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TOBACCO ROD FORMING DEVICE

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2 Sheets-Sheet 1

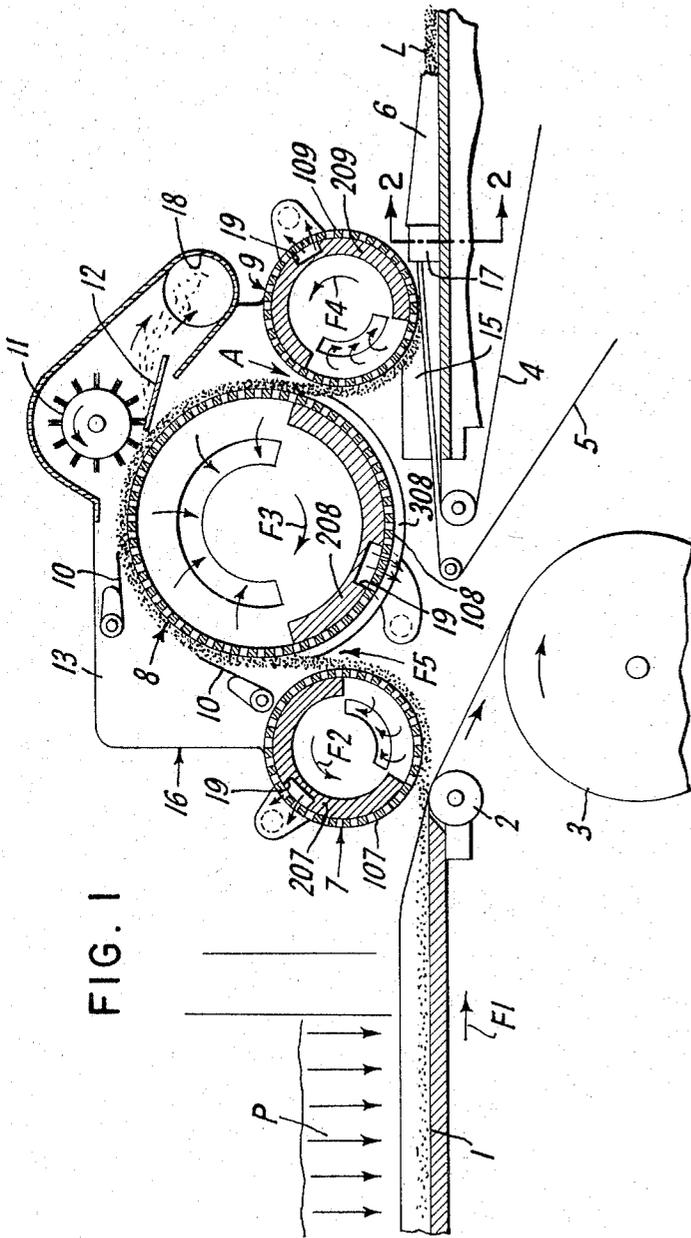


FIG. 1

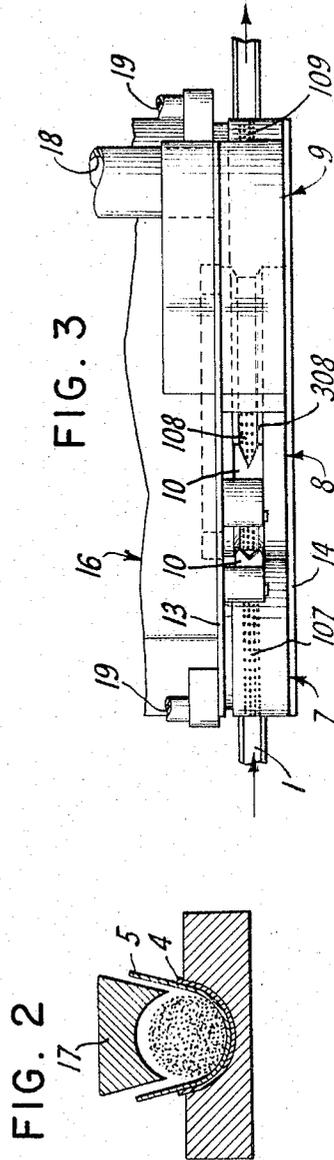


FIG. 2

FIG. 3

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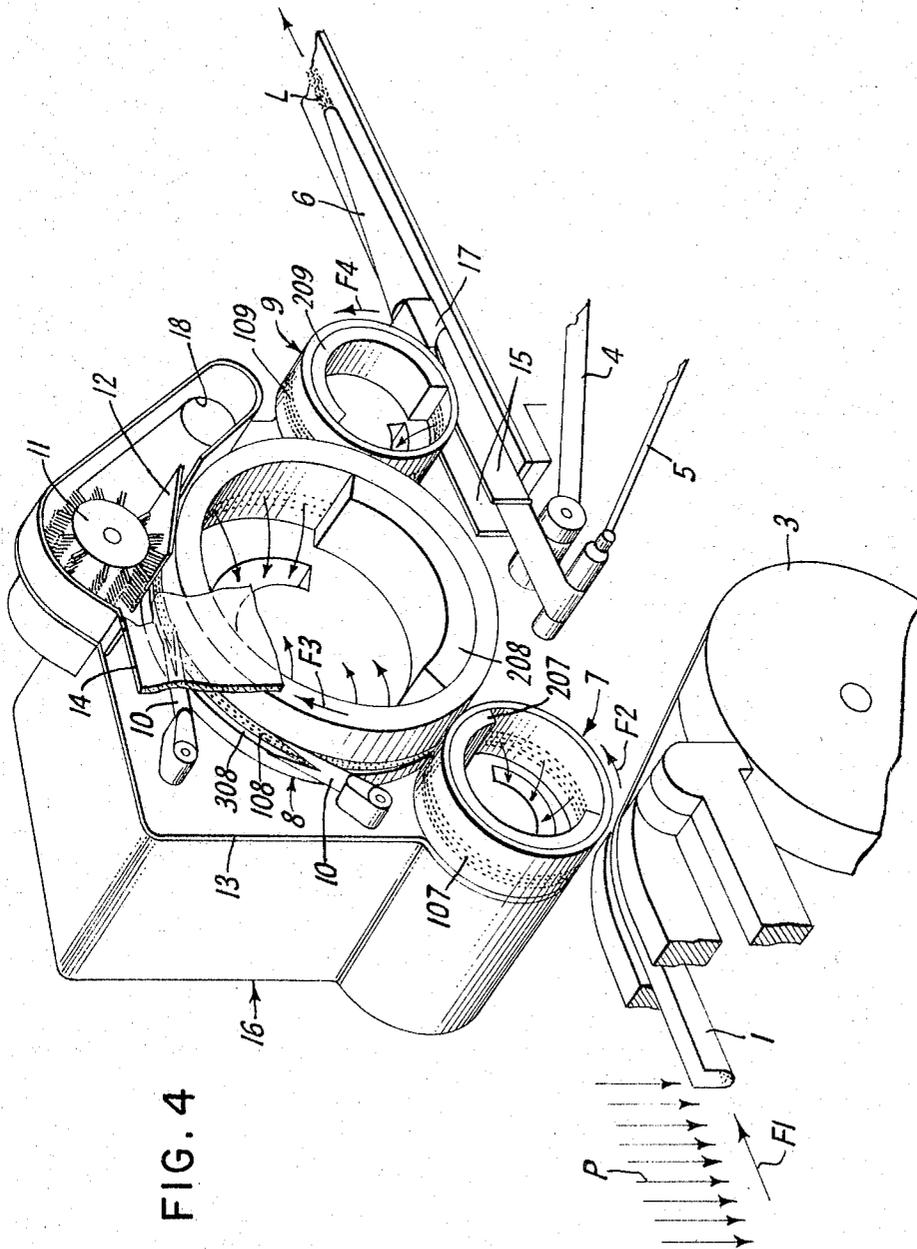


FIG. 4

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3,297,040

TOBACCO ROD FORMING DEVICE

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3 Claims. (Cl. 131-84)

This invention is an improved machine for manufacturing cigarettes and more specifically for producing a more uniform and properly packed tobacco cord immediately prior to the formation of a cigarette rod.

