June 21, 1955 D. W. MOLINS 2,711,175

MANUFACTURE OF CIGARETTES

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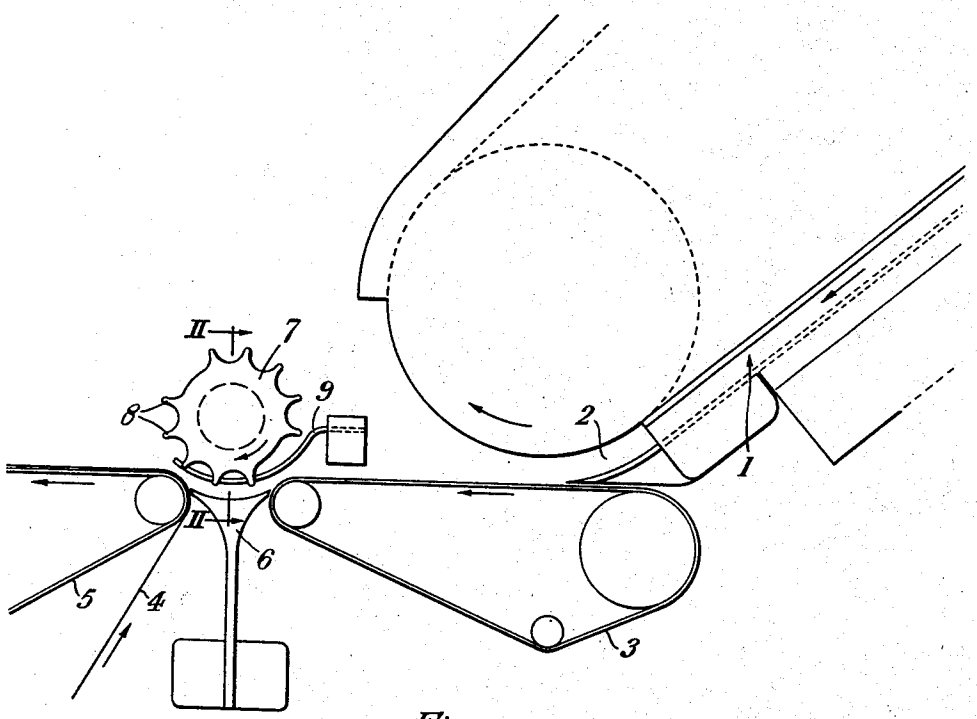


Fig. 1.

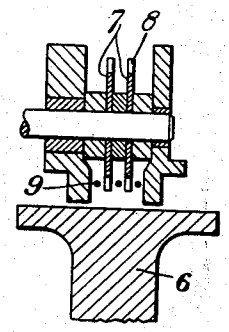


Fig. 2.

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MANUFACTURE OF CIGARETTES

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6 Claims. (Cl. 131—61)

This invention concerns improvements in or relating to the manufacture of cigarettes, and has for its object to provide a method of and means for forming a continuous tobacco stream along whose length the tobacco is alternately denser and less dense, so that the continuous rod formed from the stream can be cut through the denser parts to produce cigarettes in which the tobacco at one or both ends is denser than elsewhere in the cigarettes.

According to the present invention there is provided a method of forming a stream of tobacco having alternating portions of greater and less density, comprising feeding a stream of tobacco lengthwise, increasing the speed of the stream, and elongating spaced portions of the stream while increasing its speed, whereby the density of the tobacco in said spaced portions is reduced below that of the tobacco in other parts of the stream.

Further according to the invention there is provided a method of forming a stream of tobacco having alternating portions of greater and less density, comprising forming a continuous stream of tobacco and feeding it lengthwise on a conveyor, transferring the stream lengthwise to a moving conveyor and during said transfer engaging and accelerating tobacco in spaced portions along the length of the stream so as to draw out lengthwise the tobacco so engaged and thereby to elongate the said portions and so reduce the density of the tobacco in the said portions below that of the tobacco in other parts of the stream.

Further according to the present invention there is provided means for forming a stream of tobacco having alternating portions of greater and less density, comprising a conveyor to feed a tobacco stream lengthwise, a further conveyor to receive the stream from, and arranged to move faster than, the first said conveyor, and accelerating means to assist in transferring the stream from the slower to the faster conveyor, the said accelerating means comprising one or more members (e. g. one or more fingers) arranged to move periodically into and out of engagement with the tobacco so as to engage tobacco in spaced portions along the length of the stream, and while engaging the tobacco to move faster than the first said conveyor. By this means the tobacco in the said spaced portions is accelerated thereby elongating the latter thus reducing the density of the tobacco in the said spaced portions below that of the tobacco in parts of the stream between the said spaced portions.

