

PATENT SPECIFICATION

DRAWINGS ATTACHED



854,736



Date of Application and filing Complete Specification Feb. 26, 1957.
No. 6407/57.

Application made in France on Dec. 18, 1956.

(Patent of Addition to No. 852,721 dated Jan. 3, 1955).

Complete Specification Published Nov. 23, 1960.

764,551

Index at acceptance:—Class 130, C1(A1: C1: C2).

International Classification:—A24c.

COMPLETE SPECIFICATION

Improvements in or relating to Apparatus for Forming a Continuous Tobacco Filler

We, USINES DECOUFLE, a French Corporate Body, of 7, rue Deparcieux, Paris, France, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention concerns improvements in or relating to apparatus for forming a continuous tobacco filler, for example in a cigarette-making machine, and constitutes an improvement in or modification of the invention the subject of British Patent Specification No. 764,551, in which there is disclosed a continuous rod cigarette-making machine in which a tobacco filler (which may consist wholly of tobacco or may consist of tobacco lengths alternating with filter tips) is formed and carried on a conveyor, and is while moving lengthwise to be enclosed in a continuous wrapper.

One difficulty that arises in the formation of a continuous tobacco filler by known methods is the tendency for the filler to contain varying quantities of tobacco along its length. In conventional continuous rod cigarette-making machines it is usual to shower cut tobacco on to a travelling conveyor so as to form a loose tobacco stream which itself constitutes a filler and is subsequently compressed laterally and enclosed in a continuous web of cigarette paper to form a continuous cigarette rod. The loose stream formed on the conveyor is usually irregular in that the quantity of tobacco varies from point to point along its length, and these irregularities are generally also found, to a greater or less extent, in the filler of the wrapped cigarette rod, in spite of various means which have been used to improve the uniformity of the tobacco filler before it is enclosed in the paper wrapper. The present invention is

directed to the problem of forming a tobacco filler of improved uniformity.

The expression "filler stream" when used herein means a stream of tobacco which contains more tobacco per unit length than is required in the continuous wrapped filler, and which while moving lengthwise has surplus tobacco removed from it by a trimming operation. The part of the filler stream which remains after such trimming operation then constitutes a "filler". Neither of the expressions "filler stream" and "filler" when used herein is to be taken to include the tobacco carpet which is formed in a hopper and then fed (e.g. picked and showered) therefrom preparatory to commencing the formation of the "filler stream", nor does either of the expressions "filler stream" and "filler" include a flow of more or less discrete particles of tobacco such as a shower which is discharged in loose formation from the hopper towards a moving surface against which they build up to form the "filler stream".

According to the present invention there is provided a method of forming a tobacco filler in a tobacco-manipulating machine such as a continuous rod cigarette-making machine, comprising the steps of introducing tobacco particles into a current of air which carries them towards conveyor means on which they form a continuous filler stream, the current of air having a sufficiently high velocity, and tobacco particles being fed into the current of air in such a manner, that the speed of movement of the said particles is increased by the air current, conveying the filler stream lengthwise while controlling its width, and subjecting the filler stream so formed to a trimming operation by which surplus tobacco is removed from the filler stream so as to reduce the latter to a desired depth and thereby to produce a filler of a desired cross-sectional size.

[Price 3s. 6d.]

The velocity of the air may be such that the speed of movement of tobacco particles is increased by the air current to such an extent that particles are impelled by the air current towards the conveyor means in substantially separated condition.

The conveyor means may be air-pervious, in which case air is drawn through the conveyor-means, whereby the filler stream formed on the conveyor-means is held thereto by suction.

The air drawn through the conveyor means may exert a pressure on the tobacco, in a direction transverse to the direction of movement of the filler stream, sufficient to compress the filler stream in said transverse direction to a substantial degree, e.g. to a density at least half that required in the final product (e.g. in a cigarette).

The filler stream may be carried on an under-surface of the conveyor means. The filler stream may be trimmed while carried on an under-surface of the conveyor means, the filler produced by trimming being transferred on to a continuous wrapper (e.g. a cigarette-paper web) which travels beneath part of the conveyor means in the same general direction as the said part.

The tobacco particles may be impelled upwardly towards the conveyor means by an upwardly flowing air current, the filler stream being formed on an under-surface of the conveyor means. The tobacco particles may be fed in substantially separated form towards the air current, and their separation may be increased by the increase given to their speed of movement by the air current.

