May 7, 1963 F. A. M. LABBÉ 3,088,468

TOBACCO MANIPULATING MACHINERY

Filed Jan. 20, 1959 4 Sheets-Sheet 1

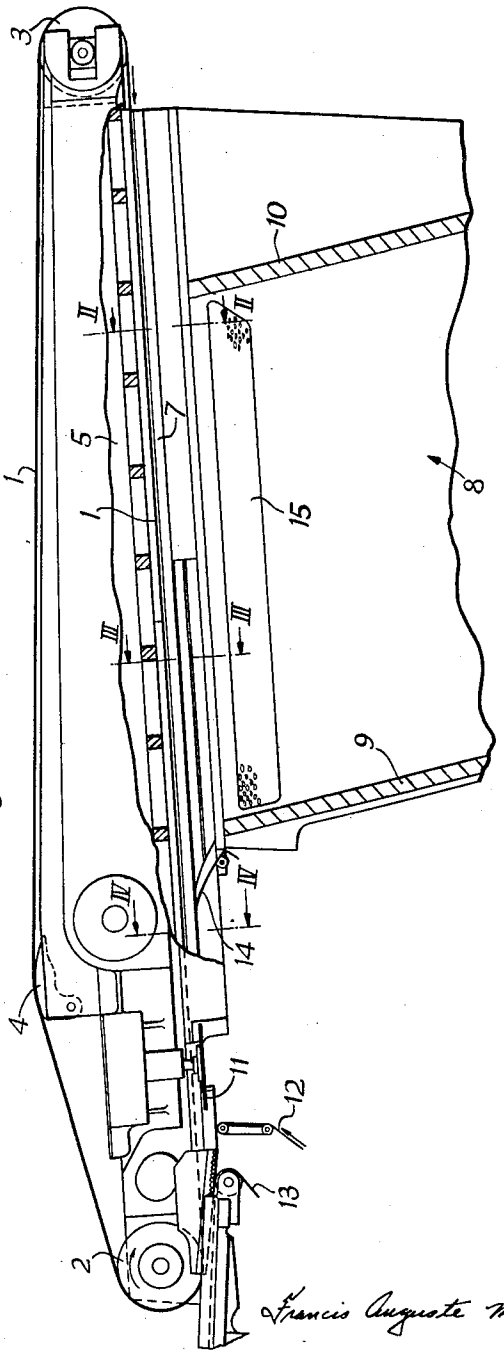

Fig. 1.

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Fig. 2.

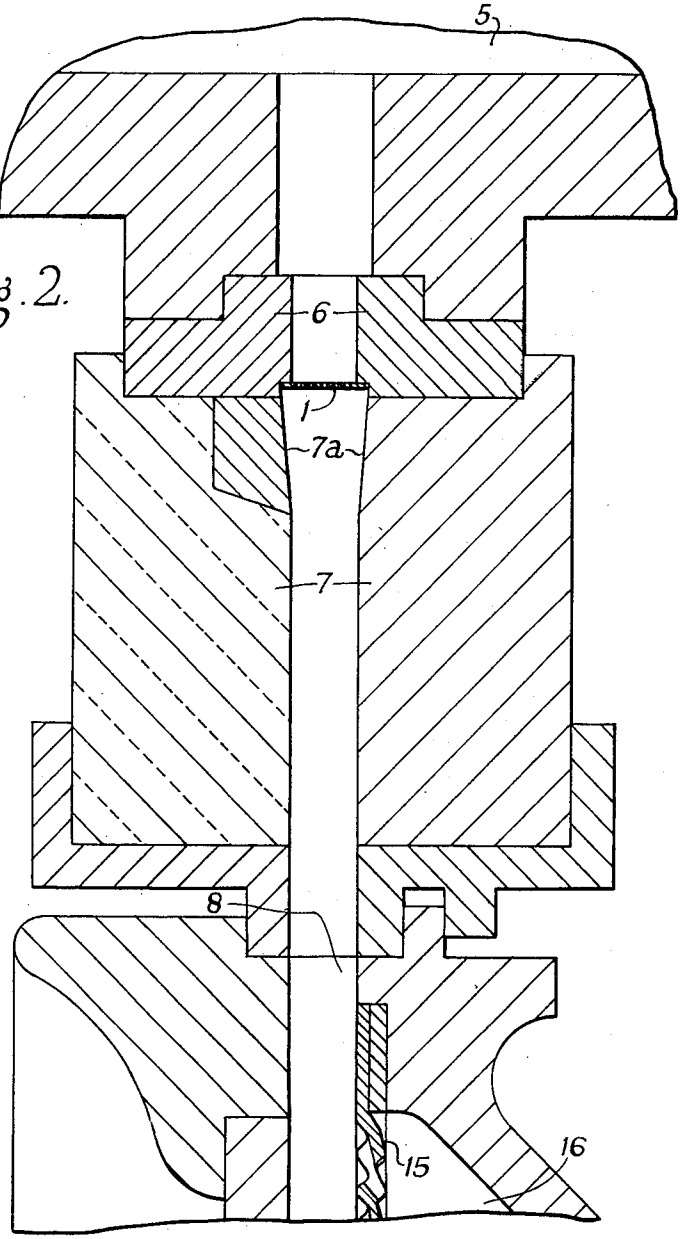

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Fig. 3.

