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METHOD OF AND APPARATUS FOR MAKING MOUTHPIECE CIGARETTES

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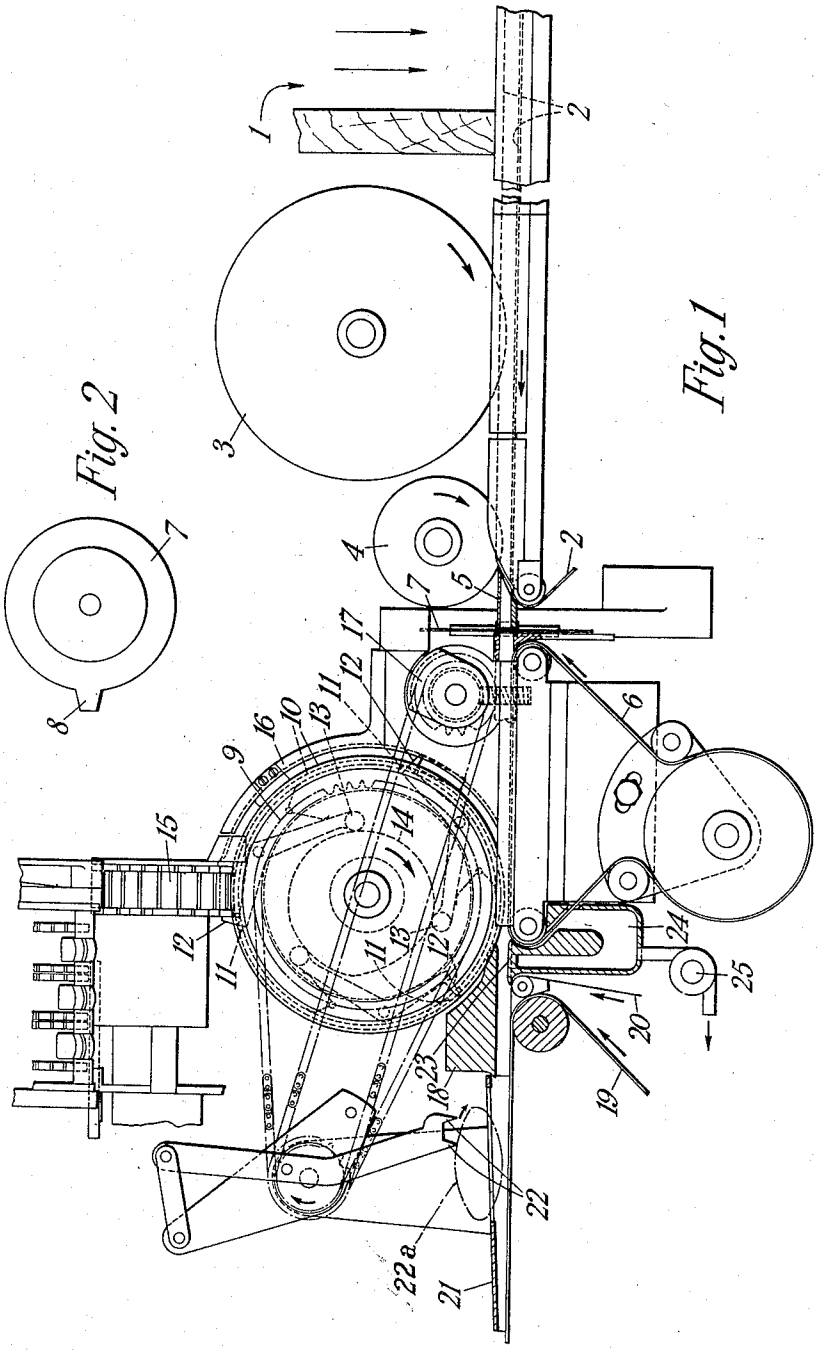


Fig. 1

Fig. 2

INVENTOR
D. W. Molins

By Watson, Cole, Grindle & Watson

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METHOD OF AND APPARATUS FOR MAKING MOUTHPIECE CIGARETTES

Desmond Walter Molins, Deptford, London, England, assignor to Molins Machine Company Limited, Deptford, London, England, a British company

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9 Claims. (Cl. 131—61)

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This invention concerns improvements in or relating to a method of and apparatus for making mouthpiece cigarettes.