This is achieved, in part, by directing a tobacco cord, using a combination of centrifugal force and air pressure, tangentially onto a suction wheel or drum, to impart motion in a direction which tends to compress the tobacco peripherally as it is received in an annular recess of the drum. Suction, then acting radially toward the center of the wheel or drum, tends to compress the cross section of the tobacco cord. These coacting forces tend to minimize the possibility of the presence of interstices, or voids, in the tobacco cord and thus in the ultimate cigarettes. The cord, while on the suction or compressing wheel or drum, is then subjected to successive levelling operations, performed by spaced spring blade compressors disposed tangentially thereof which further tend to promote production of the desired uniform cord density and cross section free of interstices or voids. The tobacco cord, while on the compressing drum, also passes under a levelling wheel, coacting with a knife blade which trims the cord while subject to suction. Immediately thereafter the compressed and trimmed stream of tobacco of uniform section is directed to cigarette forming means.

An object of the invention is to provide means for forming, stuffing, and straightening a tobacco cord from a conveyor band, which collects tobacco showered thereon and which transfers the cord to a conveyor which forms a part of the line of the cigarette rod former means for the formation of the continuous cigarette wrapped tobacco rod.

Another object of the invention is to eliminate the discontinuity produced by a bridge which is conventionally positioned between the end of the conveyor band or belt on which the showered tobacco is collected, and the beginning of a paper strip, in which the tobacco is wrapped to form the rod, or cord, by depositing or transferring the tobacco cord directly onto the paper strip.

Another object of the invention is to provide a device for making a tobacco cord having an adequate consistency, a uniform density and a well defined cross section.

To accomplish the foregoing, in accordance with the present invention, a group of three suction wheels or drums are employed by means of which the tobacco cord is received from the conveyor band which collects the tobacco as it is showered thereon and deposits it directly on the paper strip for the formation of the rod. Of the group of the three suction wheels or drums, the first changes the direction of flow of tobacco from the band, or belt, which receives the shower and transfers it to the second wheel. The second wheel or drum constitutes the tobacco pressing member. As mentioned, it coacts with suitable means for forming and straightening a uniform tobacco cord. In passage from the first suction wheel or drum to the second suction wheel or drum, the tobacco receives a tangential impetus which, with the suction, tangential spring compressing blades and trimming mechanism tend to pack it firmly and evenly in an annular groove, recess or concavity in the periphery of the second wheel. The second suction wheel or drum delivers the formed tobacco cord onto the third suction wheel or

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drum, the primary function of which is to properly direct the cord onto the paper strip of the second conveyor immediately prior to introduction into a semi-tubular conical tongue which forms part of the line means to form a wrapped tobacco cord.

The tobacco pressing, or second, suction wheel of the three suction wheels may be constructed in any suitable manner. Preferably, however, it corresponds at least in part, to subject matter in accordance with my U.S. Patent 3,173,424 which was granted March 16, 1965, by operatively cooperating with one or more elastic blades, substantially tangential to said wheel. Each of said blades is preferably forked at its respective free end. The second wheel also is provided with at least one smoothing and straightening roller which exerts a levelling action on the tobacco cord, thus eliminating its irregularities, such as elevations or crests, and imparting to it a well defined section.

These and other objects of the invention and the advantages deriving therefrom will be evident from the following description and illustrated by way of non-limitative example in the annexed drawings, in which:

FIG. 1 is a vertical section diagrammatically illustrating a device made in accordance with the present invention.

FIG. 2 is an enlarged sectional view taken on line 2-2 of FIG. 1.

FIG. 3 is a plan view of the three successive suction wheels of the device of FIG. 1.

FIG. 4 is a perspective view of the device of FIGS. 1 to 3.