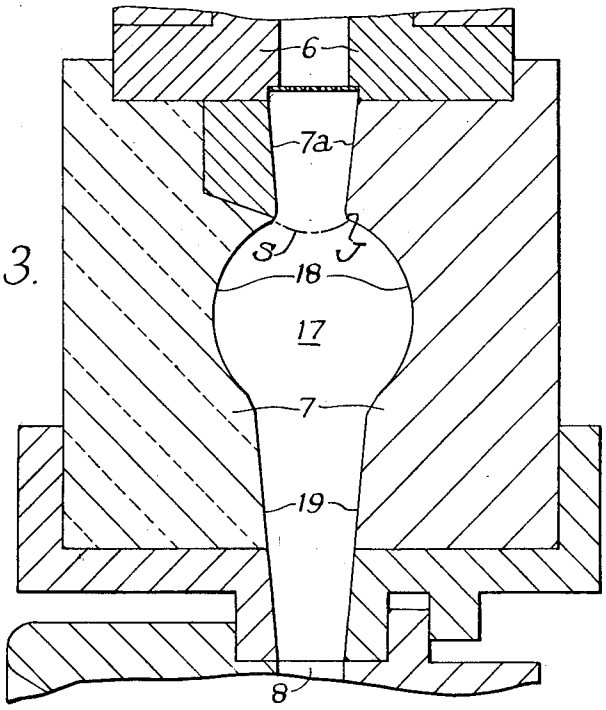
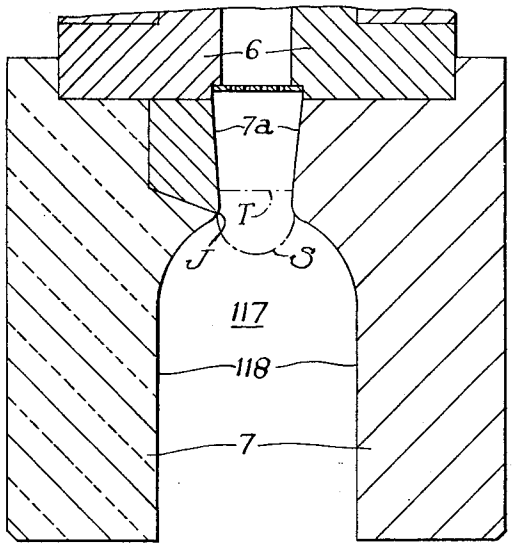


Fig. 4.



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TOBACCO MANIPULATING MACHINERY

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Fig. 6.

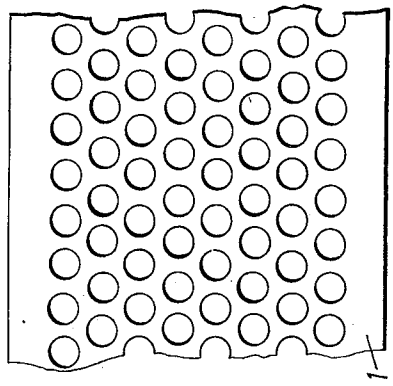
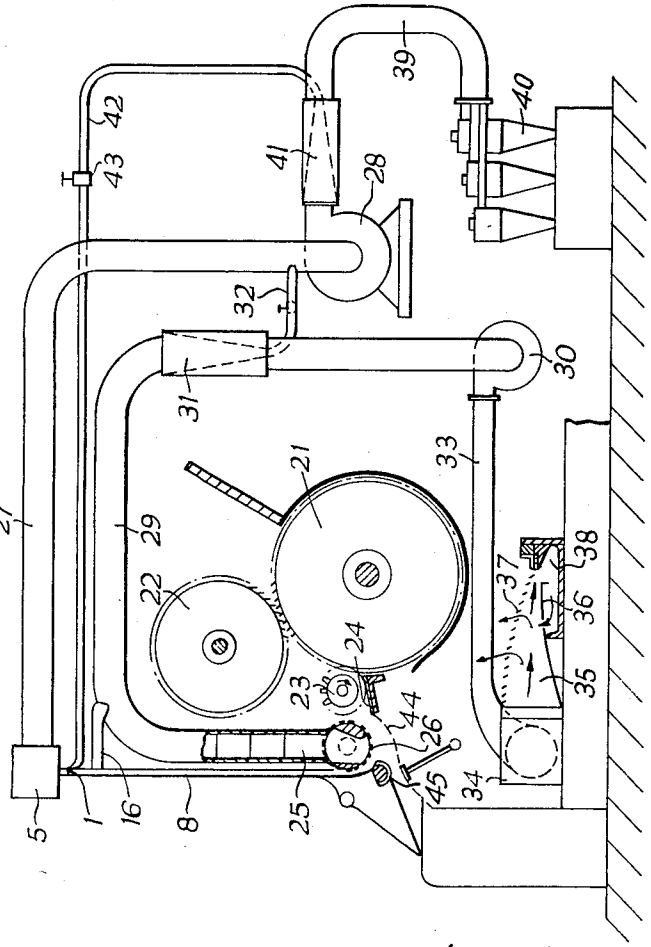


Fig. 5.



