

[54] **METHOD AND APPARATUS FOR THE PRODUCTION OF TOBACCO RODS**

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[63] Continuation of Ser. No. 512,127, Dec. 7, 1965, abandoned, which is a continuation-in-part of Ser. No. 100,690, April 4, 1961, abandoned, and a continuation-in-part of Ser. No. 100,699, April 4, 1961, abandoned.

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[58] Field of Search 131/21, 21 B, 21 D, 131/84, 84 B, 84 C, 110, 110 A, 110 AA

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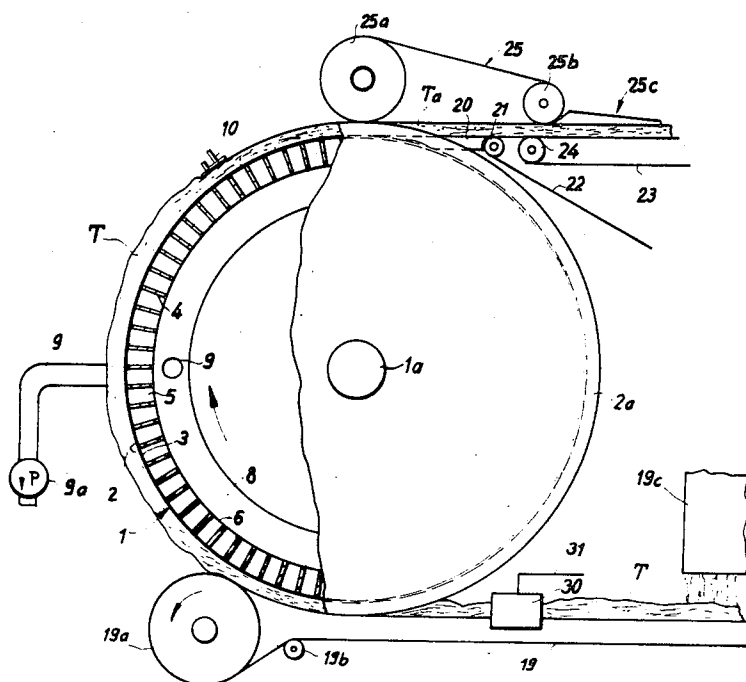
Primary Examiner—Joseph S. Reich

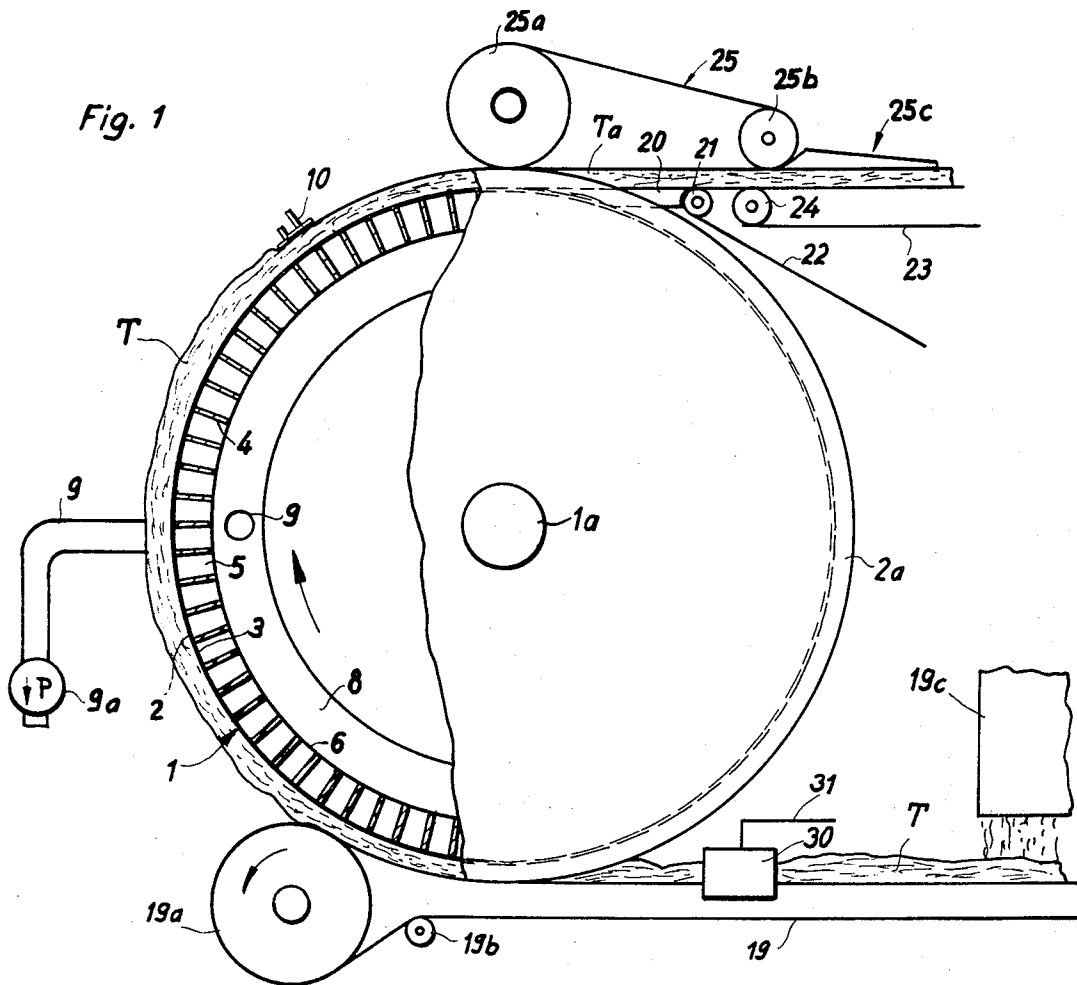
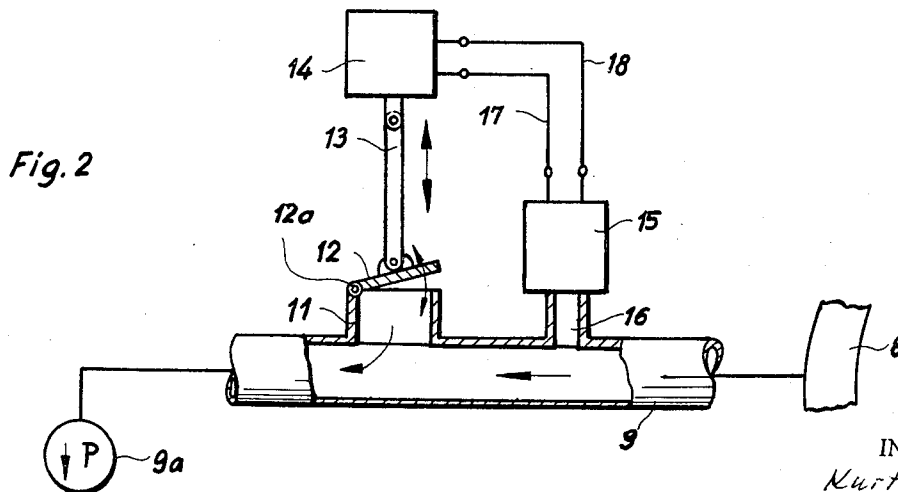
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[57] **ABSTRACT**