One way of making mouthpiece cigarettes consists in feeding unwrapped tobacco at intervals, with mouthpiece portions interrupting the continuity of the stream of unwrapped tobacco so as to form a continuous composite filler, which is enclosed in a wrapper to form a continuous composite rod, the rod being then separated at suitable intervals to produce mouthpiece cigarettes. The present invention is concerned with the manufacture of mouthpiece cigarettes according to this general method.

The mouthpiece portions may for example, be made of paper or other suitable material, and may include absorbent material, in which case the mouthpiece portions are sometimes known as "filter plugs" or "filter tips," or they may be made entirely of non-absorbent material. As a further example, the mouthpiece portions may comprise hollow tubes of material such as cardboard. For convenience, all mouthpiece portions suitable for incorporation in mouthpiece cigarettes which are made in the manner referred to above will be referred to hereinafter as "stubs."

According to the present invention there is provided in the manufacture of mouthpiece cigarettes a method comprising the steps of feeding forwardly an unwrapped tobacco stream, supporting the leading end of the stream on a conveyor which moves faster than the said stream, periodically severing the stream so as to separate therefrom a leading length thereof which is supported on the said conveyor, and causing each said length after severance to be pressed against said conveyor so as to be accelerated and caused to move at the speed of the said conveyor, whereby spaces are formed between successive lengths, inserting stubs into the said spaces so as to form a continuous composite filler of tobacco portions and stubs in alternation, and subsequently enclosing the said composite filler in a paper wrapping to form a composite rod.

Further according to the invention there is provided a method of manufacturing mouthpiece cigarettes comprising the steps of forming and feeding an unwrapped tobacco stream, severing the stream into separate lengths, engaging the tobacco after severance to grip the severed lengths and thereby feed them forwardly at a faster speed than that of the unsevered tobacco to form spaces for stubs, inserting stubs in said spaces, and thereafter reducing the speed of movement of the stubs and severed lengths of tobacco to close the gaps between the tobacco and the stubs.

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Further according to the invention there is provided apparatus for making mouthpiece cigarettes, comprising means to feed an unwrapped tobacco stream, means to sever the stream into separate lengths, means to engage the tobacco after severance to grip the severed lengths and thereby feed them forwardly at a faster speed than that of the unsevered tobacco to form spaces for stubs, means to insert stubs in said spaces, and means to reduce the speed of movement of the stubs and severed lengths of tobacco to close the gaps between the tobacco and the stubs.

Further according to the invention, there is provided apparatus for making mouthpiece cigarettes, comprising means to form and feed an unwrapped stream of tobacco, an endless conveyor to continue the feed of the tobacco, said conveyor having a speed faster than the said unwrapped stream, means to sever the stream, accelerator means movable to cause each severed length of tobacco in turn to be gripped between said accelerator means and the said conveyor, whereby the severed lengths are taken away from the unwrapped stream at a faster speed than before being cut to form spaces, means to feed stubs into said spaces, and means to reduce the speed of the stubs and severed lengths of tobacco to cause the tobacco sections and stubs to close up.

The means to sever the stream may comprise a rotatable knife movable in a plane normal to the direction of movement of the tobacco stream to sever the latter and having a narrow blade to avoid excessive holding up of the stream during the cutting.

The accelerator means may comprise a rotatable segmental roller adapted to press each length, after it is severed, against the said endless conveyor, the tobacco-engaging surface of the said roller being arranged to move at a speed substantially the same as, or slightly greater than the speed of the said conveyor.

The aligned stubs and severed lengths of tobacco may be fed by the said endless conveyor to the cigarette paper web which moves at a slower speed than the said endless conveyor.

The means to feed stubs into the spaces between the severed lengths of unwrapped tobacco may comprise a rotatable wheel located above the said endless conveyor and having retractable pusher elements which are arranged to feed the stubs in desired position on the said endless conveyor.

Apparatus according to the present invention will now be described by way of example.

The apparatus resembles a cigarette making machine of the continuous rod type for making

ordinary cigarettes, but is provided with devices, about to be described with reference to the accompanying drawings, by means of which is formed a continuous composite filler consisting of unwrapped tobacco and stubs.

In the drawings:

Figure 1 is a front elevation, partly in section of apparatus for forming and cutting a tobacco filler and incorporating stubs therein.

Figure 2 is a view of a cutting knife for cutting a tobacco filler into sections.

Referring to Figures 1 and 2 tobacco is showered from a hopper indicated diagrammatically at 1 on to a moving conveyor 2, consisting of an endless band, which conveys the showered tobacco lengthwise as a loose stream or filler of unwrapped tobacco. One or more compression rollers, such as 3 and 4, are provided which compress the stream laterally so as to impart to it a suitable cross-sectional size and shape, and also sufficient rigidity to enable it to pass from the end of the conveyor into and through a short guide tube 5 which is located just beyond the compression rollers.