With reference to the drawings, a linear conveyor or conveyor band 1, which collects a rain or shower of cut tobacco P in a cigarette-making machine, slides or moves with uniform motion in the direction of an arrow F1 and returns by means of supporting rolls 2 and a return pulley 3. The upper horizontal section of band 1 is bent or formed transversely into a U shape, and form a short inclined section between a supporting roll 2 and a return pulley 3, from the end of the collecting conveyor band 1, approximately on the same plane as its upper horizontal section and substantially axially aligned therewith, there is provided line means L for forming a continuous cigarette rod or cord. Line means L has a linear conveyor or conveyor band 4 which supports and moves a paper strip 5 and, at the beginning thereof or of band 4, there is provided a tongue or former 6 of semi-tubular conical form, to wind, form or wrap the paper strip 5 around a formed tobacco cord.

The tobacco deposited on the collecting conveyor band 1 is removed therefrom and deposited directly on the paper strip 5, on band 4 of the line means L by means of a group of three successive suction wheels, or drums, 7, 8 and 9. Generally, each of the drums is provided with an annular cavity near its periphery, and a shoe disposed in the cavity. Each such cavity is continuously under suction except over those portions covered by the associated shoe, as is well understood in the art. The middle wheel 8 provides a tobacco-pressing suction wheel and has a substantially greater diameter than either of the other two wheels 7 and 9.

The first suction wheel 7 is disposed at the end of the collecting band 1, substantially tangential to the plane of the upper horizontal section thereof. Wheel 7 has a rotatable peripheral rim or shell 107, permeable to air by means, preferably by perforations. The rim 107 is arranged so its lower part is slightly spaced or disposed a short distance from the underlying collector band 1 in the proximity of supporting roll 2. Wheel 7 rotates counterclockwise (FIG. 1) so the lower part of rim 107 moves in the same direction as the upper horizontal section of the collector band 1. The direction of rotation

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is indicated by arrow F2 (FIG. 1). The annular cavity of wheel 7 is maintained under vacuum, so that a suction is exerted from the interior of the drum through the holes of rim 107 to the outside surface thereof. This surface suction is limited, however, by means of an inner fixed shoe, or shutter 207, to a sector of the wheel 7, which extends in the direction of rotation F2, from the point at which wheel 7 operatively cooperates with or is adjacent the collector band 1, approximately to the point at which the wheel 7 operatively cooperates with or is adjacent the second or tobacco-pressing suction wheel 8.

The tobacco-pressing suction wheel 8 is slightly spaced or disposed a short distance from the first suction wheel 7 to receive tobacco approximately tangentially, from wheel 7, and preferably rotates clockwise (FIG. 1) or in the opposite direction from wheel 7, as indicated by arrow F3. This tobacco-pressing suction wheel may be of any suitable construction or in accordance with my aforementioned U.S. patent to which reference may be made for further details. Wheel 8 has a peripheral or annular groove, recess or concavity 308 with a bottom wall portion 108 which is foraminous or is permeable to air by any suitable means, such as perforations. A vacuum is maintained in the annular cavity of wheel 8 to provide suction from the interior of the wheel through the air permeable bottom 108 of the peripheral groove 308. This surface suction is limited, however, by means of a fixed internal shoe or shutter 208, to a sector which extends, in the direction of rotation F3 (FIG. 1) of the tobacco-pressing suction wheel 8, from a point adjacent the first suction wheel 7 to a point adjacent the next suction wheel 9.

At its intake (suction) sector or the area provided with surface suction, the tobacco-pressing wheel 8 cooperates with two generally flat, spring compressor or smoothing blades 10, registrable with and substantially tangential to wheel 8. The blades 10 are forked at their free ends, with a notch preferably progressively widening forward, for example, V-shaped, as better described in my aforesaid patent. After passing the blades 10, the tobacco-pressing wheel 8 cooperates with a straightening wheel 11, coupled with a blade 12 which coact to trim or remove any excessive tobacco.