A tobacco filler rod of substantially constant density and cross section is obtained by compressing a moving tobacco stream by an air current, determining the presence or absence of differences between the pressure of the air current after the latter has passed through the stream and a predetermined pressure, measuring the quantity of tobacco per unit length of the stream, adjusting the air pressure when the measured quantity differs from a predetermined quantity and/or when the measured pressure differs from a predetermined pressure, and trimming the stream. The tobacco stream is arranged to be fed into a peripheral groove on a suction wheel and the suction is measured and controlled in a pipe communicating with a suction chamber in the wheel, and with a pump or the like. The predetermined quantity can be adjusted by measuring the quantity of tobacco on a conveyor which feeds the suction wheel and adjusting the same by means of a servo-motor connected to a valve leading into the pipe, or by a motor and gear-operated bellows system which is responsive to pressure in the pipe and which also controls the servo-motor. The servo-motor can be controlled directly by the stream detector.

11 Claims, 7 Drawing Figures





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Fig. 3

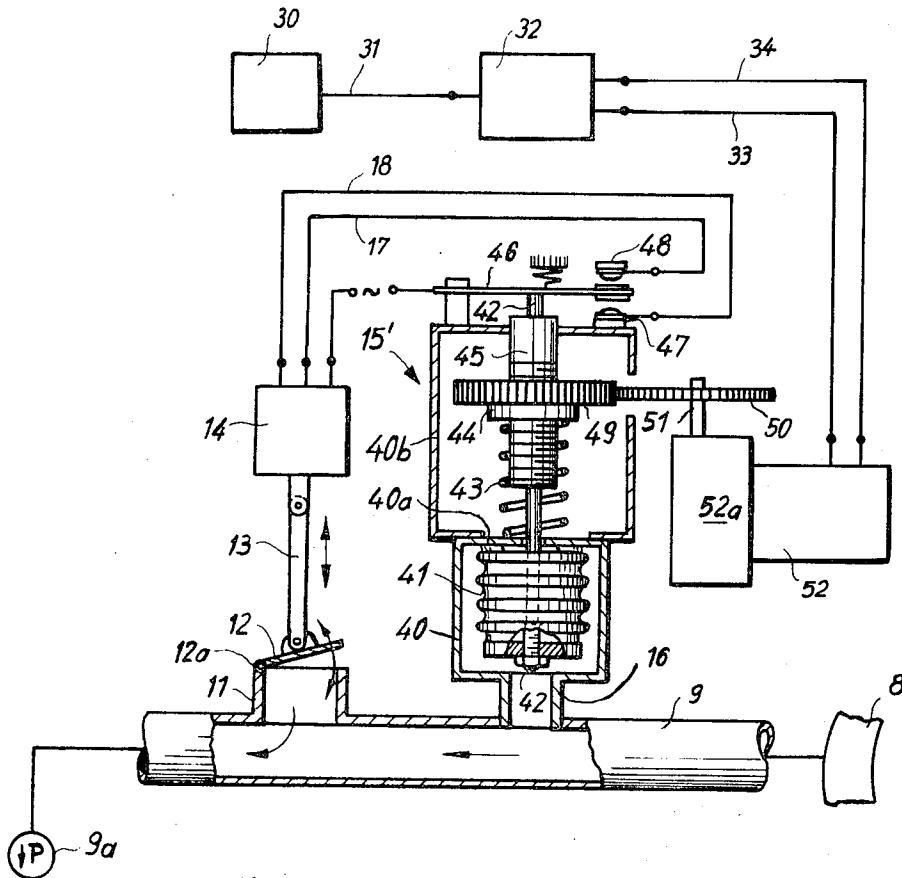
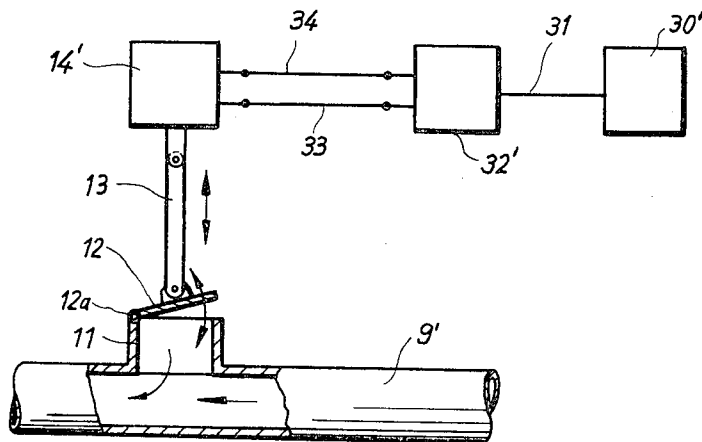