A second conveyor 6, also consisting of an endless band, is arranged just beyond the guide tube to receive the tobacco filler as it passes from the guide tube. A cutting device 7 is located adjacent the end of the guide tube and is adapted at intervals to cut across the tobacco filler as it issues from the guide tube.

It is preferable that this cutting operation should be performed in a way which avoids, as far as practicable, any considerable holding up of the oncoming tobacco filler during cutting, such as might be caused by a broad knife blade sweeping across the end of a stationary guide tube and thereby momentarily blocking the tube. For this reason the cutting device comprises a relatively narrow knife blade 8, see Figure 2, which is caused to cut across the filler at high speed, so that the guide tube is blocked only for a very short time, and thus there is very little holding up of the tobacco filler in the guide tube. A knife 10 mm. wide, as shown, can be arranged to cause a hold-up of about 2 mm. only. Any such holding up of the tobacco filler results in some lengthwise compression of the leading portion of the filler, but by cutting in the manner just described the amount of compression imparted during cutting is of course quite small.

The second conveyor 6 may be arranged to move as much as 40% faster than the first conveyor, but as will shortly be explained the tobacco filler passing on to the second conveyor does not immediately acquire this faster speed, but continues to move at substantially its original speed. In order to reduce friction so as to enable the tobacco filler to slip on the second conveyor, the latter is arranged at a slightly lower level than that of the first conveyor, and guide tube, and its surface is, for the same purpose, made smooth. This difference in level is clear from Figure 1.

Arranged above the second conveyor 6 is a wheel, also referred to as a "stub wheel," one of whose functions is to cause stubs to be placed at intervals on the second conveyor between successive portions of the tobacco filler. This stub-wheel, whose axis of rotation lies across the direction of movement of the filler, consists of a large disc 9 having a concave rim 10, like some compression wheels. The periphery is perforated at, for example, three equally spaced positions 11 and retractable stub pushing devices 12 are provided within the body of the disc which move in and out of the holes as the disc rotates, when cam followers 13 attached to the pushing devices rotate about a fixed cam 14.

A suitable stub feeding device comprising a fluted drum 15 is provided to feed stubs to the wheel at the top thereof, and these are carried around in turn by the pushers 12. The fluted drum and the mechanism for feeding stubs into its flute are constructed and operated in any suitable and convenient way but the fragment shown in Figure 1 is part of the mechanism described and illustrated in U. S. Patent 2,606,560, issued August 12, 1952.

This mechanism is quite suitable for the present purpose and reference may be made to the said specification for further details. At the side of the wheel where the stubs pass, a shield 16 is arranged to prevent stubs from leaving the concave rim, and at the bottom of the wheel each stub is delivered into a space between two filler portions. As a stub is delivered in this manner the pusher 12 is retracted by the cam 14.

A small drive roller 17 is provided above the second conveyor 6. The roller 17 is in the nature of a sector whose arcuate part is of sufficient extent for the work to be done. The sector is so arranged that it is clear of the tobacco just prior to the cut, and immediately after the cut engages the tobacco to cause the latter to travel at the faster speed of the second conveyor. This drive-roller must, of course, be so shaped as to move out of engagement with the tobacco which has not been cut. In this way, the tobacco, before being cut, is allowed, as far as possible, to slip on the faster moving conveyor 6. The stub-wheel 9 also has the further function of engaging the tobacco filler at desired times so as to cause the tobacco to be gripped between it and the second conveyor after the tobacco has been cut. This may be at the moment that the roller 17 engages the tobacco to accelerate it, or at a time when that roller does not engage the tobacco. This depends on the length of the tobacco portion, which, in turn of course, depends on the length of the cigarette being made. If the machine is making long cigarettes, the tobacco portion cut from the filler may be long enough to be engaged by the stub-wheel shortly after it has been severed from the filler and while its rear end is still engaged by the roller 17. On the other hand, if short cigarettes are being made, the tobacco portion severed from the filler may be too short to be engaged by the stub-wheel 9 and the roller 17 at the same time, and it will, in that case, not be engaged by the stub-wheel until after it has passed beneath the roller 17.