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United States Patent Office 3,088,468
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3,088,468

TOBACCO MANIPULATING MACHINERY

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Filed Jan. 20, 1959, Ser. No. 787,954
Claims priority, application Great Britain Jan. 21, 1958
4 Claims. (Cl. 131—66)

This invention concerns improvements in or relating to tobacco manipulating machinery, such as continuous rod cigarette-making machinery, in which a continuous tobacco filler is formed.

The present invention is concerned with apparatus in which a continuous tobacco filler is formed by impelling tobacco, by means of an air current, through a passage having side walls, towards a moving, perforated conveyor band on which the tobacco forms a stream and is held by suction. The stream is conveyed by the band through a channel comprising opposed walls which confine the stream laterally, and past a trimming device which trims the stream to a desired depth by removing surplus tobacco.

Since the width of the stream is controlled, the filler of desired depth produced by trimming the stream is of desired cross-sectional size, and it will, if its density is uniform, have the desired mass per unit length. (This assumes that the tobacco, considered as a body, is all of equal compressibility, which depends on such factors as the type of tobacco used, its moisture content, and the length and coarseness of the tobacco shreds. In practice these factors are usually controlled so that for at least considerable lengths of the stream its compressibility can be considered to be uniform).

It is to be understood that the depth to which the tobacco stream is trimmed may be altered from time to time by adjustment of the distance between the conveyor band and the trimming device, for example by some control device responsive to measuring or testing operations made on the filler or a wrapped cigarette rod formed from the filler, and further, certain spaced portions along the length of the stream may be deliberately left at a greater depth than the portions between them, for example where "dense end" cigarettes are to be made. Where reference is made herein to trimming the stream to a desired depth, and producing a filler of the desired cross-sectional size, therefore, it will be understood to mean a depth or size which is the desired depth or size for any particular setting of the trimming device relative to the conveyor band, and also, in a case where spaced portions are intentionally left deeper than others as mentioned above, a desired depth of the said spaced portions and a desired depth of the portions therebetween is meant.

In the apparatus referred to above, it is found that there is a tendency for the stream of tobacco formed and held by suction against the perforated conveyor band to vary in quantity and thickness or depth (that is, in the distance by which it extends from the band) from place to place along its length before the trimming operation. It has further been found that such variations in the depth of the stream cause variations in the degree to which the tobacco is compressed along different parts of the stream, so that its density varies along its length. Accordingly if the stream is trimmed to a given depth to form a filler, it is found that there are variations in density, and hence in mass per unit length, of different parts of the filler.

It is found that the variations in compression of the tobacco follow directly from the variations in quantity and thickness or depth of the untrimmed tobacco stream along the length of the porous band, since particles of tobacco touching the band are believed to be subject to the greatest degree of compression, while particles farthest from the band have the minimum compression.

In the construction referred to above, all the tobacco forming the tobacco stream is engaged by the opposed side walls, which therefore direct the air through the whole depth of the stream (whatever that depth may be from place to place along the length of the stream) in a direction such that the whole compressive effect of the air on the tobacco is exerted in a direction substantially normal to the band. Accordingly, tobacco relatively close to the band (that is, tobacco which will form part of the filler after the trimming operation) is compressed to a greater density in deeper portions of the stream, and to a less density in less deep portions.

According to the invention there is provided apparatus for forming a tobacco filler, wherein a stream of tobacco is conveyed lengthwise on a perforated conveyor band against which it is held by air pressure (e.g. by suction) and is trimmed to a desired depth to form a filler, the said apparatus comprising the said perforated conveyor band, means (e.g. suction means) to cause air to pass through the said band and thereby to press a stream of tobacco against the band, tobacco-feeding means arranged to supply tobacco in sufficient quantity to form for conveyance by the band a stream of such depth that tobacco extends from the band beyond a selected distance from the band, and air-guiding means arranged to cause air flowing towards the band to move in convergent directions immediately before reaching the said selected distance from the band, and thereafter to move substantially unidirectionally towards the band.

If the air velocity itself beyond the said selected distance is made less than the air velocity within the said distance, an improvement in the uniformity of the density of tobacco within the said distance will result.