Fig. 4



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Fig.5

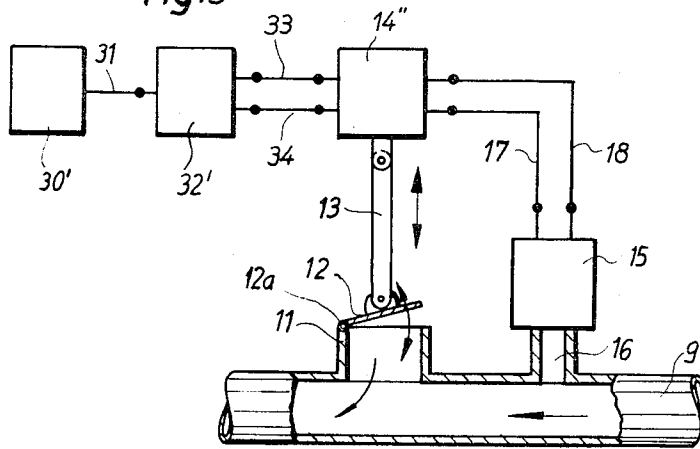


Fig. 6

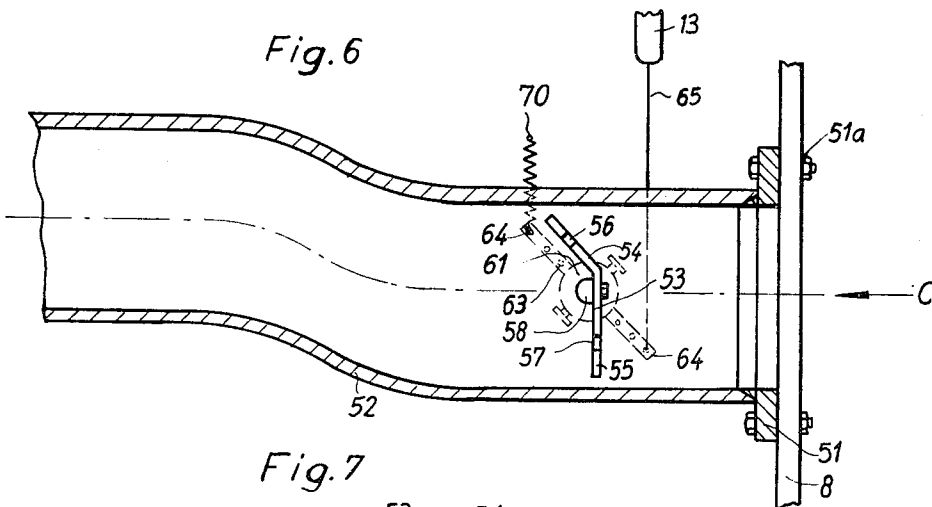
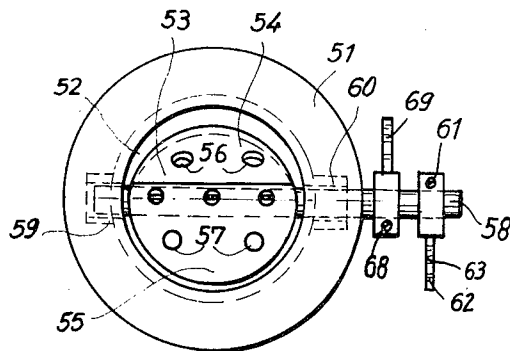


Fig. 7



METHOD AND APPARATUS FOR THE PRODUCTION OF TOBACCO RODS

This is a streamlined continuation of abandoned application Ser. No. 512,127, filed Dec. 7, 1965, which in turn was a continuation-in-part of my abandoned applications Ser. Nos. 100,690 and 100,699, filed Apr. 4, 1961.

The present invention relates to treatment of tobacco in general, and more particularly to a method and apparatus for the production of tobacco rods wherein each zone or section of the ultimate product is of uniform cross section and constant density.

It is already known to produce a tobacco rod of uniform cross section by subjecting a moving tobacco stream to the equalizing action of a trimming device which is adjustable transversely of the tobacco stream and to change the position of the trimming device in response to impulses transmitted by a measuring or testing device which is adjacent to the path of the tobacco stream and determines the quantity of tobacco per unit length of the equalized rod. However, proper adjustments of the trimming device necessitate the provision of complicated apparatus, especially when the trimming device comprises a series of revolving cutters and, furthermore, the equalizing action of a trimming device may be more accurate if it remains in a given position so as to remove a predetermined quantity of surplus tobacco from a moving tobacco stream.

Accordingly, it is an important object of my invention to provide an apparatus for the production of tobacco rods which is constructed and assembled in such a way that the tobacco rod will be of uniform cross section and of constant density even though the trimming device need not change its position with respect to the stream of tobacco which is being converted into a tobacco rod.