The said tobacco engaging member or members may consist of one or more projections on a rotatable element. The rotatable element may consist of a wheel having a plurality of fingers arranged about a part of its periphery, while another part of the periphery is blank, the wheel being arranged to rotate at a speed such that the tobacco-engaging ends of the fingers move at a faster linear speed than that of the first said conveyor. In such a case the fingers are so arranged about the periphery of the wheel that on rotation of the wheel a group of fingers moves into and out of engagement with the tobacco so as to cause elongation of spaced portions of the stream, the parts of the stream between the said spaced portions passing beneath a blank part of the periphery of the wheel.

The expression "tobacco stream" or "stream of tobacco" when used herein is to be understood as including any stream of unwrapped tobacco. In the construction about to be described by way of example, the tobacco stream referred to is one that has already been subjected to a reduction of speed in a confining passage in the manner described in the complete specification of United States patent application, Serial No. 86,628, filed April 11, 1949, and is, in the language employed in that specification, in the form of a "loose filler." Although such a "loose filler" is thought to be particularly suitable for the purpose of the present invention, the expression "tobacco stream" is not to be taken as limited to that or any other particular form of stream of unwrapped tobacco.

A construction operating in accordance with the invention will now be described by way of example with reference to the accompanying drawing in which:

Figure 1 is a diagrammatic view of a fragment of a cigarette machine showing the invention applied thereto

Figure 2 is a section of Figure 1 on the line II—II but showing the actual constructional details.

Referring to the drawing the cigarette machine has apparatus marked 1 for forming a tobacco filler as disclosed in the complete specification and drawings of United States patent application, Serial No. 86,628, but modified in that instead of having a moving cigarette paper web arranged to receive the tobacco filler from the confining passage 2 (in which the speed of the tobacco is reduced and the consistency of the stream is improved) an endless canvas band 3 receives the filler and feeds it forwardly lengthwise a short distance. The filler (which for the purpose of the present description will hereinafter be referred to as a "stream") is thereafter transferred lengthwise on to a cigarette paper web 4 carried by an endless conveyor 5 which moves faster than the band 3. A short arcuate bridge-piece 6 is arranged between the two conveyors.

Above the bridge-piece is mounted a rotatable wheel 7 which has a number of pins or fingers 8 extending from its periphery. The fingers are so arranged that on rotation of the wheel they move into engagement with tobacco in that part of the stream which is passing from the slower to the faster moving conveyor over the arcuate bridge piece, which is shaped in an arc concentric with the wheel. Thus each finger remains in engagement with tobacco as long as the latter is on the bridge piece, and then moves out of engagement with the tobacco as the latter passes on to the paper web on the faster moving conveyor.

The fingers are arranged in two groups, see Figure 1, about the periphery of the wheel, with two intervening blank spaces. The wheel is arranged to rotate at a speed such that the linear speed of the tobacco-engaging ends of the fingers is equal to that of the faster-moving conveyor 5, and thus the fingers when they move into engagement with the tobacco are moving faster than the tobacco so engaged. As the fingers of a group move successively into engagement with the stream, the tobacco so engaged by each finger is accelerated, and caused to move at the speed of the faster conveyor. Thus the tobacco as it is engaged by successive fingers in a group is teased out or drawn out lengthwise so that the portion of the tobacco stream engaged by all the fingers of that group is elongated while the speed of the tobacco so engaged is increased to that of the paper web. This drawing out and elongation of the tobacco has the effect of reducing the density of the tobacco in that portion of the stream. The group of fingers just referred to is followed by a blank space on the periphery of the wheel,

and thus the part of the stream passing on to the bridge piece immediately following the elongated portion is not engaged by fingers, and therefore its density is unchanged, or substantially so, as it moves bodily on to the faster moving conveyor. The next group of fingers then moves into engagement with the stream and a further portion is elongated as described above, while the leading fingers of this next group assist in accelerating as a whole the relatively dense part of the stream which is then moving on to the faster conveyor.

A pressing element 9, comprising a number of resilient fingers made of piano wire or other suitable material, is arranged above the path of the tobacco so that the fingers extend beneath the wheel and above and lengthwise of the tobacco stream in the region where the latter passes from the faster conveyor over the bridge-piece and on to the paper web, and resiliently press down upon the tobacco stream. The arrangement of the pressing element is similar to that described and illustrated in the specification of United States patent application, Serial No. 191,608, filed October 23, 1950.

Thus it will be seen that tobacco in spaced portions along the stream is intermittently engaged by the fingers and elongated so as to have its density reduced, while the parts of the stream between the said spaced portions pass beneath the blank parts of the wheel and do not have their density reduced, or at any rate remain at a density greater than that of the elongated portions.