Further according to the invention there is provided apparatus for forming a tobacco filler in a tobacco-manipulating machine such as a continuous rod cigarette-making machine, comprising travelling conveyor means, means to cause a current of air to flow towards the conveyor means, tobacco-feeding means to introduce tobacco particles into the air current to be impelled thereby to the conveyor means to form a continuous filler stream thereon, the air current being caused to flow at a sufficiently high velocity, in relation to the speed of movement of tobacco particles before introduction into the air current, that the speed of movement of the said particles is increased by the air current, side walls to control laterally tobacco in the filler stream, and a trimming device arranged to remove surplus tobacco from the filler stream and reduce the latter to a desired depth and thereby to produce a filler of a desired cross-sectional size.

The speed of movement of the said particles may be increased by the air current to such an extent that particles are impelled by the air current towards the conveyor means in substantially separated condition.

The conveyor means may be air-pervious, and the apparatus may comprise means to

draw air through the conveyor means, whereby the filler stream formed on the conveyor means is held thereto by suction. The means to draw air through the conveyor means may cause air to exert a pressure on the tobacco, in a direction transverse to the direction of movement of the filler stream, sufficient to compress the filler stream transversely of its length to a substantial degree, e.g. to a density at least half that required in the final product (e.g. in a cigarette).

The filler stream may be carried on an under-surface of the conveyor means. The filler stream may be carried on an under-surface of the conveyor means past the trimming device, the latter being located beneath the conveyor means.

The apparatus may comprise means to convey a continuous wrapper (e.g. a cigarette-paper web) beneath, and in the same general direction of movement as, part of the conveyor means at a position beyond the trimming device, the said wrapper being arranged to receive the trimmed filler from the said part of the conveyor means.

The said means to cause a current of air to flow towards the conveyor may be arranged to direct the air current upwardly, the filler stream being formed on an under-surface of the conveyor means.

The tobacco-feeding means may be arranged to feed tobacco particles in substantially separated form towards the air current, the current of air being caused to move at a speed sufficient to increase the speed of movement of the particles sufficiently to increase their separation.

The apparatus may comprise means for adjusting the position of the trimming device so as to alter the desired depth to which the filler stream is reduced.

The trimming device may comprise an assembly of three rotating elements co-operating to engage tobacco in the filler stream and to separate tobacco projecting beyond a desired depth of the filler stream, from tobacco within said depth, and to remove bodily tobacco so separated from tobacco within said depth, the said assembly being supported by means including a screw-threaded control device whereby the whole assembly can be moved bodily so as to alter the depth to which the filler stream is reduced.

Apparatus in accordance with the invention, for forming a continuous tobacco filler in a cigarette-making machine, will now be described by way of example with reference to the accompanying drawings, in which:—

Figure 1 is a sectional end elevation diagrammatically illustrating apparatus according to the invention;

Figure 2 is a sectional front elevation;

Figure 3 is a plan view of part of the apparatus shown in Figures 1 and 2;

Figure 4 is a sectional view taken along the line IV—IV, Figure 2;

Figure 5 is a sectional view taken along the line V—V, Figure 2, and

Figure 6 is a sectional view taken along the line VI—VI, Figure 5.

Referring first to Figure 1, the apparatus comprises a hopper 1 for cut tobacco, a conveyor belt 2 to support tobacco in the hopper, and a carded roller 3 towards which tobacco is urged by the conveyor belt 2, which moves in the direction shown by the arrow. A brushing or levelling roller 4 is located adjacent the roller 3 and rotates in the same direction, as indicated by the arrows on the rollers 3 and 4. A picker roller 5 is arranged close to the roller 3 and is rotatable so as to pick tobacco from the carding of the roller 3 and distribute it on an endless conveyor belt 6. The conveyor 6 is arranged to move in the direction of the arrow at a speed of 4 feet per second.

Beyond the end of the upper run of the conveyor 6 is a passage 8 which extends along the whole width of the conveyor belt 6, see Figure 2. The passage 8 comprises opposed walls, spaced 10 mm. apart, whose opposed surfaces are slippery to reduce friction. These walls extend upwardly and their upper extremities are connected to a pair of side guides or walls which form a channel 9, as best seen in Figure 4. The walls of the channel 9 have slippery opposed surfaces, the upper parts of which are convergent (considered in a downward direction), each being at an angle of 10° to the vertical. A flat endless conveyor belt 10, which is 10 mm. wide, is arranged to move through the upper part of the channel 9, and passes wheels or rollers 11, 12 and 13 (see Figure 2) of which the roller 11 drives the belt. The conveyor belt 10 is perforated, being provided with small holes each of a diameter of 0.8 to 1.2 mm, and thus constitutes air-pervious conveyor means. About 40 such holes per square centimetre of the entire surface of the belt are provided.

