine for producing a tobacco rod of constant cross section, comprising stream producing means arranged to form a tobacco stream which contains tobacco in excess of that required in the tobacco rod; conveyor means arranged to advance the tobacco stream and the tobacco rod in an elongated path; trimming means adjacent to said path and arranged to enter a portion of said tobacco stream and to remove excess tobacco from the stream so as to produce a tobacco rod of constant cross section, said stream producing means comprising storing means arranged to receive excess tobacco from said trimming means and adjustable transfer means for delivering tobacco from said storing means into said path at a point ahead of said trimming means; a test device arranged to measure the quantity of tobacco in said path; and means for adjusting said transfer means in accordance with the results measured by said test device.

2. A machine for producing a tobacco rod of constant cross section, comprising stream producing means arranged to form a tobacco stream which contains tobacco in excess of that required in the tobacco rod; conveyor means arranged to advance the tobacco stream and the tobacco rod in an elongated path; trimming means adjacent to said path and arranged to enter a portion of said tobacco stream and to remove excess tobacco from the stream so as to produce a tobacco rod of constant cross section, said stream producing means comprising an adjustable distributor arranged to deliver a shower of tobacco to said conveyor means at a point ahead of said trimming means, storing means arranged to receive excess tobacco from said trimming means and adjustable transfer means for delivering tobacco from said storing means into said path at a point ahead of said trimming means; control means arranged to measure the quantity of excess tobacco in said storing means and to adjust said distributor so that the distributor delivers less tobacco when the quantity of excess tobacco in said storing means exceeds a predetermined value; a test device arranged to measure the quantity of tobacco in said path; and means for adjusting said transfer means in accordance with the results measured by said test device.

3. A machine for producing a tobacco rod of constant cross section, comprising stream producing means arranged to form a tobacco stream which contains tobacco in excess of that required in the tobacco rod; conveyor means arranged to advance the tobacco stream and the tobacco rod in an elongated path; trimming means adjacent to said path and arranged to enter a portion of said tobacco stream and to remove excess tobacco from the stream so as to produce a tobacco rod of constant cross section, said stream producing means comprising storing means arranged to receive excess tobacco from said trimming means and adjustable transfer means for delivering tobacco from said storing means into said path at a point ahead of said trimming means and in such a way that tobacco which is being added at said point bypasses said trimming means; a test device arranged to measure the quantity of tobacco in said path; and means for adjusting said transfer means in accordance with the results measured by said test device.

4. A machine for producing a tobacco rod of constant cross section, comprising stream producing means ar-

ranged to form a tobacco stream which contains tobacco in excess of that required in the tobacco rod; conveyor means arranged to advance the tobacco stream and the tobacco rod in an elongated path; trimming means adjacent to said path and arranged to enter a portion of said tobacco stream and to remove excess tobacco from the stream so as to produce a tobacco rod of constant cross section, said stream producing means comprising an adjustable distributor arranged to deliver a shower of tobacco to said conveyor means at a point ahead of said trimming means, storing means arranged to receive excess tobacco from said trimming means and transfer means for delivering tobacco from said storing means into said path at a point ahead of said trimming means; and control means arranged to measure the quantity of excess tobacco in said storing means and to adjust said distributor in accordance with the measured result so that the distributor delivers less tobacco when the quantity of excess tobacco in said storing means exceeds a predetermined value.

5. In a machine for producing a tobacco rod of constant cross section, in combination, conveyor means arranged to advance in an elongated path a continuous tobacco stream which contains tobacco in excess of that required in the tobacco rod, trimming means adjacent to said path and arranged to enter a portion of said tobacco stream and to remove excess tobacco from the stream so as to form a tobacco rod of constant cross section; storing means arranged to receive excess tobacco from said trimming means; adjustable transfer means arranged to remove tobacco from said storing means; a test device adjacent to and arranged to measure the quantity of tobacco in said path; and means for adjusting said transfer means in accordance with the result measured by said test device.

6. A machine as set forth in claim 1, wherein said conveyor means comprises a rotary feed wheel having a circumferential suction groove defining a portion of said elongated path for the tobacco stream and wherein said transfer means comprises a second rotary wheel adjacent to and concentric with said feed wheel, said second wheel having a circumferential groove provided with a spiked bottom wall arranged to deliver tobacco from said storing means toward said point of the path.

7. A machine as set forth in claim 1, wherein said stream producing means comprises a tobacco distributor having a first portion arranged to deliver a continuous stream of tobacco into said path at a point between said first mentioned point and said trimming means and a second portion located at said first mentioned point, said transfer means being arranged to deliver excess tobacco to said second portion of the distributor so that tobacco delivered by said transfer means is covered by tobacco showered by the first portion of said distributor.

8. A machine as set forth in claim 1, wherein said test device is located past said trimming means as seen in the direction of advance of tobacco in said path so that said test device measures the tobacco rod.

9. A machine as set forth in claim 1, wherein said test device is located ahead of said trimming means as seen in the direction of advance of tobacco in said path so that said test device measures the tobacco stream.