Accordingly, the present invention further provides apparatus for forming a tobacco filler, wherein a stream of tobacco is conveyed lengthwise on a perforated conveyor band against which it is held by air pressure (e.g. by suction), and is trimmed to a desired depth to form a filler, and comprising means to cause air to flow towards and through the said band and to move towards the said band at a greater velocity within a selected distance from the band than beyond the said distance, and tobacco-feeding means arranged to supply tobacco in sufficient quantity to form for conveyance by the band a stream of such depth that tobacco extends beyond said selected distance so as to be acted on by air moving at the lower velocity.

Further according to the present invention there is provided apparatus for forming a tobacco filler, wherein a stream of tobacco is conveyed lengthwise on a perforated conveyor band to which it is held by air pressure (e.g. suction), and is trimmed by a trimming device to desired depth to form a filler, the said apparatus comprising the said perforated conveyor band, means (e.g. suction means) to cause air to pass through the said band and thereby hold a stream of tobacco to the band, and opposed walls extending from the said band and having opposed continous surfaces which engage the sides of the stream within a selected distance from the band, considered in a direction substantially normal to the band, and which direct air in the said direction through tobacco confined between the said surfaces, whereby the tobacco so confined is compressed in the said direction, wherein beyond the said selected distance from the band, the said opposed walls are arranged so as to permit the air drawn through the band to flow in directions having components transverse to the said direction, whereby any tobacco which may project beyond the said selected distance is subjected to air pressure exerted in directions having components transverse to the said direction.

By means of this arrangement, tobacco beyond the selected depth of the stream is subjected to air pressure

not wholly directed in a direction normal to the band, but in other directions as well. Thus a substantial part of the compressive force exerted by the air on that part of the tobacco stream which projects beyond that selected depth or distance from the band acts in a direction or directions transverse to the direction normal to the band, and has less effect on the compression of tobacco within the said selected distance or depth than would be the case if all the air passed unidirectionally through all the tobacco, and thus variations in the density of the tobacco within a given depth are less than would otherwise be the case.

It is to be understood that where the word "width" is used herein in relation to a tobacco stream, it means the dimension between the said opposed walls which confine the stream laterally; while the word "depth" in relation to the stream means the dimension transverse to the width of the stream.

It is also to be understood that the words "filler stream" or "stream" where used herein mean an untrimmed stream of tobacco from which the final filler is formed by trimming, while the word "filler" means that part of the stream which remains when surplus tobacco has been removed by the trimming operation.

It is further to be understood that the expression "substantially normal to the band," where used herein, refers to a direction substantially normal to a line extending across the width of the band, since, as will appear from the specific arrangement to be described hereafter by way of example, the direction of air flow towards the band may be somewhat inclined to the length of the conveyor band.

One at least of the said opposed walls may be recessed laterally beyond the said selected distance from the band, to provide an enlarged space between the said opposed walls larger than the space between the said tobacco-engaging surfaces. The recessed portion of the said wall may have a concave surface.

The said opposed walls may extend from the band beyond the said enlarged space to form a passage, e.g. narrower than the said enlarged space, through which passage air can flow into and through the said enlarged space towards the band.

The apparatus may comprise means to cause a current of air to flow through the said passage towards and through the band, and tobacco-feeding means to feed tobacco particles into the passage to be conveyed by the air current towards the band to form the said tobacco stream thereon, the said tobacco-feeding means being arranged to supply tobacco to the passage in such quantity as to form a tobacco stream which extends from the band into the said enlarged space. Opposed portions of both said opposed walls may be recessed to provide the said enlarged space, and both the said recessed portions may have concave surfaces. The opposed walls past which air flows into the said enlarged space may be divergent considered in the direction of air flow.

Part of the band may extend lengthwise beyond the said passage, and in that case the opposed walls extending from that part of the band may be recessed to provide an enlarged space which is open to atmosphere.

The said trimming device may be arranged to trim the stream at a position closer to the band than the said selected distance from the band.

Apparatus in accordance with the invention will now be described by way of example with reference to the accompanying drawings, in which:

FIGURE 1 is a front elevation, partly in section, of part of a cigarette-making machine;

FIGURE 2 is a section on the line II—II, FIGURE 1;

FIGURE 3 is a section on the line III—III, FIGURE 1;

FIGURE 4 is a section on the line IV—IV, FIGURE 1;

FIGURE 5 is an end view illustrating diagrammatically arrangements for feeding tobacco and forming a tobacco stream by means of an air current; and

FIGURE 6 shows a fragment of a perforated conveyor band, to a greatly enlarged scale.

A perforated, endless metal conveyor band **1** passes over pulleys **2** and **3**, FIGURE 1, and over a shoe **4** which is adjustably mounted to take up slack in the band. The pulley **2** is driven in the direction indicated by the arrow.

The band **1** extends directly beneath a suction chamber **5**, the edges of the band, as shown in FIGURES 2 to 4, engaging shoulders formed on opposed members **6** which form a conduit communicating with the suction chamber.