The belt 10 is held within the channel 9 by the lower surfaces of a pair of opposed elements 14, which overhang the walls of the channel 9 by about 1 mm. on each side thus forming shoulders which guide the belt through the channel.

The channel 9 and conveyor belt 10 are slightly inclined downwardly in the direction of movement of the band. This inclination may for example be at an angle of 6° to 10° to the horizontal.

A suction chamber 15 communicates with the perforated conveyor belt 10 by way of a narrow chamber 16 formed by the opposed elements 14. The chamber 15 further communicates with a pipe 17, Figures 1 and 2, which extends to the inlet of a fan (not shown) arranged to draw air through the pipe 17 from the chambers 15 and 16 and

thus through the perforated conveyor belt 10.

The passage 8 extends downwardly below the conveyor belt 6, and communicates with a pipe 21 which extends to the output side of the fan referred to above, so that air is blown through the pipe 21 into and through the passage 8. As illustrated in Figure 2, the air sucked through the conveyor 10 between the points marked 18 and 19 in the figure reaches the conveyor from the passage 8, while between the points marked 19 and 20 the air is drawn through the channel 9, whose opposed sides are extended downwardly by guide plates 22.

In a modified arrangement, not illustrated, the channel 9 is as far as practicable closed in between the points 19 and 20 so as to cause air to be drawn from the passage 8 through the conveyor belt 10 between those points also.

The arrangement of the fan, the pipe 17, and the suction chambers 15 and 16, is such, that a negative pressure of about 800 to 900 mm. of water is maintained in the chamber 16.

A trimming device for trimming the tobacco filler stream is provided beneath the channel 9 at a position beyond the passage 8, that is, between the points marked 19 and 20 in Figure 2. The trimming device comprises a pair of peripherally chamfered discs 23 mounted on two rotating spindles 24 driven by pinions 25. The discs are arranged to be rotated in opposite directions as indicated in Figure 3, with a peripheral speed slightly greater than the linear speed of the conveyor belt 10. The two discs 23 have their bottom surfaces disposed in a single plane parallel to the plane of the flat conveyor belt 10. Although in the drawings the discs are shown apparently in contact, their opposed edges are, at the point where they are closest to each other, separated by a distance of 0.1 to 0.2 m.m.

Beneath the trimming device is a paddle-wheel device 26 for removing tobacco which passes beneath the discs 23. This comprises a hub 27 provided with four radial blades 28, each about 8 mm. wide. The hub is mounted on the end of a spindle 29 which is arranged to rotate at high speed and is inclined to the direction of movement of the conveyor belt 10. The blades 28 are adjusted so that their extreme edges rub against the bottom surface of both the discs 23 at the region where the edges of the two discs approach closest to each other, and thus engage and remove tobacco which is beneath the discs, thus co-operating with the discs by completing the separation of that tobacco which extends beyond a desired depth of the filler stream, from the tobacco within the said depth, which latter tobacco passes above the discs.

An endless conveyor 30 extends beneath the rotating paddle-wheel 26 to receive tobacco



removed and thrown downwardly by the blades 28. The conveyor 30 is arranged to convey such tobacco towards, and deposit it upon, a further conveyor 31 (Figure 1) which in turn deposits the tobacco on the conveyor band 2, which returns it to the hopper 1.

Means are provided for adjusting the position of the trimming device, in order to alter the level or depth of the filler stream at which tobacco beyond that depth is separated from the tobacco within that depth carried by the conveyor 10. A frame 32 (Figures 5 and 6) supports bearings 33 for the spindles 24 of the discs 23, and also the bearing 34 for the shaft 29 of the paddle-wheel 26. The frame 32 has a slide 36 which is slidable in a guide-way in a stationary frame 38. A tapped member 37 is carried by the slide 36, and a screw 39 which extends through the frame 38 is threaded through the member 37 and can be rotated by a knob 40 in order to raise or lower the frame 32, and therefore the discs 23 and the paddle-wheel 26. The latter can move up and down with the frame 32 because its spindle 29 includes a universal joint 35.