10. A method of producing a tobacco rod of constant cross section, comprising the steps of producing a tobacco stream which contains tobacco in excess of that required in the tobacco rod and advancing the tobacco stream in an elongated path; trimming the tobacco stream at a first point of said path by trimming means entering a portion of said tobacco stream and removing excess tobacco therefrom whereby the stream is transformed into a tobacco rod of constant cross section; forming a supply of stored tobacco by collecting excess tobacco which is removed from the tobacco stream; measuring the quantity of tobacco in said path; and delivering excess tobacco from said supply to a second point of said path at a rate proportional with the measured result, said second point of the path being located past said first point as seen in the

direction in which tobacco advances in said path so that excess tobacco delivered into said path forms part of the tobacco stream which contains tobacco in excess of that required in the tobacco rod.

11. A method of producing a tobacco rod of constant cross section, comprising the steps of producing a tobacco stream which contains tobacco in excess of that required in the tobacco rod partially by showering tobacco into an elongated path and thereupon advancing the thus formed tobacco stream endwise in said path; trimming the tobacco stream at a first point of said path by trimming means entering a portion of said tobacco stream and removing excess tobacco therefrom whereby the stream is transformed into a tobacco rod of constant cross section; forming a supply of stored tobacco by collecting excess tobacco which is removed from the tobacco stream; measuring the quantity of tobacco in said supply of stored tobacco and adjusting the rate at which tobacco is being showered into said path in accordance with the measured result; measuring the quantity of tobacco in said path; and delivering excess tobacco from said supply to a second point of said path at a rate proportional with the result of said last mentioned measurement, said second point of the path being located past said first point as seen in the direction in which tobacco advances in said path so that excess tobacco delivered into said path forms part of the tobacco stream which contains tobacco in excess of that required in the tobacco rod.

12. A method of producing a tobacco rod of constant cross section, comprising the steps of producing a tobacco stream which contains tobacco in excess of that required in the tobacco rod partially by showering tobacco into an elongated path and thereupon advancing the resulting tobacco stream along said path; trimming the tobacco stream at a first point of said path by trimming means entering a portion of said tobacco stream and removing excess tobacco therefrom whereby the stream is transformed into a tobacco rod of constant cross section; forming a supply of stored tobacco by collecting excess tobacco which is removed from the tobacco stream; delivering excess tobacco from said supply to a second point of said path which is located past said first point as seen in the direction in which tobacco advances in said path so that excess tobacco delivered from said supply forms part of the tobacco stream which contains tobacco in excess of that required in the tobacco rod; measuring the quantity of tobacco in said supply; and adjusting the rate at which tobacco is being showered into said path in accordance with the measured result.

13. In the method of making a continuous cigarette rod, the steps of forming a first stream of shredded tobacco in excess of that required for a cigarette rod, forming a second stream by overturning the first stream, stripping the excess tobacco from the second stream to leave a third stream passable to a rod former, storing the stripped tobacco, metering the stored tobacco, and delivering it to the surface of the first stream to improve its uniformity.

14. The method according to claim 13 which includes variably metering the stripped tobacco to the first stream responsive to detection of the uniformity of the first stream.

15. In a continuous cigarette rod making apparatus, a first conveyor, means for showering an excess of shredded tobacco as a first stream onto said first conveyor, a second conveyor, means for forming the first stream into a second stream on said second conveyor, said second stream having as its top the bottom of the first stream, continuous tobacco stripping means adjacent said conveyor to leave

a finished stream conveyable to a rod former, and means for storing excess tobacco stripped from said first stream, said storing means including a commodious supply chute for the excess tobacco, tobacco metering means in the outlet of said chute and adjacent the first conveyor, the metering means unsnarling the tobacco and depositing same at a determined rate of supply on the stream on the first conveyor, to tend to smoothen the hills and dales in said first stream.

16. In apparatus according to claim 15, a detector for continuously measuring the density of the first tobacco stream before the tobacco discharge and redistribution from the chute, and means responsive to the detector for varying the speed of the tobacco discharge and redistribution means in the chute.

17. In apparatus for the manufacture of a continuous cigarette rod, a first conveyor, means for continuously showering an excess of tobacco above that employed in forming a cigarette rod on said first conveyor to form a first tobacco stream, a second conveyor in the form of a suction drum adjacent to the downstream portion of the first conveyor and adapted to remove the first stream and to form a second stream in which the bottom and top surfaces have been reversed from their relationship in said first stream, trimming means adjacent said drum and adapted to continuously trim the second stream to remove said excess therefrom, means to convey the tobacco remaining in said second stream after said trimming to a cigarette rod making means, a storage and supply chute, between said trimming means and the surface of said first tobacco stream, adapted to store the trimmed excess tobacco, tobacco discharge and redistribution means at the outlet of the chute, said tobacco discharge and redistribution means arranged for delivering a selected quantity of trimmed tobacco at a predetermined rate to the first tobacco stream, to tend to make the thickness of the lateral cross-section of said second stream greater than required at all points along the length of said second stream prior to said trimming.

18. In apparatus according to claim 17, continuous density measuring means upstream from the chute outlet to the first stream, and means responsive to said density measuring means for continuously varying the rate of delivery from the tobacco discharge and redistribution means of the chute.

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