Another object of the invention is to provide an apparatus of the just outlined characteristics wherein the tobacco stream need not be subjected to any or is subjected to negligible mechanical compression such as could cause excessive comminution of tobacco in the stream.

A further object of my invention is to provide a novel method of controlling the density of a tobacco stream and of transforming the tobacco stream into a tobacco rod of constant density irrespective of the rate of feed, moisture content and/or thickness (cut) of particles which form the tobacco stream.

An additional object of the invention is to provide a method of the just outlined characteristics according to which the density of the tobacco rod remains constant even if the rate at which the particles of tobacco are being fed by a distributor fluctuates within a wide range and even if the position of the trimming device with respect to the moving tobacco stream remains unchanged. Cigarettes, cigarillos, cigars, rods of chewing or pipe tobacco and other tobacco containing products which are obtained by severing a tobacco rod of constant density and uniform cross section will have the same weight which is of utmost important in the manufacture of such products.

Briefly stated, one feature of my invention resides in the provision of a method of producing a tobacco stream of constant density. This method comprises the steps of forming a continuous tobacco filler stream and moving the thus formed stream lengthwise in an elongated path, pneumatically compressing the moving tobacco filler stream by an air current (preferably by a current of suction air) which passes transversely across the path and through the tobacco stream, measuring the pressure of the air current after the current has passed through the tobacco filler stream, comparing the measured pressure with a predetermined pressure, and adjusting the pressure of the air current whenever the measured pressure differs from the predetermined pressure.

The thus densified tobacco filler stream may be trimmed by removing surplus tobacco whereby the remainder of the stream forms a tobacco filler rod or rod stream of constant cross section which may be wrapped into cigarette paper, tobacco foil or tobacco leaves to form a wrapped cigarette rod or cigar rod.

The just outlined method may comprise the additional steps of measuring the quantity of tobacco per unit length of the stream, comparing the measured quantity with a preselected quantity, and changing the predetermined pressure when the measured quantity differs from the preselected quantity.

Alternatively, the method of my invention may comprise the steps of forming a tobacco filler stream and moving it lengthwise in an elongated path, pneumatically compressing the moving stream by a current of air which is conveyed across the path, measuring the quantity of tobacco per unit length of the stream, and comparing the measured quantity with a preselected quantity, and adjusting the pressure of the air current when the measured quantity differs from the preselected quantity. This method may further comprise the steps of measuring the pressure of the air current after the current has passed through the tobacco stream, comparing the measured pressure with a predetermined pressure, and adjusting the pressure of the air current when the measured pressure differs from the predetermined pressure.

It will be seen that the pressure of the air current may be regulated when the pressure of the air current which has passed through the tobacco filler stream deviates from a predetermined pressure and/or when the quantity of tobacco per unit length of the stream deviates from a preselected quantity. The thus densified tobacco filler stream is then trimmed to produce a tobacco filler rod or rod stream of uniform cross section, and the rod stream is wrapped to form a wrapped cigarette rod, cigar rod, cigarillo rod, pipe tobacco rod or chewing tobacco rod.

The novel features which are considered as characteristic of the invention are set forth in particular in the appended claims. The improved apparatus itself, however, both as to its construction and its mode of operation, together with additional features and advantages thereof, will be best understood upon perusal of the following detailed description of certain specific embodiments with reference to the accompanying drawings, in which:

FIG. 1 is a fragmentary side elevational view of a cigarette rod making apparatus, a portion of which is broken away and which embodies one form of my invention;

FIG. 2 is a schematic view of a pneumatic stabilizing unit which is utilized in the apparatus of FIG. 1 and a portion of which is broken away;

FIG. 3 is a schematic view of a modified pneumatic stabilizing unit which may be utilized in the apparatus of FIG. 1 and a portion of which is broken away;

FIG. 4 is a schematic view of a third pneumatic stabilizing unit and a portion of which is broken away;

FIG. 5 is a schematic view of a fourth pneumatic stabilizing unit and a portion of which is broken away;

FIG. 6 is a section through a suction conduit which accommodates a pressure regulating valve; and

FIG. 7 is an end elevational view of the suction conduit as seen from the right-hand side of FIG. 6.

Referring to the drawings in detail, FIG. 1 illustrates a portion of a cigar or cigarette rod making apparatus including a conveyor in the form of a suction disk 1 which is disposed in a vertical plane to rotate about the axis of a horizontal shaft 1a. This conveyor is provided on its circumference with a suction groove 2 having an air-permeable bottom wall 3 which is connected with radially inwardly extending partitions 4 defining between themselves a series of annularly arranged compartments 5 whose inner ends are bounded by a stationary ring 6 surrounding a fixed suction chamber 8. The partitions 4 rotate with the bottom wall 3 but the suction chamber 8 inclusive of the ring 6 is fixed to the frame of the cigarette rod making apparatus. The ring 6 is perforated to insure that suction prevailing in the chamber 8 is felt in the compartments 5 and in the circumferential groove 2. The chamber 8 communicates with the intake end of a suction pipe or conduit 9 which is connected to a suction generating device, for example, to a vacuum pump 9a.