In the construction illustrated, the minimum distance of the edges of the discs 23 from the conveyor belt 10 is 9 mm., and this distance can if required be increased, by lowering the frame 32, by any suitable amount.

In practice it is found that this distance can be increased from 9 to 12 mm. with satisfactory results. The minimum distance of 9 mm. is of course determined by the walls of the channel 9. If it is desired to position the discs 23 still closer to the conveyor 10, this can be done by making the channel less deep, or in other words by making the channel walls narrower.

Referring now to Figure 2, an endless conveyor belt 41 is arranged to carry a continuous web 42 of cigarette-paper through rod-forming mechanism, including a tongue 43, by which the tobacco filler is enclosed in the cigarette-paper web to form a continuous cigarette rod. The belt 41 and cigarette-paper web 42 extend beneath part of the conveyor 10, and move at the same speed as the conveyor 10 and in the same general direction, although in the construction shown, the belt 41 runs horizontally while the conveyor 10 is slightly inclined downwardly in its direction of movement.

The suction chamber 16 extends to the point marked 20, Figure 2, and beyond that point the conveyor 10 is no longer in communication with the source of suction. The paper web 42 is led in beneath the conveyor 10 just before the latter reaches the point 20, and is thus in a position to receive and support the tobacco filler when this is no longer held by suction against the conveyor 10. The spacing between the paper web 42 and the conveyor 10 is at no point greatly in excess

of the depth of the tobacco filler, and is preferably approximately equal to the depth of the filler, so that the latter can be transferred from the conveyor to the paper without any substantial drop and thus with little disturbance.

A shoe 44 is arranged between the tongue 43 and the roller 11 and has an edge just clear of the conveyor 10 to prevent tobacco being carried around the roller 11 by the conveyor 10.

The belt 41 is supported in a trough which shapes it and the paper web 42 into arcuate form in the usual way.

The operation of the apparatus is as follows:—

Tobacco is fed from the hopper 1 by the carded roller 3, on which it forms a carpet or layer from which surplus tobacco is brushed back by the brushing roller 4. The picker roller 5, rotating at high speeds, picks tobacco from the carding of the roller 3 and throws it on to the conveyor 6, which as stated above is moving at a speed of 4 feet per second. This speed of 4 feet per second is high relative to the peripheral speed of the carded roller 3, and the tobacco is thus spread or distributed over the conveyor 6 fairly sparsely and in a somewhat separated condition.

At the point 7, Figure 1, the conveyor 6 passes over a guide roller and, due to the speed of the band 6, the tobacco is projected towards the passage 8. The distance from the point 7 (that is, the end of the conveying surface of the conveyor 6) to the passage 8 is, in the example illustrated, about 6 inches.

The passage 8 is so arranged and dimensioned in relation to the suction fan and the various air conduits that a stream of air flows upwardly through the passage 8 at a velocity of 30 feet per second. As stated, above, the opposed walls of the passage 8 are spaced 10 mm. apart. This arrangement, whereby air flows at a speed of 30 feet per second through a 10 mm. passage, is found to give good results. Both the air speed and the dimensions of the passage may be varied if desired, but in any such case it is found preferable that the relationship between the air speed in the passage, and the spacing between the passage walls, should be governed by the

formula $V = \frac{300}{T}$, where V=velocity of air

in feet per second, and T=the distance between the walls of the passage (or in other words the depth of the stream of air) in millimetres.

As mentioned above, the tobacco is distributed over the conveyor 6 in a somewhat separated condition—that is to say, the individual shreds or particles of tobacco are to a considerable extent separated from one another by the picking operation and are



distance

distributed over the surface of the conveyor 6 in a similar condition owing to the high speed of the conveyor 6 relative to that of the carded roller 3.

5 These particles of tobacco, moving at a speed of 4 feet per second, are projected into the passage 8 and thus immediately subjected to the action of a current of air moving upwardly through the passage at a speed of 30
10 feet per second. Thus successive particles of tobacco are suddenly and violently accelerated by the rapid upward current of air. This sudden acceleration greatly increases the separation of particles from one another, and tends to space individual particles apart from
15 one another to a considerable extent, resulting in a rapid upward flow of separated particles most of which are spaced well apart from each other.

20 These particles are thus carried at high speed up into the channel 9 where they accumulate on the underside of the conveyor 10, and on each other, to form a filler stream. The particles are held to the conveyor 10
25 against the action of gravity by suction acting through the small holes in the conveyor.

