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(54) Applying liquid additive foam to tobacco filler.

(57) In a cigarette-making machine a stream of tobacco passes from ecreteur 18 past splitter knife 63 and liquid additive foam is applied by nozzle 58. The moist tobacco stream is deposited by vacuum belt 12 onto conveyor belt 160 for passage through a microwave cavity 140 which dries and sets the additive foam. The tobacco is then delivered to garniture tape 22 for formation and wrapping of the tobacco rod.

Alternatives described have the foam nozzle 58 upstream of trimmer knife 18 with drying and setting upstream or downstream of knife 18. Hot air may be used as an alternative to microwave heating.

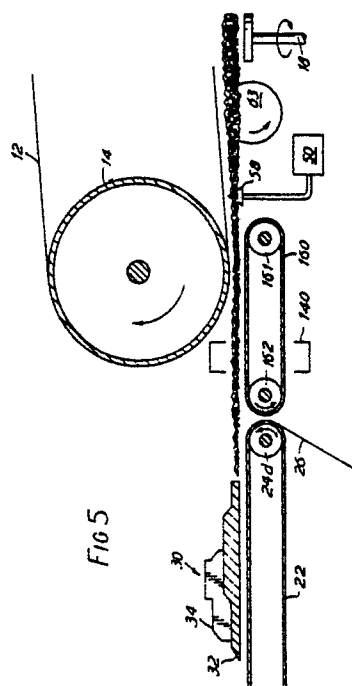


Fig 5

EP 0 259 071 A2

APPLYING LIQUID ADDITIVE FOAM TO TOBACCO FILLER

The present invention relates to an apparatus and method for processing tobacco and more particularly to the application of a liquid additive foam to tobacco in the course of cigarette manufacturing.

Our European Patent Application No. 85305139.9, published on 26th February 1986 under number 0172654 describes a method in which a liquid additive foam is applied to tobacco in the course of manufacture of cigarettes, either in the chimney of a cigarette-making machine - particularly the belt guide section of the chimney - or as the tobacco is deposited on the moving garniture tape, or between the ecreteur and the short tongue, or at the short tongue. It is also disclosed that the liquid additive foam could be injected into the tobacco rod of a finished cigarette by injecting it through the end of the tobacco rod using a needle.

Because the additive material was applied as a foam, a small amount could be more uniformly applied over a large amount of tobacco. Further, much less liquid or solvent need be used as compared to earlier methods of applying additive material.

However, even the small amount of liquid used in the liquid additive foam may mar the wrapper of a finished cigarette made with the treated tobacco filler. Further, where the liquid additive foam is a binder, intended to increase the firmness of the finished cigarette, if the filler is compressed to make the cigarette before the foam has set, the full firmness-increasing effect of the binder may not be realized.

It would be desirable to be able to dry and set a liquid additive foam that has been added to tobacco filler in a cigarette making machine, said drying and setting occurring prior to the incorporation of the filler into a finished cigarette.

Summary of the Invention

It is therefore an object of this invention to be able to dry and set a liquid additive foam that has been added to tobacco filler in a cigarette making machine, said drying and setting occurring prior to the incorporation of the filler into a finished cigarette.

In accordance with this invention, there is provided apparatus for manufacturing cigarettes comprising a cigarette maker having means for providing a moving stream of tobacco, an inlet chimney for receiving cut tobacco filler, an ecreteur section, and a garniture, movable garniture tape and short tongue for forming said filler into a cigarette rod. The apparatus also comprises means for producing

a liquid additive foam, means for applying said liquid additive foam to said moving stream of tobacco, and means for drying and setting said applied liquid additive foam.

5 A cigarette manufacturing method according to this invention comprises providing a moving stream of tobacco, producing a liquid additive foam, applying said liquid additive foam to said moving stream of tobacco, and drying and setting said applied liquid additive foam.