Extending downwardly from the band **1** are opposed walls **7**, whose opposed surfaces have parts **7***a* which are arranged to converge for a short distance in a direction away from the band, as shown in FIGURES 2–4. These convergent surfaces **7***a* form, with the band, a channel along which a stream of tobacco is conveyed by the band **1**.

The opposed walls **7**, and extensions thereof, extend downwardly to form side walls of a long, narrow passage **8** which is provided with end walls **9** and **10**. At its lower extremity, as shown diagrammatically in FIGURE 5, the passage **8** is open to allow a current of air to enter and flow upwardly through it. FIGURE 5 also shows diagrammatically tobacco-feeding means by which tobacco particles are fed into the passage to be carried by the air current upwardly towards the band **1** to form a tobacco stream thereon. These arrangements for causing the air to flow in the passage and for feeding tobacco into the passage will be described later.

The conveyor band **1** and suction chamber **5** extend beyond the passage **8**, as shown in FIGURE 1, and about mid-way between the end wall **9** and the pulley **2** is located a trimming device which comprises a pair of discs **11** arranged side by side a short distance beneath the band **1**. The discs **11** (only one of which is visible in FIGURE 1) are arranged to be rotated so that their opposed edges cooperate to trim the stream of tobacco carried past them by the band **1**, by removing surplus tobacco. Preferably the discs are arranged for bodily movement up and down in response to measurements effected on the tobacco stream, or on the wrapped cigarette rod, or on both, by conventional measuring devices such as are commonly employed for the purpose of controlling rod density.

Beyond the discs **11** the band **1** and suction chamber **5** extend over a cigarette-paper web **12** carried by a tape **13**, the arrangement being such that the trimmed tobacco filler is led on to the paper web while still suctionally held by the band **1**, so that the filler is continuously controlled and has little or no opportunity of losing its lateral compression imparted to it by suction. The paper web is partially folded about the filler before the latter is released from the band after moving past the extreme end of the suction chamber **5**.

A pivoted flap **14** is mounted just to the left of the left-hand end of the passage **8** (as viewed in FIGURE 1) in order to close the gap between the channel along which the tobacco stream is conveyed out of the passage, and the top edge of the end wall **9**. The flap **14** is urged upwardly by the pressure of air flowing from atmosphere towards the band **1**. Its purpose is to prevent air from flowing from atmosphere over the wall **9** into the passage, which might cause turbulence in the region of the tobacco stream and consequent disturbance of the tobacco in the stream.

One of the side walls of the passage **8** is apertured by the provision of a grill **15**, FIGURES 1 and 2, formed of expanded metal whose numerous small apertures constitute louvres. These apertures communicate with a duct **16**, FIGURES 2 and 3, from which air is drawn by suction means to be referred to later. The purpose of this arrangement is to draw off some of the air from the passage **8** and thus provide a greater flow of air through the passage than would be practical if the whole of the air were drawn through the conveyor band **1**. The presence of this grill **15** near the top of the passage may be in part responsible for the tendency for air to flow into the passage

over the end wall 9, as explained above, if not prevented from doing so by the flap 14.

The opposed walls 7 vary in shape along the length of the band 1. At that part of the channel which extends about half-way along the length of the passage 8 from the end wall 10 (and which may for convenience be termed the first half of the passage), the opposed surfaces of the walls 7 are, beyond the convergent surfaces 7a parallel, as shown in FIGURE 2.

In the second half of the passage 8, the opposed walls 7 are shaped as shown in FIGURE 3. Immediately beyond the surfaces 7a the walls are recessed laterally to provide an enlarged space 17 between concave recessed surfaces 18. The opposed walls immediately beyond this enlarged space are formed with surfaces 19 which diverge (considered in the direction of the air flow towards the band 1), while beyond the surfaces 19 the passage walls are parallel. In order to avoid sharp corners at the junctions of the surfaces 18 with the surfaces 7a and 19, these corners are respectively rounded and chamfered as shown in FIGURE 3.

In the construction illustrated, the extreme distance between the recessed concave surfaces 18 is 20 mm., and the surfaces 19 diverge from one another through a total angle of 11°. The purpose of diverging the surfaces 19 in this manner is to provide a suitable entrance to the enlarged space 17 through which air can flow with the minimum turbulence, and the corners are chamfered as mentioned above for the same reason.

The distance from the band 1 to the position at which the channel formed between the surfaces 7a joins the enlarged space 17 is 13 mm. This is a greater distance than the distance by which the trimming discs 11 are spaced from the band 1. This latter distance may vary with adjustment of the trimming device as mentioned above, but is on the average about 10.5 mm.

The width of the band 1, in the construction illustrated, is 9 mm.