By the device disclosed a tobacco filler stream can be built up with a considerable degree of uniformity of packing and density.
30 The expression "uniformity of density" must not, however, be understood as meaning necessarily a density which is uniform throughout the depth of the filler stream. The forces acting on the particles of tobacco at
35 different depths or levels of the filler stream, as the latter is built up in the channel 9, may be affected by the changing quantity of tobacco held against the perforated conveyor, in such a way as to produce a greater density
40 of tobacco at one level than at another. The expression "uniformity of density" therefore refers chiefly to the density at any one level along the length of the filler stream (excluding any parts of the filler stream whose density
45 may be deliberately increased by some other means other than the air current).

The walls of the channel 9 being convergent (considered in a direction away from the conveyor 10) tend to give some support
50 to the filler stream in addition to that given by suction.

As stated above, the walls of the channel 9 are slippery, and consequently they offer a low resistance to the tobacco filler stream
55 formed in the channel 9. The effect, therefore, is that the filler stream is conveyed forward by the conveyor and subjected to the minimum of disturbance along its length.

Tobacco is fed to the passage 8 in sufficient quantity, in relation to the speed of the conveyor 10, to enable a filler stream to be
60 built up on the conveyor of greater depth than is required in the final filler. The filler stream so formed may vary in depth from point to point along its length, but its mini-

mum depth should, as far as is practicable, be at least equal to the distance between the conveyor 10 and the discs 23 of the trimming device which removes excess tobacco and thereby trims the filler stream to a desired
70 depth. Since the width of the filler stream is controlled by the side walls of the channel 9, it will be seen that the filler produced by trimming the filler stream and reducing the latter to a desired depth will have a substantially uniform cross-sectional size.

In the construction described, where a negative pressure of 800 to 900 mm. of water is maintained in the chamber 16, and where
80 air is blown at a velocity of 30 feet per second upwardly through the passage 8 whose walls are 10 mm. apart, it is found that a filler of a particular type and moisture content can be formed on the conveyor 10 with a density
85 equal to at least half the density required in the final filler—that is, when it has been compressed beneath the tongue 43 and enclosed in the paper web 42.

The amount of pressure exerted on the tobacco to compact it to at least half the final
90 density will of course vary with the kind and condition of the tobacco being used. Accordingly such pressure will vary according to immediate needs.

The suction acting on the tobacco through the conveyor 10 subjects the filler stream to
95 air pressure directed against the tobacco in a direction transverse to the direction of movement of the filler stream, by drawing air through the filler stream and the conveyor, both during the building up of the filler
100 stream on the conveyor in the manner just described, and after the building up of the filler stream has been completed and the completed filler stream has moved beyond the passage (i.e. to the left of the point 19 as
105 viewed in Figure 2). This air pressure is thus exerted on the tobacco particles not only during the period in which they are arriving at the conveyor (or being added to particles already suctionally held to the conveyor) but
110 also during the succeeding period when no more particles are being added to the filler stream and the latter has therefore been built up to its full depth.

It is thought that continued application of air pressure, over a period of time, to the tobacco particles forming the tobacco filler
120 stream increases the degree of regularity with which those particles are arranged relatively to one another in the filler stream. This continued suctional pressure on the tobacco is therefore believed to improve the uniformity of the density of the tobacco in the filler
125 stream, to a degree beyond the relatively high degree of uniformity in density which may be imparted to the filler stream due to the way in which the tobacco particles which form it are fed to the conveyor as explained above. It
130 will be seen, however, that while the filler

stream is being built up in the passage, further particles are continually being added to it, and those particles which are added just before the filler stream leaves the passage cannot be subjected to air pressure within the passage for any appreciable period of time. Accordingly the full equalising effect of the air pressure is only obtained if the pressure is maintained on the tobacco filler stream for a period of time after its building up in the passage has been completed. This occurs, in the specific construction described and illustrated, while the filler stream is travelling from a position beyond the point 19, Figure 2, (at which point its building up has been completed) towards the discs 23, which, as shown, are spaced from the said position. It will be appreciated that the greatest possible equalisation of tobacco density in the stream should, as far as is practicable and convenient in any particular machine, be accomplished before the filler stream reaches the trimming device which reduces it to a desired depth and cross-sectional size. (This will, in general, be uniform although there may be cases in which the cross-sectional size of the filler produced by trimming the filler stream is deliberately varied, for example varied by adjustment of the trimming device. However, the effect of trimming is to reduce the filler stream to a depth and cross-section which is uniform for any particular setting of the trimming device relative to the conveyor, and along any particular length which is intended to have a selected depth and cross-section). Thus it is clearly advantageous to have a treatment which tends to make the density of the tobacco filler stream more uniform along its length before trimming occurs. This is because the more nearly the density of the tobacco approaches complete uniformity before trimming, the more nearly can the filler (of uniform cross-section) produced by trimming approach complete uniformity in mass per unit length.