10 The present invention involves treating tobacco filler with a flavouring or other material applied in the form of a liquid additive foam. By using a liquid additive foam, the filler can be impregnated thoroughly due to the exceptional penetrating ability of foam. The low density of foam also enables application of materials in a quantity sufficient to permeate the filler without staining the cigarette wrapper. The liquid additive foam may be added to 15 the filler either in the chimney of a cigarette maker, before the tobacco leaves the vacuum belt, as the tobacco drops off the vacuum belt, at the short tongue, or at any other suitable location prior to enclosing the tobacco rod in a wrapper. Where the liquid foam is applied before the short tongue, the treated filler can be dried and set by the application of hot air, ambient temperature air, reduced humidity ambient temperature air, or microwave radiation. The liquid additive foam may also be 20 applied to the tobacco filler prior to transporting the filler to a cigarette maker or it may be applied to finished cigarettes through a hollow tube.

25 The above and other objects and advantages of the invention will be apparent upon consideration of the following detailed description, taken in conjunction with the accompanying drawings, in which like reference characters refer to like parts throughout, and in which:

30 Figure 1 is a vertical cross-sectional view of the chimney section of a cigarette making machine, modified for drying and setting applied liquid additive foam;

35 Figure 2 is a vertical cross-sectional view of the chimney section of a cigarette-making machine, modified in a second way for drying and setting applied liquid additive foam;

40 Figure 3 is a vertical cross-sectional view of the chimney section of a cigarette-making machine, modified in a third way for drying and setting applied liquid additive foam;

45 Figure 4 is a vertical cross-sectional view of the ecreteur section of a cigarette-making machine, modified for drying and setting applied liquid additive foam.

Figure 5 shows a modification of Figure 4.

After the foamed material has been added to the tobacco filler as described in our European patent specification No. 0172655, referred to above, it is preferable to dry and set the foam, evaporating the liquid or solvent contained in it. As discussed above, drying reduces the cigarette wrapper staining that can be caused even by the small amount of liquid or solvent in the foam. In addition, if a particular final moisture level is desired, drying allows the addition of more additive while achieving the same final moisture level. Setting the foam optimizes its firmness-improving abilities.

The embodiments shown in Figures 1 and 2 use conditioned forced air to dry and set the foamed material. The conditioned air is heated to a temperature appropriate to dry and set the particular foamed material being used and is humidified to prevent overdrying or toasting of the tobacco filler. Alternatively, the conditioned air can be ambient temperature air at ambient or reduced humidity.

In the embodiment of Figure 1, the drying and setting takes place in the chimney 10 of a cigarette maker such as is shown in Figure 1 of European patent specification 0172654.

Tobacco is blown from the chimney 10 onto a perforated vacuum belt 12 driven by rollers 14 and 16 to convey the tobacco to ecreteur or trimmer knife assembly 18. Foam generator 50 supplies additional foamed adhesive through pipe 51 to a nozzle 58 which injects adhesive parallel to the belt 12.

The cigarette making machine normally includes a fan 120 which supplies air through conduit 121 to chimney 10 to transport the tobacco filler. The air is removed by manifold 122 and returned to fan 120 by conduit 123. By interposing conditioner 124 in conduit 123, the air stream in chimney 10 can be heated and humidified to the proper levels, or otherwise conditioned, and then a portion of the conditioned air can be allowed to impinge on the tobacco held by vacuum belt 12 downstream of foam-applying nozzle 58. The air flow in chimney 10 is illustrated by arrows A.

In the embodiment shown in Figure 2, vacuum belt 12' extends beyond ecreteur 18, running over rollers 14', 16, and garniture tape 22 (shown in European patent specification 0 172 654) does not begin until the end of vacuum belt 12'. A supply 130 of air, conditioned as described above, provides a flow of air for drying and setting the foamed material between ecreteur 18 and garniture tape 22. Air supply 130 can come from fan 120 or could be a separate supply.

The embodiments of Figures 1 and 2, which rely on heated or conditioned air to perform the drying and setting of the foamed material, may result in proper drying and setting of the outer

layers of the mass of tobacco filler exposed to the air, but, even with conditioning of the relative humidity level of the air, may result in overdrying or toasting of those outer layers if the process is continued until the interior of the mass is also dried and set. This result, in particular, from the tendency of the foamed material, while were, to accumulate at the crossover points between tobacco shreds in the interior of the mass of tobacco filler. Therefore, in the embodiments of Figures 3 and 4, the foamed material added to the tobacco filler is dried and set by exposing it to microwave radiation, which reaches and heats moisture in foamed material within the tobacco mass at essentially the same time that it reaches and heats the moisture in foamed material in the outer layers of the tobacco mass.