FIGURE 4 shows the shape of the channel beyond the passage 8, that is, between the end wall 9 and the trimming device 11. At this position the walls 7 are recessed to provide an enlarged space 117 which is open to atmosphere, the greater part of the opposed surfaces 118 being parallel and spaced apart by a distance of 20 mm. Adjacent the discs 11, the walls 7 are cut away to accommodate the discs, the average position of the discs relative to the band 1 being shown in FIGURE 4 by a dot-and-dash line marked T.

The means for causing air to flow through the passage 8, and for feeding tobacco particles into the passage, will now be briefly described with reference to FIGURE 5.

A carded conveyor drum 21 receives tobacco in bulk on the upper part of its surface and carries it past a carded refuser roller 22, and the tobacco is picked from the drum 21 by a picker roller 23 and impelled across a guide plate 24. Beyond the plate is an air duct 25 at whose entrance is a rotating perforated cylinder 26, and the passage 8 is located alongside the duct.

The suction chamber 5 communicates by way of a conduct 27 with a suction fan 28 by which air is drawn through the band 1. The duct 25 is connected by a conduit 29 with a further suction fan 30. The duct 16 connects the passage 8 to the conduit 29 so that air is drawn from the passage through the louvred grill 15, FIGURES 1 and 2. Within the conduit 29 is a dust separating device 31 by which dust is extracted and passed with some air through a conduit 32 into the conduit 27. The outlet of the fan 30 communicates with a conduit 33 which conducts air to an air manifold 34, through which the air is discharged to a diffuser 35 comprising a curved plate 36, a sheet 37 of expanded metal, and a chamber 38 to receive short particles of tobacco which may be contained in the air. The plate 36 is apertured to allow some of the air to flow over its right-hand edge (as viewed in FIGURE 5) into the chamber 38, and out of the chamber through a central aperture.

Air flows upwardly through the expanded metal sheet 37 to be drawn into the passage 8 and duct 25.

The air discharged by the fan 28 passes through a conduit 39 to a multi-unit cylone 40 by which, after removal of dust, the air is discharged to atmosphere. Accordingly the air drawn into the passage 8 and duct 25 consists of air from the diffuser 35 mixed with atmospheric air.

A further dust-separating device 41 is provided in the conduit 39 and is connected by a conduit 42 to the channel through which the band 1 moves, at a position beyond the passage 8, so as to convey a certain quantity of short tobacco particles to the tobacco stream. This can be controlled or put out of action if desired by a valve 43.

The air drawn into the passage 8 and duct 25 passes through an apertured plate 44. The air drawn through the cylinder 26 into the duct 25 deflects the tobacco impelled over the plate 24 so that the tobacco particles move in a curved path into the entrance to the passage 8, in which they are accelerated by reason of the high-velocity air current flowing upwardly through the passage.

Vanes 45 direct the air entering the passage in a direction substantially parallel with the walls 9 and 10, FIGURE 1, which are slightly inclined to the perpendicular and at an angle to the length of the band 1.

In operation of the apparatus, tobacco particles are impelled up the passage 8 by the high-velocity air current, and build up on the band 1 to form a stream thereon. The suction exerted on the tobacco through the perforated band 1 causes the tobacco to be compressed laterally—that is, in a direction substantially normal to the band—to a considerable extent. The stream builds up gradually as the band moves from right to left, FIGURE 1, and in the early stages of building up, the depth of the stream is not great and in the first half of the passage (where the opposed walls have the shape shown in FIGURE 2) the stream will not generally project beyond the divergent surfaces 7a.

As the band progresses further to the left, FIGURE 1, more and more tobacco builds up on the band 1 until tobacco projects beyond the surfaces 7a. This occurs in the second half of the passage, where the opposed walls 7 have the shape shown in FIGURE 3. Thus when the stream increases in depth to such an extent as to project beyond the surfaces 7a, the tobacco so projecting extends into the enlarged space 17.

The stream thus built up on the band 1 in the passage is carried out of the passage towards the trimming device 11, and after leaving the passage and before reaching the trimming device, has its lowermost part projecting into the space 117, FIGURE 4.

The dot-and-dash lines S in FIGURES 3 and 4 schematically indicate approximate levels of the tobacco stream at the two positions shown. It will be understood that these two levels will vary according to the average amount of tobacco in the stream in any particular case, and also in accordance with local variations or irregularities in depth. Similarly the cross-sectional shape of the part of the tobacco stream protruding into the space 17 or into the space 117 may differ from time to time and will not necessarily be as represented by the lines S in FIGURES 3 and 4.

The tobacco-feeding means described above are arranged to supply tobacco to the passage in such quantity that the depth of the stream built up on the band 1 is not more than about 4 mm. greater than the distance from the band to the juncture of the surfaces 7a and the recessed walls 18 and 118, FIGURES 3 and 4, but as far as practicable the stream is built up to a depth such that some tobacco will always project into the enlarged space 17 before leaving the passage 8, and into the space 117 after leaving the passage.