The third suction wheel 9 is slightly spaced or disposed a short distance from the descending side (FIG. 1) of tobacco-pressing suction wheel 8, opposite from wheel 7, in a position as to receive the tobacco, preferably, tangentially. Wheel 9 rotates in a direction (FIG. 1) F4 opposed to that of tobacco-pressing wheel 8 and, therefore, the same as that of the first suction wheel 7. Suction wheel 9 is aligned with the rod forming line means L above the paper strip 5. At this point, forming of strips and supporting band 4 each for transverse U-shape has commenced. A scraper and tobacco shaping means 17 is provided substantially tangential to wheel 9, the lower part of which moves in the same direction as the underlying paper strip 5, and forwardly (to the left in FIG. 1) of tongue or forming means 6, suction wheel 9, constructed substantially like wheel 7, is provided with a rotating air permeable peripheral rim 109, and, preferably is of smaller axial width or thickness than wheel 7. A fixed inner shoe or shutter 209 abuts and closes part of rim 109, which is rotating, thus limiting suction at the surface of wheel 9 to a sector which extends, in the direction of rotation as indicated by arrow F4 (FIG. 1), of said wheel from a point adjacent the tobacco-pressing suction wheel 8 to a point above the line means L.

The tobacco-pressing wheel 8 and the operatively associated suction wheels 7 and 9 are, in part, enclosed between two spaced parallel walls 13 and 14, of which the rear wall 13 is formed by the wall of a box 16 which contains the support and drive means (not shown) for the three wheels, while the front wall 14 is preferably of a transparent material. Under the last suction wheel 9 and in advance of the same, with reference to the running

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direction of strip 5, there are provided two elongated rectangular elements 15, which delimit the lateral movement of the paper strip 5 and supporting band 4, and are connected to the walls 13 and 14 and abut the rotating rim 109 of wheel 9.

The operation of the above described device is as follows:

The upper horizontal section of the collecting band 1 conveys tobacco, from a shower, to its end. The cut tobacco is transferred from band 1 to the rotating rim 107 of wheel 7, and is retained thereon by the suction action exerted through said rim 107. The first suction wheel 7, therefore, has the function of diverting the flow of tobacco from the rectilinear direction, on band 1, and at the same time removing it from said band.

At the output end of the suction sector of wheel 7, or where the perforations or other flow path means through the rotating rim 107 thereof are closed by the fixed shoe or shutter 207, the cut tobacco is hurled or transferred from wheel 7 by centrifugal force in a substantially tangential direction to the succeeding, tobacco-pressing suction wheel 8, lodging in the peripheral groove, recess or concavity 308 thereof and maintained therein by surface suction exerted through the air permeable bottom 108 of recess 308.

The peripheral speed of the first suction wheel 7 is preferably, appreciably greater than that of the next or tobacco-pressing suction wheel 8. Thus in addition to centrifugal force, the air stream produced by the rotating wheels 7 and 8 in the space therebetween and confined between walls 13 and 14 is in such a direction as to deflect and compress tobacco, hurled or released by wheel 7, against the first tangential spring blade 10. For these two reasons, the tobacco cord which forms in the recess or concavity 308 of wheel 8 undergoes a packing or stuffing action resulting from compression by blade 10 and forces acting in the circumferential direction of rotation of wheel 8 causing transfer of tobacco from one wheel to the other. At the same time, the cord also is subject to a packing or stuffing action in a radial direction that is perpendicular to the tobacco cord and inwardly on wheel 8, due to the centrifugal force and suction through the bottom wall 108 of recess 308.

The first spring blade 10 exercises a gentle mechanical pressure on the tobacco cord in the peripheral recess or concavity 308 of wheel 8 as it passes thereunder, thus, completing the initial packing or stuffing of said cord into recess 108 to derive a substantially uniform density. Although the tobacco cord after passing the first blade 10 is of substantially uniform density, its section is not well defined because of the presence of elevations or crests. The second spring blade 10, therefore, is provided to act on the tobacco as it passes thereunder and further compress the cord toward the desired uniform density and cross section in recess 308 and particularly along the margins thereof. Such action of the second blade 10, however, does not interfere with the uniform forward motion of the cord.