As in Figure 2, vacuum belt 12' extends in the embodiment of Figure 3 beyond ecreteur 18, running over rollers 14', 16, and garniture tape 22 (not shown) does not begin until the end of vacuum belt 12'. The section of vacuum belt 12' between ecreteur 18 and garniture tape 22 passes through a microwave cavity 140, so that the tobacco filler containing the wet foamed material is exposed to microwave radiation as it passes through cavity 140, drying and setting the foamed material. The power level of the microwave radiation is set based on the speed of vacuum belt 12' and the total amount of energy required to adequately dry and set the foamed material. For example, if 480 watt-seconds of energy are required, and belt 12' moves at 400 feet per minute, then if microwave cavity 140 has a length of 0.4 feet, so that tobacco transits cavity 140 in 0.06 seconds, the power level should be set to 8000 watts.

In the embodiment of Figure 4 another method of adding foamed material to the tobacco is used. A splitter blade 63 turns in the direction shown at such a speed that the linear velocity of the outer edge of the blade 63 is greater than or equal to the speed of advance of the tobacco in the belt 12. The blade 63 opens up the moving stream of tobacco for foamed material to be applied inside the tobacco bed from generator 50 through nozzle 58.

A garniture tape 22 running over an idler roller 24d carries the tobacco under a short tongue 30 which comprises a compression foot 32 mounted on an arm 34. The compression foot has a longitudinal channel of semi-cylindrical shape which cooperates with a garniture (not shown) to form the tobacco into a cylindrical rod. Cigarette paper 26 is fed onto the garniture tape 22 to be wrapped round the formed rod. The microwave cavity 40 is positioned round the garniture tape 22 after the end of vacuum belt 12 and before short tongue 30.

The power level and length of microwave cavity 140 are determined in this case based on the speed of garniture tape 22, rather than that of the vacuum belt.

Figure 5 shows a modification of the embodiment of Figure 4 in which the tobacco passes through the microwave cavity 140 before being delivered to the garniture tape 22. This may be of advantage if the short period during which the moist tobacco rests on the cigarette paper 26 in the apparatus of Figure 4 results in staining. It also avoids passage of the cigarette paper through the microwave cavity. The tobacco falling from the vacuum belt 12 is received by a belt 160 running around rollers 161 and 162 and is advanced through the cavity 140 on the belt 160. It is delivered to the garniture tape 22 downstream of the cavity 140.

Because it is desirable that the microwave energy is used to dry and set the foamed material as efficiently as possible, and to prevent damage to microwave cavity 140, the embodiments of Figures 3, 4 and 5 should be constructed so that only microwave-compatible materials pass through microwave cavity 140. By microwave-compatible is meant microwave transparent, i.e., neither microwave-absorptive nor microwave-reflective. The use of microwave-absorptive materials would waste energy because energy that would otherwise be used to dry and set the foamed material would be absorbed by other materials in the cavity. The use of microwave-reflective materials, particularly metals, would cause internal reflections of microwave energy within cavity 140 which could damage the cavity.

In particular, in the embodiment of Figure 3 vacuum belt 12 should be nonmetallic. In addition, at least that portion of belt guide 62 (not shown in Figure 3) which passes through cavity 140 should also be nonmetallic. In the embodiment of Figure 4, garniture tape 22, and at least that portion of garniture 20 (not shown in Figure 4) passing through cavity 140, should be nonmetallic. In the embodiment of Figure 5, belt 160 should be nonmetallic. In any of these three embodiments, the nonmetallic material used is preferably microwave-transparent (nonabsorptive) as well.

Claims

1. Apparatus for manufacturing cigarettes, said apparatus comprising:

a cigarette maker having means for providing a moving stream of tobacco, said maker including an inlet chimney for receiving cut tobacco filler, an ecreteur section, and a garniture, movable garniture tape and short tongue for foaming said filler into a

cigarette rod;

means for producing a liquid additive foam;

means for applying said liquid additive foam to said moving stream of tobacco; and

means for drying and setting said applied liquid additive foam.