The apparatus further comprises a second conveyor including an endless belt 19 which is trained around a reversing roller 19a in such a way that the left-hand end portion of its horizontal upper stringer abuts against the flanges 2a of the conveyor 1 and closes the open side of the suction groove 2 along an angle of about 30°. The roller 19a cooperates with a tensioning roll 19b to direct the lower stringer of the belt 19 toward a second reversing roller, not shown. The upper stringer of the belt 19 advances beneath the discharge end of a tobacco distributor 19c which showers shredded tobacco onto this upper run so that such tobacco forms a continuous filler stream T which contains tobacco in excess of that required in the wrapped tobacco filler rod. The belt 19 directs the stream T into the suction groove 2, and the left-hand end portion of its upper stringer may but need not subject the stream to some mechanical compression in addition to the compressive action of suction which prevails in the compartments 5. Once the tobacco stream T passes beyond the reversing roller 19a, it is retained by the current of air which flows across the path defined by the conveyor 1 and counteracts the centrifugal force. The air current also compacts or compresses the tobacco so that the tobacco stream has a predetermined density at the time it reaches a fixed trimming or equalizing device 10 which is located close to the uppermost point of the suction groove 2. In the illustrated embodiment, the trimming device 10 comprises a plurality of cooperating rotary cutters but its exact construction forms no part of this invention.

A blade-like scraper or bridge 20 which is located downstream of the trimming device 10 serves as a means for removing the equalized tobacco filler rod or rod stream Ta from the suction groove 2 and for directing the tobacco filler rod substantially tangentially of

the conveyor 1 onto the horizontal upper stringer of a forming belt 23. This belt is trained around a reversing roller 24 which is spaced from the scraper 20 to provide room for introduction of a web or tape 22 of cigarette paper or tobacco foil which passes over a roller 21. The latter is closely adjacent to the right-hand end of the scraper 20 and is spaced from the roller 24 so that the filler rod Ta moves on an unsupported portion of the web 22 prior to reaching the upper stringer of the belt 23. An endless steel band 25 which is trained around a pair of rollers 25a, 25b assists the scraper 20 in transferring the filler rod Ta onto the belt 23, and this band 25 extends from the uppermost point of the conveyor 1 toward and beyond the roller 24. The manner in which surplus tobacco removed by the trimming device 10 is returned to the distributor 19c or to the tobacco stream T forms no part of this invention. A portion of the wrapping mechanism is indicated schematically at 25c.

Referring to FIG. 2, the suction pipe 9 is provided with a nipple or inlet 11 whose open end may be sealed by a valve here shown as a plate-like flap 12 which is pivotally secured thereto by a hinge 12a. This flap is articulately connected with an adjusting or motion transmitting link 13 which is reciprocable by an adjusting device or servo motor 14. A second nipple 16 9 leads into a pressure gauge 15 which is connected with the adjusting device 14 by conductors 17 and 18. The gauge 15 serves to measure the pressure in the pipe 9 at a point intermediate the flap 12 and the suction chamber 8 and comprises means for sending control impulses to the adjusting device 14 which in turn comprises means for converting such impulses into reciprocatory movements of the adjusting link 13 so that the latter may adjust the angular position of the flap 12. The gauge 15 compares the pressure of the air current which has passed through the tobacco stream T with a predetermined optimum pressure and causes the link 13 to adjust the valve 12 when the measured pressure differs from the predetermined pressure.

The apparatus of FIGS. 1 and 2 operates as follows.

The distributor 19c showers tobacco onto the upper stringer of the belt 19 in such a way that the thus formed tobacco stream T contains tobacco in excess of that required in the wrapped tobacco filler rod. The stream T enters the fully enclosed channel between the leftmost portion of the belt 19 and the conveyor 1 and advances lengthwise with the bottom wall 3 toward the trimming device 10. While advancing in the groove 2, the stream T is held by an air current passing transversely through the stream and strong enough to compact the tobacco and to insure that the density of the pneumatically compressed stream T is at an optimum value at the time when the surplus of tobacco is removed therefrom whereby the stream T is transformed into a tobacco filler rod or rod stream Ta which travels toward the edge of the scraper 20. The density of the tobacco stream T at the trimming station is directly proportional to the pressure prevailing in the chamber 8 and compartments 5.

If the distributor 19c feeds tobacco at a constant rate, if the moisture content of the tobacco stream T is constant, and if the thickness of tobacco shreds is uniform, suction prevailing in the chamber 8 will remain constant because the stream T advancing from the lowermost point of the groove 2 toward the trimming device 10 will offer an unchanging resistance to the passage of

an air current through the bottom wall 3 and into the compartments 5. However, if one or more of the aforementioned factors should change (i.e., if the moisture content, the cut and/or the rate of feed of tobacco changes), the resistance which the stream T offers to the flow of air into the compartments 5 will change with a simultaneous change in suction prevailing in the chamber 8 and pipe 9. Thus, the stream T offers a greater or lesser resistance to the flow of an air current radially of the conveyor 1 as soon as the rate of feed, the moisture content and/or the thickness of tobacco shreds changes. Any changes in pressure prevailing in the pipe 9 are detected by the gauge 15 which sends an appropriate impulse to the link 13 of the device 14 to adjust the flap 12 and to thereby regulate the pressure in such a way that the density of the stream T at the trimming station corresponds to an optimum density such as is required in the tobacco filler rod Ta. Thus, the gauge 15 controls the adjusting device 14 to insure that suction prevailing in the chamber 8 remains constant even if the rate of feed, the moisture content and/or the cut of tobacco changes.

The optimum value of suction for a given rate of feed may be determined empirically and the gauge 15 is then adjusted in such a way that the pressure prevailing in the chamber 8 equals or approaches very closely such empirically selected predetermined pressure. If the pressure remains constant, the density of the tobacco stream at the trimming station is also constant so that the tobacco filler rod Ta leaving the trimming station is one of constant density and of uniform cross section.