The arrangement on the wheel of the groups of fingers and blank spaces is such that the spaced portions of the stream engaged by the fingers, and the parts which pass beneath the blank spaces, have respectively the lengths desired in the portions of reduced density and the parts of greater density in the tobacco stream.

The stream delivered on to the faster moving conveyor, and moving at the faster speed, thus has alternating portions of greater and less density which are suitably spaced along the length of the stream to enable the continuous rod formed from the stream to be cut through the denser portions so as to produce cigarettes in which the tobacco at one or both ends, as may be desired, is denser than elsewhere in the cigarettes. If it is desired that the cigarettes should be denser at both ends, the fingers are so grouped on the periphery of the wheel as to cause a portion of reduced density to be somewhat shorter than the length of a cigarette. If on the other hand it is required to have the denser tobacco at one end only of a cigarette (such as when the cigarettes are later assembled with filter plugs, to form filter tip cigarettes), the grouping of the fingers is such that the portions of lower density are longer than in the case just referred to.

If for example the cigarettes are to be assembled with plugs in the manner described in United States Patent No. 2,156,600, each cigarette made will be double the length of the tobacco portion of a finished filter tip cigarette. If then it is desired to have the denser part of the tobacco at the end of the finished cigarette adjacent the plug, the fingers are so grouped as to provide portions of lower density which are somewhat shorter than a double-length cigarette, and the rod will be cut through the denser portions to provide double-length cigarettes, and these will be later assembled with double-length plugs in a continuous rod in which the denser tobacco portions will be adjacent the plugs.

It is to be understood that when reference is made herein to the density of the stream, this expression is to be taken to mean primarily the weight per unit length of the stream and not necessarily also the weight per unit volume, since there may be found to be some difference between the cross-sectional areas of the elongated portions (which are referred to herein as being "less dense") and the parts of the stream which are not engaged by the fingers. In the example being described, however, the stream of tobacco on the slower-moving

conveyor has a cross-sectional area substantially greater than that of the final cigarette rod, and thus the stream must eventually be reduced to uniform cross-sectional area when it is formed into a rod, and therefore the tobacco in the eventual cigarette rod will have along its length alternating portions of greater and less density in the sense of "weight per unit volume" as well as in the sense of "weight per unit length." In any case it is thought that the teasing or drawing action of the fingers on the tobacco does reduce the weight per unit volume of the tobacco so acted upon as well as elongating the portions of the stream engaged and so reducing the weight per unit length of the tobacco in those portions.

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

1. A method of forming a stream of tobacco having alternating portions of greater and less density, comprising feeding a stream of tobacco lengthwise, increasing the speed of the stream, repeatedly engaging and accelerating the tobacco in spaced portions only of the stream to effect elongation of such spaced portions while maintaining the continuity of the stream and increasing its speed whereby the density of the tobacco in said spaced portions is reduced below that of the tobacco in other parts of the stream.

2. A method of forming a stream of tobacco having alternating portions of greater and less density, comprising forming a continuous stream of tobacco and feeding it lengthwise on a conveyor, transferring the stream lengthwise to a moving conveyor and during said transfer intermittently engaging and accelerating tobacco in spaced portions along the length of the stream so as to draw out lengthwise the tobacco so engaged and thereby to elongate the said portions while maintaining the continuity thereof, and so reduce the density of the tobacco in the said portions below that of the tobacco in other parts of the stream.

3. Means for forming a stream of tobacco having alternating portions of greater and less density, comprising a conveyor to feed a tobacco stream lengthwise, a further conveyor to receive the stream from, and arranged to move faster than, the first said conveyor, and accelerating means to assist in transferring the stream from the slower to the faster conveyor, the said accelerating means comprising a group of members one behind the other spaced apart in a non-uniform way and arranged to move periodically into and out of engagement with the tobacco so that all the members of said group in turn engage tobacco in each of a succession of spaced portions along the length of the stream, and while engaging the tobacco to move faster than the first said conveyor.

4. Apparatus as claimed in claim 3 wherein the accelerating means consists of a group of projections non-uniformly spaced about a rotatable element.

5. Apparatus as claimed in claim 4 wherein the rotatable element is a wheel having a plurality of fingers arranged about part of its periphery, while another part of the periphery is blank, the wheel being arranged to rotate at a speed such that the tobacco-engaging ends of all the said fingers engage tobacco in each said portion and move at a faster linear speed than that of the first said conveyor.

6. Apparatus as claimed in claim 4 comprising a pressing element adapted to press resiliently on the tobacco stream in the region of the rotatable element.

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