The parts are, however, so arranged that this gripping and acceleration of the tobacco filler by the stub-wheel commences after the oncoming filler has been cut by the cutting device. This causes the severed portion of the filler to be separated from and spaced apart from the uncut filler which is still moving at the slower speed, and by the time the separated portion has passed completely under the stub-wheel at the faster speed there is a gap between the rear end of the separated portion and the leading end of the oncoming filler which is sufficient to accommodate the next stub which is delivered into the gap by the next pusher 12 of the stub-wheel.

The reason for these provisions to ensure that the leading portion of the tobacco filler is not gripped and accelerated until the filler has been cut is that it is desirable that the whole of the

separated filler should be accelerated bodily. If the leading end or the leading part of the filler were gripped and caused to move at the faster speed before cutting, the filler would tend to be drawn out lengthwise, or possibly even broken, and it is desired to avoid this.

Just beyond the stub-wheel, and located above the second conveyor, is a scraper 18 to remove any tobacco which tends to move up with the wheel after the delivery of a stub and which may act also as a compression shoe beneath which the stubs and separated portions of tobacco filler pass as a composite stream. This shoe is arranged with one end in contact, or nearly so, with the edge of the wheel so as to ensure that the stubs and the tobacco are properly stripped from the wheel.

The second conveyor ends near the compression shoe just referred to, and the composite stream passes from the second conveyor to a third conveyor which may be arranged to move at the same speed as the first conveyor 2, but preferably at a higher speed than the first conveyor. The third conveyor is constituted by an endless band 19 which carries a web of cigarette paper 20. As the composite stream moves on to the paper web on the third conveyor it passes beneath a tongue 21 and through a garniture (not shown) of the usual type, where the tobacco and stubs are gripped and their speed is thus reduced to the speed of the paper web, and due to this reduction in speed the tobacco portions and stubs are closed up to each other endwise so as to abut closely so that they form a continuous composite filler.

The tongue 20 and the garniture above referred to, and indeed all remaining parts of the machine, follow orthodox continuous rod cigarette making machine practice so no further description is necessary.

In the foregoing, certain relative speeds of conveyors have been mentioned but prolonged experiment has led to the following general conclusions and while the speeds mentioned below are not to be regarded as limitations they are useful guides in carrying out the invention, and those skilled in the art will be able to adapt such machines as they possess to carry out the invention by following the instructions, modifying them according to conditions imposed by the type of machine, nature and quality of the tobacco and the desired quality of the final product.

Broadly speaking the speeds of the first and third conveyors are proportioned to the length of the components carried thereon. For example, two 72 mm. mouthpiece cigarettes are formed by the correct cutting of a piece of composite rod formed from stubs and a tobacco portion, so the two components require 144 mm. space on the conveyor. The tobacco in each finished cigarette is about 57 mm. long and the stub 15 mm. long. Thus 114 mm. net is required on the first conveyor, and as there is ultimately some compacting, 117 mm. is allowed. The ratio of speeds of the first and third conveyors is therefore 117 to 144 or about 100 to 123. In the particular example being discussed the second conveyor moves 164 mm. to the 117 and 144 mm. respectively, of the first and third conveyors, and thus the ratios of the speeds of the three conveyors, are 100 : 140 : 123.

A timing and locating device is located above the third conveyor, comprising a pair of fingers 22 arranged to move downwardly into the path of the tobacco and stubs, as indicated by the

track 22*a* shown in broken lines, and then to move in the direction of movement of the latter, after which the fingers move upwardly out of the said path. The parts may be so arranged that the leading finger moves down a short distance behind a stub and then moves somewhat faster than the third conveyor so as to overtake the stub. Thus if a stub is lagging behind its correct longitudinal position in the composite stream, the leading finger engages that stub and accelerates it. The other finger engages the tobacco just behind the stub and accelerates it so as to assist in closing up any gap between the tobacco and the stub. However, more satisfactory results are obtained if the fingers are arranged to move down into the path of the stubs and tobacco at a point somewhat further behind a stub than in the case just described, so that the leading finger does not engage the stubs at all, but acts only on the tobacco. This acceleration of the leading end part of the tobacco may have the effect of drawing out the tobacco to some extent, which may correct any tendency for the tobacco at the leading end of a length to be denser or more compressed than at other parts, due to any momentary holding up of the tobacco filler which may occur during cutting.

The paper web is then folded and secured about the continuous composite filler so as to form a continuous composite rod, which passes to the usual cut-off device which cuts the rod so as to produce mouthpiece cigarettes. The stubs and the tobacco portions of the composite rod are double the length of the corresponding portions in a finished mouthpiece cigarette, and therefore the cut-off is timed to cut the rod in the middle of each stub portion and each tobacco portion to produce individual mouthpiece cigarettes.