When the suction prevailing in the chamber 8 is excessive, i.e., when the tobacco stream T is subjected to excessive pneumatic compression, the gauge 15 sends a signal to the adjusting device 14 which shifts the link 13 in a sense to admit more air into the pipe 9 and to thereby insure that the pressure prevailing in the chamber 8 will rise with a corresponding drop in density of the tobacco stream. If the suction prevailing in the chamber 8 is insufficient so that the tobacco stream T is not compressed to the extent necessary to form a satisfactory tobacco filler rod, the gauge 15 sends an impulse which causes the adjusting device 14 to move the link 13 downwardly, as viewed in FIG. 2, and to reduce the flow of air into the nipple 11 whereby the pump 9a draws more air from the chamber 8 and the pressure in the compartments 5 drops to bring about greater compression of the tobacco stream. The speed at which the adjusting device 14 receives impulses in response to changes in suction prevailing in the pipe 9 depends on the construction of the gauge 15. As a rule, the gauge need not react immediately because, in normal operation, the factors which affect the flow of an air current transversely across the tobacco stream T will change only gradually. It is not expected that the feed of tobacco particles from the distributor 19c will change very rapidly, that the moisture content of the tobacco stream will change without any gradual transition, and/or that the operator will suddenly fill the distributor with a supply of tobacco whose cut is substantially different from the cut of tobacco that has been fed in the preceding operation.

The tobacco filler rod Ta produced in the apparatus of my invention is one of uniform cross section and of constant density, and this is achieved by subjecting the tobacco stream to a constant pressure differential

across the suction groove 2 and by thereupon subjecting the thus compacted or densified stream to the equalizing action of the trimming device 10. Such constant pressure differential is maintained by the stabilizing unit which includes the gauge 15, the adjusting device 14, the link 13 and the flap 12.

If the apparatus utilizes a slowly reacting stabilizing unit, such unit preferably reacts to changes in tobacco feed and/or to changes in moisture content. A rapidly reacting stabilizing unit will also respond to rapid changes in the cut of tobacco particles. Regardless of whether the apparatus utilizes a rapidly or slowly reacting stabilizing unit, the weight of cigarettes will vary very little if the negative pressure remains constant.

Pressure gauges which may be utilized in the apparatus of FIGS. 1 and 2 are manufactured by Kiesbach u. Peter, of Berlin-Britz, Germany.

FIG. 3 illustrates a portion of a slightly modified cigarette rod machine wherein the pressure prevailing in the suction pipe 9 is measured by an adjustable pressure gauge 15'. This gauge 15' comprises a casing 40 which accommodates a bellows 41. The lower end of the bellows 41 is connected to the lower end of a push rod 42 which extends upwardly through the bellows and with clearance through the top wall 40a of the casing 40. This push rod 42 is biased by a helical balancing spring 43 which bears against the top wall 40a and against a regulating nut 44 meshing with a sleeve 45 threadedly connected with the rod 42. The bias of the spring 43 may be adjusted by rotating the nut 44. The upper end portion of the bellows 41 is fixed to the top wall 40a and the interior of this bellows communicates with the atmosphere. The nut 44 is connected with a gear 49 which mates with a second gear 50 secured to the output shaft 51 of a transmission 52a which is driven by a reversible electric motor 52. The rod 42 extends upwardly through and beyond the sleeve 45 to abut against the underside of a spring-biased switching lever 46 one end of which is secured to a housing 40b mounted on the casing 40. When the pressure prevailing in the pipe 9 is such that the tobacco stream T is subjected to optimum compression, the right-hand end portion of the lever 46 is located between a pair of fixed contacts 47, 48 so that the adjusting device 14 is idle and the link 13 maintains the flap 12 in a given position which determines the pressure momentarily prevailing in the pipe 9. The contacts 47, 48 are respectively connected with conductors 18, 17. The sleeve 45 is movable axially but cannot rotate with reference to the housing 40b.

The motor 52 receives impulses from a control device or servo 32 which is connected thereto by conductors 33, 34. A conductor 31 connects the control device 32 with a testing device 30 (see FIG. 1) which is adjacent to the elongated path for the tobacco stream T which travels with the upper stringer of the belt 19. The device 30 measures with beta rays or in another suitable way one or more factors which can affect the pressure prevailing in the compartments 5 and chamber 8. The device 30 is assumed to measure the quantity of tobacco per unit length of the tobacco stream T, but it is equally within the scope of my invention to use a measuring device which measures the cross section of the stream (i.e., the unit quantity) and the moisture content. Such measuring devices are well known in the art.

The pressure gauge 15' is adjusted in such a way that the switching lever 46 is disengaged from the contacts 47, 48 when the negative pressure prevailing in the chamber 8 is sufficient to compress the tobacco stream T in the groove 2 to a requisite optimum density. Such adjustment is effected by moving the nut 44 to a selected axial position with respect to the sleeve 45 to regulate the bias of the spring 43 which tends to contract the bellows 41. When the pressure in the pipe 9 drops, the bellows 41 expands because its interior is maintained at atmospheric pressure and because the pressure in the casing 40 is the same as in the suction chamber 8 whereby the bellows causes the rod 42 to move downwardly, as viewed in FIG. 3, so that the lever 46 moves into abutment with the contact 47 to complete the circuit of the adjusting device 14 which then shifts the link 13 in a sense to admit more air through the nipple 11 whereby the pressure in the chamber 8 rises with attendant reduction in the compressive action of the air current which flows into the compartments 5. On the other hand, when the pressure in the pipe 9 rises, the bellows 41 contracts and the rod 42 moves the lever 46 into abutment with the contact 48 so that the adjusting device 14 moves the link 13 downwardly and reduces the flow of air into the nipple 11.