The trimmed filler is carried on the undersurface of the conveyor 10 past the point 20, Figure 2, beyond which it is no longer held to the conveyor 10 by suction. By this time, however, it has been led over the paper web 42 which is moving at the same speed as the filler and is close enough to the conveyor 10 to receive the filler from the conveyor without the filler being subjected to any substantial drop or other disturbance. Thus the structure of the filler which as been formed and trimmed on the conveyor 10 is little disturbed during transfer to the paper web.

The final compression of the filler under the tongue 43, and its enclosure in the paper web 42 to form a continuous wrapped cigarette rod which is severed to produce individual cigarettes, follows conventional practice and need not be described.

The apparatus described and illustrated

herein and in the accompanying drawings is also described and illustrated in the complete specification and drawings of British Patent Application No. 14133/60 (Serial No. 854,737), which is divided out of the present application. In the complete specification of Application No. 14133/60 (Serial No. 854,737), there is claimed a method of producing a continuous tobacco filler in a tobacco-manipulating machine such as a continuous rod cigarette making machine, comprising the steps of building up a continuous filler stream of tobacco, and, while controlling its width, conveying the filler stream lengthwise on air-pervious conveyor means from a position beyond that at which the building up of the stream has been completed, to a trimming position, the two said positions being spaced apart, trimming the filler stream at the said trimming position by removal of surplus tobacco from the filler stream to reduce the latter to a desired depth and thereby produce a filler of a desired cross-sectional size, and subjecting the filler stream, during its passage between the two said positions to air pressure by drawing air through the filler stream and the conveyor means, so as to urge tobacco in the filler stream towards the conveyor means.

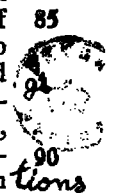
Part of the apparatus described and illustrated herein and in the accompanying drawings is also described and illustrated in the complete specification and drawings of British Patent Application No. 26496/60 (Serial No. 854,737), which is divided out of the present application. In the complete specification of Application No. 26496/60 (Serial No. 854,737), there is claimed a continuous rod cigarette-making machine, comprising means to form a lengthwise-moving filler stream of tobacco, a trimming device to remove surplus tobacco from the filler stream to reduce the latter to a desired depth, thereby producing a filler, and a perforated suction conveyor arranged to carry the trimmed filler on the underside of the conveyor by suction over a continuous, lengthwise-moving wrapper and to deposit the filler on said wrapper for enclosure therein.

WHAT WE CLAIM IS:—

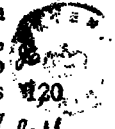
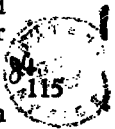
1. A method of forming a tobacco filler in a tobacco-manipulating machine such as a continuous rod cigarette-making machine, comprising the steps of introducing tobacco particles into a current of air which carries them towards conveyor means on which they form a continuous filler stream, the current of air having a sufficiently high velocity, and tobacco particles being fed into the current of air on such a manner, that the speed of movement of the said particles is increased by the air current, conveying the filler stream lengthwise while controlling its width, and subjecting the filler stream so formed to a trimming operation by which surplus tobacco is



Continuous



tions



filler in current



stream is being built up in the passage, further particles are continually being added to it, and those particles which are added just before the filler stream leaves the passage cannot be subjected to air pressure within the passage for any appreciable period of time. Accordingly the full equalising effect of the air pressure is only obtained if the pressure is maintained on the tobacco filler stream for a period of time after its building up in the passage has been completed. This occurs, in the specific construction described and illustrated, while the filler stream is travelling from a position beyond the point 19, Figure 2, (at which point its building up has been completed) towards the discs 23, which, as shown, are spaced from the said position. It will be appreciated that the greatest possible equalisation of tobacco density in the stream should, as far as is practicable and convenient in any particular machine, be accomplished before the filler stream reaches the trimming device which reduces it to a desired depth and cross-sectional size. (This will, in general, be uniform although there may be cases in which the cross-sectional size of the filler produced by trimming the filler stream is deliberately varied, for example varied by adjustment of the trimming device. However, the effect of trimming is to reduce the filler stream to a depth and cross-section which is uniform for any particular setting of the trimming device relative to the conveyor, and along any particular length which is intended to have a selected depth and cross-section). Thus it is clearly advantageous to have a treatment which tends to make the density of the tobacco filler stream more uniform along its length before trimming occurs. This is because the more nearly the density of the tobacco approaches complete uniformity before trimming, the more nearly can the filler (of uniform cross-section) produced by trimming approach complete uniformity in mass per unit length.