An openwork bridge, or a pair of narrow rails 23, may be provided, constructed as described in detail in my copending U. S. patent application, Serial No. 210,506, filed February 12, 1951, between the second and third conveyors and fitted with a suction device 24—25 to collect any shorts which may fall from the bridge.

I claim:

1. Apparatus for making mouthpiece cigarettes, comprising means to feed forwardly an unwrapped tobacco stream, a conveyor arranged to move faster than said stream and under the leading end portion of the stream, cutting means operable periodically to sever the stream to cut off therefrom a leading length thereof containing said end portion, accelerator means comprising a device having a surface moving in the same general direction as the said conveyor and adapted after each length is cut to press such length against the conveyor so as to cause said length to be gripped between the conveyor and the said surface, which latter moves faster than the tobacco stream, whereby the length so gripped is accelerated bodily and caused to move at the speed of the said conveyor and whereby a space is formed between the said length and the uncut stream, and means to feed a stub into each space so formed so as to form a continuous composite filler.

2. Apparatus for making mouthpiece cigarettes, comprising a first conveyor to feed forwardly an unwrapped tobacco stream, a second conveyor to receive the leading end portion of said stream from the first conveyor, the said second conveyor being arranged to move in the same general direction as and faster than the

first conveyor, means operable between the first and second conveyors to sever the stream periodically so as to cut off and separate from the stream a leading length of the stream containing said portion, accelerating means cooperating with the second conveyor and comprising a surface movable after each said severing operation to press the separated length against the the second conveyor while moving in the general direction of and at a speed not less than that of the latter, whereby each separated length is gripped between said surface and the second conveyor and caused bodily to move at the speed of the second conveyor, so as to form a space between the said length and the uncut stream, means to insert a stub into each such space, and a third conveyor arranged to receive stubs and separated lengths of tobacco from the second conveyor and to move slower than the latter so as to reduce the speed of the stubs and separated lengths of tobacco whereby gaps between stubs and tobacco are closed up.

3. Apparatus as claimed in claim 2, wherein the said third conveyor comprises a cigarette paper web onto which the stubs and severed lengths of tobacco are fed, and which is subsequently wrapped around said stubs and tobacco lengths to form a composite rod.

4. Apparatus for making mouthpiece cigarettes, comprising means to feed forwardly an unwrapped tobacco stream, a conveyor arranged to move in the same general direction as, and faster than, the said stream under the leading end portion of said stream, cutting means arranged periodically to cut off a length of tobacco containing said leading end portion, and means operable in timed relationship with said cutting means to engage the top of said length and press it against the conveyor, only when it is in the form of a length severed from the stream, said last-named means comprising a rotatable member having a tobacco engaging surface which presses against the rear end portion of a severed tobacco length while moving in the general direction of and at least as fast as the said conveyor so as to cause the said length to be gripped between said surface and said conveyor, whereby it is spaced apart lengthwise from the uncut tobacco stream.

5. Apparatus as claimed in claim 1, wherein the said accelerator means also comprises a rotatable wheel so positioned that the peripheral surface thereof engages the leading end portion of a severed tobacco length at substantially the same time as the rear end portion of said length is engaged by the said device, and wherein the said peripheral surface moves in the general direction of and at least as fast as the said conveyor and presses the said length against the conveyor so as to grip the said length between the conveyor and the said peripheral surface, and continues so to grip the said length after the first said moving surface no longer engages said length, so as to assist in accelerating the said length.

6. Apparatus as claimed in claim 5, wherein the said wheel is provided with means to transfer a stub from a source of supply onto said conveyor and just in advance of a tobacco length.

7. Apparatus as claimed in claim 1 wherein the cutting means comprises a knife rotatably movable in a plane normal to the direction of movement of the tobacco stream to sever the latter and having a narrow blade to avoid excessive holding up of the stream during the cutting.

8. Apparatus as claimed in claim 1 wherein the accelerator means comprises a rotatable segmental roller adapted to press each length, after it is severed, against the said endless conveyor, the tobacco-engaging surface of the said roller being arranged to move at a speed greater than the speed of the said uncut tobacco stream.

9. Apparatus as claimed in claim 1 wherein the aligned stubs and severed lengths of tobacco are fed by the said conveyor to a cigarette paper web which is caused to move at a slower speed than the said endless conveyor so as to cause the stubs and tobacco lengths to close up endwise.

DESMOND WALTER MOLINS.

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