The gauge 15' is adjustable by the control device 32 which may cause the motor 52 to drive the shaft 51 in a clockwise or in a counterclockwise direction and to thereby change the bias of the balancing spring 43. The motor 52 is operated in accordance with the signals transmitted by the testing device 30. Thus, the stabilizing unit of FIG. 3 will regulate the pressure in the pipe 9 when such pressure deviates from a predetermined pressure (such deviation is detected by the bellows 41) and/or when the measurement carried out by the testing device 30 indicates that an adjustment in the predetermined optimum pressure is necessary. The axial position of the nut 44 is indicative of the predetermined pressure and the gauge 15' compares the pressure in the pipe 9 with such predetermined pressure. Thus, the gauge 15' serves as a means for determining the presence or absence of differences between the suction which actually prevails in the pipe 9 and a predetermined optimum value of suction and for thereupon adjusting the suction to correspond to such predetermined suction. The gauge 15' is adjusted (by the motor 52) to remain inactive when the negative pressure prevailing in the pipe 9 is satisfactory to produce a tobacco stream of requisite density, but this gauge will automatically change the pressure as soon as the pressure is too weak or too strong. The device 32 controls the gauge 15' so that the latter is adjusted to compare actual suction with a new optimum value of suction which is determined by the testing device 30. Thus, the testing device 30 selects the optimum suction and calibrates the gauge 15' which latter then insures that the suction actually prevailing in the pipe 9 and chamber 8 corresponds to such optimum suction.

The testing device 30 may be located at any point along the path in which the tobacco stream travels, i.e., at any selected point between the distributor 19c and the discharge end of the apparatus. This testing device may test the tobacco stream T, the filler rod Ta, the wrapped rod which emerges from the wrapping mechanism 25c, or the sections which are obtained upon severing of the wrapped rod.

FIG. 4 illustrates a different stabilizing unit wherein an adjusting device 14' can receive impulses directly from a control device 32', i.e., from a testing device 30'. The gauge 15 or 15' is omitted so that pressure in the suction pipe 9' is regulated solely in response to measurements carried out by the testing device 30' which is adjacent to the path of the tobacco stream T and serves to measure the quantity of tobacco per unit length of this stream. When the quantity changes, the control device 32' causes the device 14' to adjust the position of the flap 12 so that the suction in the pipe 9' is changed accordingly. The stabilizing unit of FIG. 4 compares the quantity of tobacco in the stream T with a predetermined quantity and increases the suction if the quantity of tobacco increases or reduces the suction if the quantity of tobacco in the stream T is reduced. Thus, suction prevailing in the pipe 9' and in the chamber 8 is proportional with the quantity of tobacco delivered per unit of time by the distributor 19c to insure that the density of the tobacco stream at the trimming station is between allowable limits and that the tobacco filler rod formed by tobacco which remains in the groove 2 will be of constant density and uniform cross section.

While the testing device 30' may be located at any point along the path of tobacco from the distributor 19c to and beyond the wrapping mechanism 25c, it is often preferred to place this testing device along the belt 19 or along the conveyor 1 upstream of the trimming device 10 because the suction then changes in good time to insure that the tobacco stream reaching the trimming station is compressed to requisite density. If the testing device is located past the trimming station, a given length of the filler rod will have to be discarded because its density does not correspond to a desired optimum density.

The stabilizing unit of FIG. 5 is similar to that which is shown in FIG. 3 with the exception that the testing device 30' which measures the quantity of tobacco in the stream which advances with the upper stringer of the belt 19 is operatively connected with an adjusting device 14'' and that the adjusting device 14'' is also controlled by the pressure gauge 15. Thus, instead of controlling the position of the flap 12 solely through the intermediary of the gauge 15, the control device 32' can transmit impulses directly to the adjusting device 14'' and to the flap 12 via link 13. This stabilizing unit will adjust suction in the pipe 9 by comparing actual pressure in this pipe with a predetermined optimum pressure (gauge 15) and/or by comparing the quantity of tobacco per unit length of the stream T with a preselected quantity (testing device 30').

Referring finally to FIGS. 6 and 7, there is shown a modified suction pipe 52 which accommodates a different valve in the form of a V-shaped flap 53. A flange 51 at the intake end of the pipe 52 is connected to the suction chamber 8 by means of bolts 51a. The flap 53 comprises two legs 54, 55 which are respectively provided with pairs of apertures 56, 57. A shaft 58 which is fixed to or in the proximity of the apex of the flap 53 extends diametrically across the interior of the pipe 52 and is rotatable in two bearings 59, 60 which are integral with or connected to the pipe. One end of the shaft 58 extends from the pipe 52 and carries two fixedly attached collars 61, 68. The collar 61 is rigid with a lever 62 which is formed with a series of apertures 63 one of which receives a clamping bolt 64 fixed to one end of

a control cable 65. The other end of this cable is attached to the adjusting link 13 of FIG. 2, 3, 4, or 5. The collar 68 is provided with a lever 69 which is biased by a return spring 70, and this spring tends to bias the flap 53 in a clockwise direction, as viewed in FIG. 6. When the link 13 moves upwardly, the cable 65 turns the flap 53 in a counterclockwise direction and permits more air to flow from the suction chamber 8. Thus, the flap 53 replaces the flap 12 and the nipple 11.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can, by applying current knowledge, readily adapt it for various applications without omitting features which fairly constitute essential characteristics of the generic and specific aspects of my contribution to the art.