Finally, the straightening wheel 11 and the blade 12 cooperate to smooth the shreds of tobacco projecting from the cord, and the various elevations or crests thereof, as is required, and to remove excess tobacco which may be present outside the peripheral recess or concavity 308 of the tobacco-pressing suction wheel 8, thus, providing a cord of well defined section which is ideally conditioned for passage through the rod former line means L. The removed cut tobacco is drawn into the input 18 of a duct which communicates with a hopper, not shown, of the machine.

At point A, FIG. 1, the suction sector of the tobacco-pressing wheel 8 terminates and the suction sector of the next wheel 9 begins. The peripheral speeds of the two suction wheels 8 and 9 are exactly the same. Therefore, the tobacco cord formed in the peripheral recess or concavity 308 of the tobacco-pressing wheel 8 is trans-

ferred smoothly in a uniform stream from the latter to the peripheral rim 109 of the suction wheel 9 without interruption, thickening or other deformation thereof which might be caused by any difference in speed between wheels 8 and 9. The tobacco cord is likewise held on wheel 9 by suction exerted through the perforated rim 109 thereof.

At the output of the suction sector of wheel 9, the tobacco cord is deposited directly, by the wheel, onto the paper strip 5 in which it is to be enveloped. The last suction wheel 9 is immediately followed by the scraper and shaper means 17 of the rod forming line means L, so that the tobacco cord is pressed into uniform section and inserted in the tongue or former 6 under the influence of the action of the wheel 9 and movement of paper strip 5.

The peripheral apertures of wheels 7, 8, 9 are kept clean and free from any shreds of cut tobacco by jets of air, supplied through ducts 19 from a source, not shown, to an exhaust cavity disposed in each of the shoes or shutters 207, 208, and 209. The jet air emerges from the interior of each cavity through each of the peripheral apertures, in the respective or associated rotating rim, as they pass and communicate the cavity to carry away or remove tobacco particles lodged in the apertures.

The invention is not limited to the embodiment described and illustrated herein, but may be varied and modified structurally, and may be applied to various cigarette-making machines, without departing from the principle as set forth above and claimed in the following.

What is claimed is:

1. In a cigarette making machine having a first linear conveyor on which shredded tobacco in excess of that required for a uniform rod is showered forming a filler stream, a second linear conveyor spaced from the first conveyor and adapted to advance a rod stream to means for forming individual cigarettes, and pneumatic means between said conveyors for transporting and converting the filler stream into a rod stream, the improvement wherein said pneumatic means comprises a plurality of rotating suction wheels each formed with a peripheral groove having a foraminous bottom and means for communicating with a source of suction, and an arcuate shoe member associated with said groove for blocking the flow of air through a portion of the periphery of said groove so as to permit only a portion of each wheel to be placed under suction, said wheels serially spanning the space between said linear conveyors, the shoe in each conveyor being so located and the direction of rotation of each wheel being such that tobacco is trans-

ferred from the first linear conveyor to the first of said wheels at the initial suction boundary of that portion of the groove which is adapted to be placed under suction, and transported thereon to the terminal suction boundary of the same adjacent to the initial suction boundary in a second wheel whereby tobacco is transferred from the groove in the first wheel to that in the second wheel under the influence of centrifugal force and suction from the second wheel and a third wheel between the second wheel and the second linear conveyor adapted to receive and transfer tobacco therebetween under the influence of centrifugal force of the second wheel and suction from the third wheel, the suction in the periphery said third wheel terminating adjacent the rod conveyor, and means adjacent to the groove in the second wheel for removing excess tobacco therefrom thereby forming a uniform rod stream.

2. The cigarette making machine in accordance with claim 1 wherein, the second wheel is spaced between the first and third wheels and rotates at a peripheral speed less than that of the first wheel and equal to that of the third wheel to transfer tobacco tangentially from the suction portion of the first wheel to that of the second wheel to create an air flow in the space between the first and second wheels and in the direction of transfer of tobacco between said first and second wheels.

3. A cigarette machine according to claim 1 wherein said second suction wheel is rotated in a direction counter to the rotation of the first and third suction wheels so that the tobacco is transferred from said first to said second wheels and from said second to said third wheels in a direction tangential to the periphery of each of said wheels.

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