As pointed out above, the depth of the stream tends to vary from place to place along its length, due to small

variations in the quantity of tobacco supplied to the passage, or possibly to variations in the condition of the tobacco affecting its compressibility. The stream is compressed by the pressure of air drawn through it and through the perforated conveyor band **1**. If the whole of the air so drawn through the tobacco is directed in a direction substantially normal to the band, the whole of its compacting or densifying action on the tobacco is exerted in that direction, and where the stream varies in depth, there will be corresponding variations in the density to which the tobacco is compressed in that section of the stream which remains after the trimming operation, and which forms the filler.

The construction being described is so arranged that any part of the tobacco stream projecting beyond a certain selected distance from the band **1**—namely the distance from the band to the junction of the surfaces *7a* and the recessed surfaces **18** or **118**—is exposed to air which travels not only in a direction substantially normal to the band, but also to air moving in convergent paths towards the exposed sides of the stream and having components transverse to the said direction. That is to say, air passing up the passage **8** spreads out into the enlarged space **17**, and not only has a lower velocity in that part but some at least of the air travels over or close to the concave walls **18**, and enters the exposed part of the stream of tobacco from the sides, so that the air flowing towards the band moves in convergent directions immediately before reaching the selected distance from the band. Thus, it is believed, a good deal of the effect of the air on the tobacco projecting into the space **17** tends to compress that tobacco in directions transverse to the normal to the band **1**, whilst air moving normal to the band has a reduced effect on tobacco which is in the space **17**. Thus this arrangement reduces to a considerable degree the upward compressive effect of the air on that exposed part of the stream from what it would be if the walls along the whole length of the stream were straight and parallel, such as shown in FIGURE 2 for the first part of the stream. Accordingly, variations in the compression of the whole depth of the stream in a direction normal to the band, due to variations in the depth of the stream, are reduced by the construction shown in FIGURES 3 and 4.

Similarly at a position outside the passage **8**, where the tobacco stream projects downwardly into the space **117**, FIGURE 4, the air entering the space **117** from atmosphere is in part directed against the exposed sides of the projecting tobacco.

It will be seen that both inside and outside the passage **8** that part of the air which impinges against the sides of the projecting part of the tobacco stream does so below the junction of the opposed surfaces *7a* (which engage the sides of the main bulk of the tobacco stream) and the recessed surfaces **18** and **118** respectively. Thus tobacco projecting beyond a selected, fixed distance from the band—in the present construction, 13 mm.—is subjected to the action of air which in part is travelling in converging directions which have components transverse to a direction normal to the band **1**. Thus, to some extent, the compressive effect of the air on tobacco projecting beyond the fixed distance of 13 mm. from the band is nullified so far as it affects the compression of the tobacco within the said fixed distance—i.e. tobacco between the surfaces *7a*. It is also possible that a considerable proportion of the air entering the tobacco stream does so at the region where the surfaces *7a* join the recessed surfaces **18** or **118**, having by-passed the bulk of the projecting tobacco. Furthermore owing to the increase in cross sectional size of the air stream in the space **17** the velocity of the air is reduced in that part so that in addition to some of the air moving in transversely to tobacco extending into the enlarged space **17**, the pressure exerted by air moving normal to the band **1** will be less than the pressure exerted by the air between the surfaces *7a*. In any case, it is found that with this arrangement, variations in the density of the filler produced by trimming the stream are reduced to a useful degree.

It will be appreciated that the portion of tobacco which extends beyond the surfaces *7a*, and which is relatively unconfined, may be described for the purpose of defining the relative position of the two portions with reference to the conveyor as "superimposed" on the confined portion of the filler stream, whether the tobacco be carried beneath or above the conveyor.

Mention has been made above of the fact that, in the construction described herein, the direction of air flow towards the band is, by means of the vanes **45**, FIGURE 5, inclined to the length of the band. Thus it can be seen from FIGURE 1 that the end walls **9** and **10** of the passage **8** are slightly inclined to the perpendicular to the band **1**. The purpose of thus directing the air is to give to the tobacco particles impelled through the passage a component of movement in the direction of movement of the band **1**. It will be seen however, that this does not materially affect the functioning of the arrangements described above, and this feature of the construction is mentioned only in order to make it clear that, as stated above, the term "normal to the band" is to be understood as meaning "normal to a line across the width of the band."