What is claimed as new and desired to be protected by Letters Patent is:

1. In an apparatus for producing a cigarette rod of constant density including conveying means adapted to form a tobacco filler stream and to advance the filler stream in an elongated path, means for equalizing the filler stream to form a rod stream, said equalizing means including a detector located adjacent to the filler stream for measuring the quantity of tobacco therein and for producing a signal varying therewith, suction means arranged to produce a current of air traversing the filler stream in a portion of said path to densify the filler stream against said conveying means, means for detecting the pressure in a portion of said suction means, adjustable vent means for varying the pressure in said suction means, and means connecting said pressure detecting means with said vent means to obtain and maintain such a pressure in said suction means that the density of tobacco in the filler stream is maintained between allowable limits, said connecting means having adjustable means responsive to said signal for determining the value of said pressure.

2. In an apparatus for producing a tobacco rod of substantially constant density including conveying means adapted to form a tobacco filler stream containing tobacco in excess of that required in the rod and to advance the filler stream in an elongated path, means for equalizing the filler stream by removing said excess to form a rod stream, detector means adjacent to the filler stream for measuring the quantity of tobacco therein and for producing a signal varying therewith, suction means arranged to produce a current of air traversing the filler stream in a portion of said path to densify the filler stream against said conveying means, adjustable means for varying the pressure in said suction means, and means responsive to said signal to adjust said adjustable means so that the density of tobacco in the filler stream is maintained at a constant level.

3. In an apparatus as defined in claim 2, wherein said adjustable means comprises vent means having a member movable between a plurality of positions in each of which said member establishes a different pressure in said suction means.

4. In an apparatus for producing a tobacco rod stream of substantially constant density, conveying means adapted to form a tobacco filler stream containing tobacco in excess of that required in the rod stream and to advance the filler stream in an elongated path; means for subjecting the moving filler stream to the densifying action of an air current passing transversely across said path and through the filler stream, comprising a suction chamber adjacent to one side of said path,

a suction generator, and a conduit connecting said suction generator with said chamber; adjustable pressure regulating means for varying the densifying action of the air current, comprising a valve arranged to control the flow of air through said conduit between said chamber and said suction generator; testing means for measuring the quantity of tobacco per unit length of the moving filler stream and for comparing the measured quantity with a preselected quantity; adjusting means for adjusting said pressure regulating means when the measured quantity differs from said preselected quantity so that the densifying action of the air current remains constant; trimming means for removing said excess from the filler stream so that the thus trimmed filler stream forms a rod stream; gauge means for measuring the pressure of the air current after the current has passed through the filler stream and for comparing the measured pressure with a predetermined pressure, said gauge means being connected with said conduit between said valve and said chamber; and an operative connection between said gauge means and said adjusting means for effecting adjustment of said pressure regulating means when the measured pressure differs from said predetermined pressure.

5. A method of producing a tobacco rod stream of constant density, comprising the steps of forming a tobacco filler stream which contains tobacco in excess of that required in the rod stream and moving the thus formed filler stream in an elongated path; pneumatically compressing the filler stream by a current of air passing transversely through the moving filler stream to densify the filler stream; measuring the quantity of tobacco in the filler stream for determining the presence and absence of differences between the measured quantity and a preselected quantity; adjusting the pressure of the air current when the measured quantity differs from said preselected quantity to maintain the density of tobacco in the filler stream at a constant level; and trimming the filler stream by removing therefrom said excess of tobacco so that the thus trimmed filler stream forms a rod stream.

6. A method as defined in claim 5, wherein said trimming step is performed upon such portions of the tobacco filler stream which are traversed by said current of air.

7. A method as defined in claim 5, further comprising the steps of measuring the pressure of air current after the current has passed through the tobacco filler stream, determining the presence and absence of differences between the measured pressure and a predetermined pressure, and adjusting the pressure of the air current when the measured pressure differs from said predetermined pressure.

8. A method as defined in claim 5, wherein said step of pneumatically compressing the filler stream comprises conveying said current of air by suction across the path of the tobacco filler stream.

9. In an apparatus for producing a tobacco rod stream of constant density, conveying means adapted to form a tobacco filler stream containing tobacco in excess of that required in the rod stream and to advance the filler stream in an elongated path; means for subjecting the moving filler stream to the densifying action of an air current passing transversely across said path and through the filler stream; adjustable pressure regulating means for varying the densifying action of the air current; testing means for measuring the quan-

tity of tobacco per unit length of the moving filler stream and for determining the presence and absence of differences between the measured quantity and a preselected quantity; adjusting means for adjusting said pressure regulating means when the measured quantity differs from said preselected quantity so that the density of tobacco in the filler stream is maintained at a constant level; and trimming means for removing said excess from the filler stream so that the thus trimmed filler stream forms a rod stream.

10. In an apparatus as defined in claim 9, gauge means for measuring the pressure of the air current after the current has passed through the tobacco filler stream and for determining the presence and absence of differences between the measured pressure and a predetermined pressure, and an operative connection between said gauge means and said adjusting means for effecting adjustment of said pressure regulating means when the measured pressure differs from said predeter-

mined pressure.

11. A machine, such as that used in the manufacture of cigarettes, using compressible material to form a product, comprising a conveyor for said material, a trimmer for the material on said conveyor, feed means spaced from said trimmer along said conveyor for feeding an amount of said material to said conveyor in excess of that required for said product, adjustable means intermediate said trimmer and said feed means for varying the density of the material conveyed to said trimmer, said trimmer being adapted to separate said material into a first portion of predetermined cross-section and a second excess portion, means for utilizing said separated first portion to form said product, means for detecting the quantity of said material in said first portion, and means for controlling said adjustable means in accordance with the quantity of material detected to maintain said quantity constant.

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