The trimmed filler is carried on the under-surface of the conveyor 10 past the point 20, Figure 2, beyond which it is no longer held to the conveyor 10 by suction. By this time, however, it has been led over the paper web 42 which is moving at the same speed as the filler and is close enough to the conveyor 10 to receive the filler from the conveyor without the filler being subjected to any substantial drop or other disturbance. Thus the structure of the filler which as been formed and trimmed on the conveyor 10 is little disturbed during transfer to the paper web.

The final compression of the filler under the tongue 43, and its enclosure in the paper web 42 to form a continuous wrapped cigarette rod which is severed to produce individual cigarettes, follows conventional practice and need not be described.

The apparatus described and illustrated

herein and in the accompanying drawings is also described and illustrated in the complete specification and drawings of British Patent Application No. 14133/60 (Serial No. 854,737), which is divided out of the present application. In the complete specification of Application No. 14133/60 (Serial No. 854,737), there is claimed a method of producing a continuous tobacco filler in a tobacco-manipulating machine such as a continuous rod cigarette making machine, comprising the steps of building up a continuous filler stream of tobacco, and, while controlling its width, conveying the filler stream lengthwise on air-pervious conveyor means from a position beyond that at which the building up of the stream has been completed, to a trimming position, the two said positions being spaced apart, trimming the filler stream at the said trimming position by removal of surplus tobacco from the filler stream to reduce the latter to a desired depth and thereby produce a filler of a desired cross-sectional size, and subjecting the filler stream, during its passage between the two said positions to air pressure by drawing air through the filler stream and the conveyor means, so as to urge tobacco in the filler stream towards the conveyor means.

Part of the apparatus described and illustrated herein and in the accompanying drawings is also described and illustrated in the complete specification and drawings of British Patent Application No. 26496/60 (Serial No. 854,737), which is divided out of the present application. In the complete specification of Application No. 26496/60 (Serial No. 854,737), there is claimed a continuous rod cigarette-making machine, comprising means to form a lengthwise-moving filler stream of tobacco, a trimming device to remove surplus tobacco from the filler stream to reduce the latter to a desired depth, thereby producing a filler, and a perforated suction conveyor arranged to carry the trimmed filler on the underside of the conveyor by suction over a continuous, lengthwise-moving wrapper and to deposit the filler on said wrapper for enclosure therein.

WHAT WE CLAIM IS:—

1. A method of forming a tobacco filler in a tobacco-manipulating machine such as a continuous rod cigarette-making machine, comprising the steps of introducing tobacco particles into a current of air which carries them towards conveyor means on which they form a continuous filler stream, the current of air having a sufficiently high velocity, and tobacco particles being fed into the current of air in such a manner, that the speed of movement of the said particles is increased by the air current, conveying the filler stream lengthwise while controlling its width, and subjecting the filler stream so formed to a trimming operation by which surplus tobacco is



continuous

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100

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filler

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current

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* C L M S *

removed from the filler stream so as to reduce the latter to a desired depth and thereby to produce a filler of a desired cross sectional size.

5 2. A method as claimed in Claim 1, wherein the velocity of the air is such that the speed of movement of tobacco particles is increased by the air current to such an extent that particles are impelled by the air current towards the conveyor means in substantially separated condition.

10 3. A method as claimed in any of the preceding claims, wherein the conveyor means is air-pervious and wherein air is drawn through the conveyor means, whereby the filler stream formed on the conveyor means is held thereto by suction.

15 4. A method as claimed in Claim 3, wherein the air drawn through the conveyor means exerts a pressure on the tobacco, in a direction transverse to the direction of movement of the filler stream, sufficient to compress the filler stream in said transverse direction to a substantial degree, e.g. to a density at least half that required in the final product (e.g. in a cigarette).