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

1. Apparatus for use in a cigarette making machine for forming a tobacco filler for enclosure in a continuous cigarette paper web, comprising an air pervious conveyor to convey a stream of tobacco from which the filler is to be formed by the removal of surplus tobacco, opposed walls having tobacco engaging surfaces extending a uniform distance from the conveyor and forming a tobacco confining channel, means to supply tobacco to the conveyor in such quantity that the stream of tobacco while conveyed by said conveyor extends from the conveyor beyond the said distance, suction means to draw air into the said channel and through the said conveyor so as to flow through and compress tobacco confined in the channel, the said tobacco engaging surfaces being arranged to guide air flowing therebetween in a direction substantially normal to the conveyor surface, said walls also having surfaces receding outwardly from the said tobacco engaging surfaces and meeting the latter at said distance to permit air approaching the channel to flow across the said receding surfaces, and through tobacco extending beyond the said distance, in directions transverse to the said direction and at a lower velocity than that of the air flowing through the said channel, thereby effecting less compression of the last named tobacco than of tobacco in the channel, so as to improve the uniformity of the density of the tobacco in the channel by reducing the effect thereon of variations in the quantity of tobacco in the stream, and a trimming device to separate and remove tobacco from the tobacco stream to form a filler of desired depth, the said trimming device being operative on tobacco at a distance from the conveyor such that at least the greater part of the tobacco remaining in the trimmed filler is tobacco which has been confined between said tobacco engaging surfaces.

2. A cigarette making machine comprising means to build up a stream of tobacco containing a surplus of tobacco and from which a filler is to be formed by the removal of the surplus tobacco, a zone in which the building up of the stream is completed, a trimming device, spaced downstream from said zone, to separate and remove surplus tobacco from the stream, thereby producing a trimmed filler for enclosure in a continuous paper web, an air pervious conveyor extending between the said zone and the said trimming device to convey the completed stream to the trimming device, suction means to draw air through the stream toward and through the air pervious conveyor, side walls extending alongside the conveyor

between the said zone and the said trimming device, the said walls having inner surfaces defining with the air pervious conveyor a channel of substantially uniform cross-section and extending a distance from the conveyor less than the depth of the stream when carried thereon by said conveyor, the said walls having further surfaces joining said inner surfaces at said distance and angled relatively thereto so as to recede outwardly therefrom, the said inner surfaces and the said receding surfaces cooperating with the suction means to produce, respectively, a restricted airflow, directed substantially unidirectionally toward the conveyor, through tobacco confined in the said channel to compress the said tobacco, and an airflow of lower velocity, and in converging directions, through unconfined tobacco in the stream protruding beyond the confines of the channel, to effect less compression of the unconfined tobacco than of the tobacco confined in the said channel, so as to improve the uniformity of the density of the tobacco in the channel by reducing the effect thereon of variations in the quantity of tobacco in the stream, the said trimming device being operative on the stream at a level such that at least the greater part of the tobacco remaining in the trimmed filler is tobacco which has been confined within the said channel and subjected to the greater compression.

3. In apparatus for making a continuous cigarette rod, the combination with a conveyor on which a filler stream, from which a filler is to be formed by the removal of surplus tobacco, is fed in a predetermined path toward cigarette rod forming mechanism, of means confining a portion of said moving filler stream of predetermined depth, means causing air to flow through the filler stream in a direction toward the conveyor, the said confining means causing the air to flow at relatively high velocity and unidirectionally through said confined portion of said filler stream to apply a compressive force thereto, means for directing said air to flow at relatively low velocity and in a plurality of directions through a second portion of the filler stream superimposed on the confined portion and extending in varying depth beyond said predetermined depth to apply to said second portion a compressive force of less magnitude than that applied to said confined portion, so as to improve the uniformity of the density of the tobacco in the confined portion by reducing the effect thereon of variations in the quantity of tobacco in the stream, trimming means positioned to separate and remove from the filler stream a portion of the filler stream varying in depth and subjected to the compressive force of less magnitude, thereby producing a trimmed filler, at least the greater part of which consists of tobacco which has been confined by said confining means, and means to enclose the trimmed filler in a continuous wrapper to form a continuous cigarette rod.

4. In apparatus for making a continuous cigarette rod, conveyor means to feed a tobacco filler stream, from which a filler is to be formed by the removal of surplus tobacco, in a predetermined path, the said filler stream exhibiting variations in depth, means confining the filler stream to a predetermined level and extending from the conveyor means to said predetermined level only, to confine that part of the filler stream which extends from the conveyor means to said level, and to leave unconfined a further part of the filler stream extending beyond said confining means, said level being so located that the said unconfined part includes substantially all the said variations in depth, means causing air to flow in converging directions and at relatively low velocity toward the unconfined part of the filler stream to enter the filler stream, the said confining means directing the said air to flow unidirectionally toward the conveyor means and at relatively high velocity through the confined part of the filler stream to apply more compressive force to the said confined part than to the unconfined part, so as to improve the uniformity of the density of the tobacco in the confined part by reducing the effect thereon of variations in the quantity of tobacco in the stream, trimming means to trim the filler stream by separating and removing surplus tobacco from the filler stream, said trimming means being positioned to remove tobacco which has been unconfined and which contains substantially all the said variations in depth, thereby producing, for enclosure in a continuous cigarette paper web, a trimmed filler of which at least the greater part of the tobacco is tobacco which has been confined, and cigarette rod forming mechanism toward which the trimmed filler is fed in said predetermined path.

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