20 5. A method as claimed in Claim 3 or Claim 4, wherein the filler stream is carried on an under-surface of the conveyor means.

25 6. A method as claimed in Claim 5, wherein the filler stream is trimmed while carried on an under-surface of the conveyor means, and wherein the filler produced by trimming is transferred on to a continuous wrapper (e.g. a cigarette-paper web) which travels beneath part of the conveyor means in the same general direction as the said part.

30 7. A method as claimed in any of Claims 3 to 6, wherein the tobacco particles are impelled upwardly towards the conveyor means by an upwardly flowing air current and the filler stream is formed on an under-surface of the conveyor means.

35 8. A method as claimed in any of the preceding claims, wherein the tobacco particles are fed in substantially separated form towards the air current, and wherein their separation is increased by the increase given to their speed of movement by the air current.

40 9. Apparatus for forming a tobacco filler in a tobacco-manipulating machine such as a continuous rod cigarette-making machine, comprising travelling conveyor means, means to cause a current of air to flow towards the conveyor means, tobacco-feeding means to introduce tobacco particles into the air current to be impelled thereby to the conveyor means to form a continuous filler stream thereon, the air current being caused to flow at a sufficiently high velocity, in relation to the speed of movement of tobacco particles before introduction into the air current, that the speed of movement of the

said particles is increased by the air current, side walls to control laterally tobacco in the filler stream, and a trimming device arranged to remove surplus tobacco from the filler stream and reduce the latter to a desired depth and thereby to produce a filler of a desired cross-sectional size.

10. Apparatus as claimed in Claim 9, wherein the speed of movement of the said particles is increased by the air current to such an extent that particles are impelled by the air current towards the conveyor means in substantially separated condition.

11. Apparatus as claimed in Claim 9 or Claim 10, wherein the conveyor means is air-pervious, and comprising means to draw air through the conveyor means, whereby the filler stream formed on the conveyor means is held thereto by suction.

12. Apparatus as claimed in Claim 11, wherein the means to draw air through the conveyor means causes air to exert a pressure on the tobacco, in a direction transverse to the direction of movement of the filler stream, sufficient to compress the filler stream transversely of its length to a substantial degree, e.g. to a density at least half that required in the final product (e.g. in a cigarette).

13. Apparatus as claimed in Claim 11 or Claim 12, wherein the filler stream is carried on an under-surface of the conveyor means.

14. Apparatus as claimed in Claim 13, wherein the filler stream is carried on an under-surface of the conveyor means past the trimming device, the latter being located beneath the conveyor means.

15. Apparatus as claimed in Claim 14, comprising means to convey a continuous wrapper (e.g. a cigarette-paper web) beneath, and in the same general direction of movement as part of the conveyor means at a position beyond the trimming device, the said wrapper being arranged to receive the trimmed filler from the said part of the conveyor means.

16. Apparatus as claimed in any of Claims 11 to 15, wherein the said means to cause a current of air to flow towards the conveyor is arranged to direct the air current upwardly, and the filler stream is formed on an under-surface of the conveyor means.

17. Apparatus as claimed in any of Claims 9 to 16, wherein the said tobacco-feeding means is arranged to feed tobacco particles in substantially separated form towards the air current, and wherein the current of air is caused to move at a speed sufficient to increase the speed of movement of the particles sufficiently to increase their separation.

18. Apparatus as claimed in any of the preceding Claims 9 to 17, comprising means for adjusting the position of the trimming device so as to alter the desired depth to which the filler stream is reduced.

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19. Apparatus as claimed in any of the preceding Claims 9 to 18, wherein the trimming device comprises an assembly of three rotating elements cooperating to engage tobacco in the filler stream and to separate tobacco projecting beyond a desired depth of the filler stream, from tobacco within said depth, and to remove bodily tobacco so separated from tobacco within said depth, the said assembly being supported by means including a screw-threaded control device whereby the whole assembly can be moved bodily so as to alter the depth to which the filler stream is reduced.
20. A method of forming a tobacco filler in a continuous rod cigarette-making machine, substantially as described herein with reference to the accompanying drawings.
21. Apparatus for forming a tobacco filler in a continuous rod cigarette-making machine, constructed, arranged and adapted to operate substantially as described herein with reference to the accompanying drawings.

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Leamington Spa: Printed for Her Majesty's Stationery Office, by the Courier Press.—1960.
Published at The Patent Office, 25, Southampton Buildings, London, W.C.2, from which copies may be obtained



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