2. The apparatus of claim 1 wherein said drying and setting means comprises means for heating said applied liquid additive foam.

3. The apparatus of claim 2 wherein said heating means comprises means for contacting said filler and said applied liquid additive foam with a heated fluid.

4. The apparatus of claim 3 wherein said fluid is air.

5. The apparatus of claim 2 wherein said heating means comprises means for exposing said filler and said applied liquid additive foam to microwave radiation.

6. A method for manufacturing cigarettes, said method comprising:

providing a moving stream of tobacco;

producing a liquid additive foam;

applying said liquid additive foam to said moving stream of tobacco; and

drying and setting said applied liquid additive foam.

7. The method of claim 6 wherein said drying and setting step comprises heating said applied liquid additive foam.

8. The method of claim 7 wherein said heating step comprises contacting said filler and said applied liquid additive foam with a heated fluid.

9. The method of claim 8 wherein said contacting step comprising contacting said filler and said applied liquid additive foam with heated air.

10. The method of claim 7 wherein said heating step comprises exposing said filler and said applied liquid additive foam to microwave radiation.

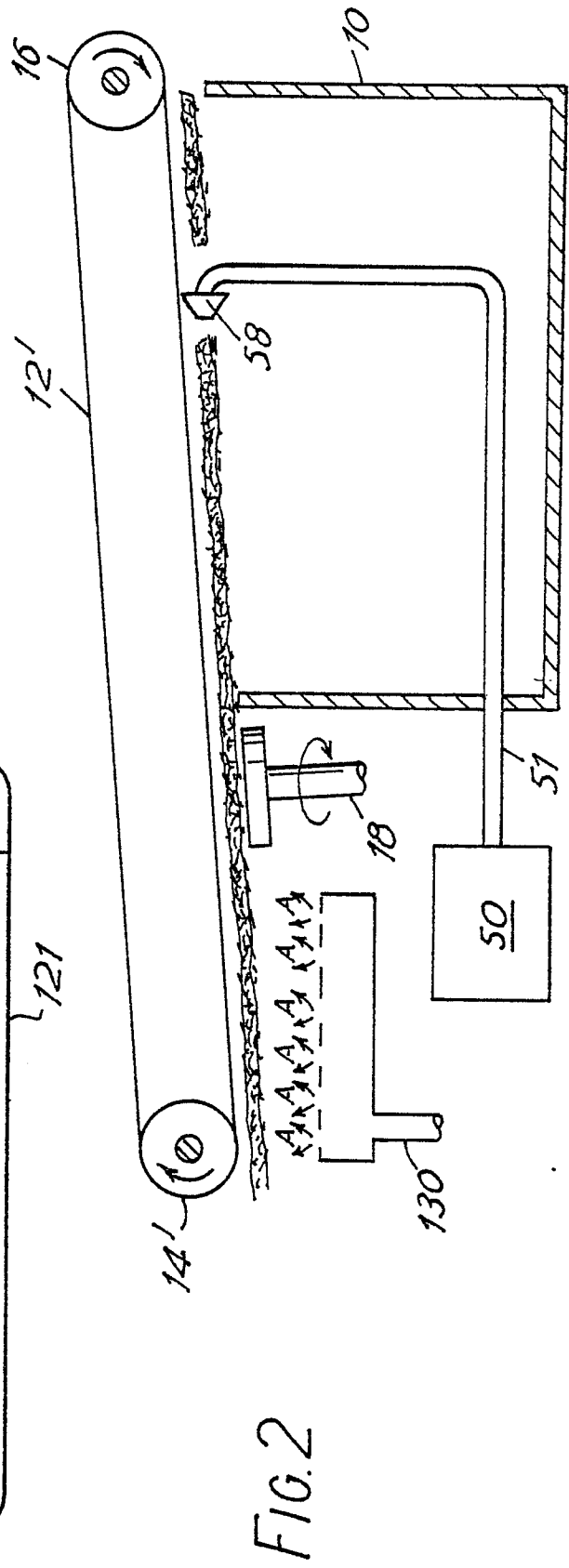
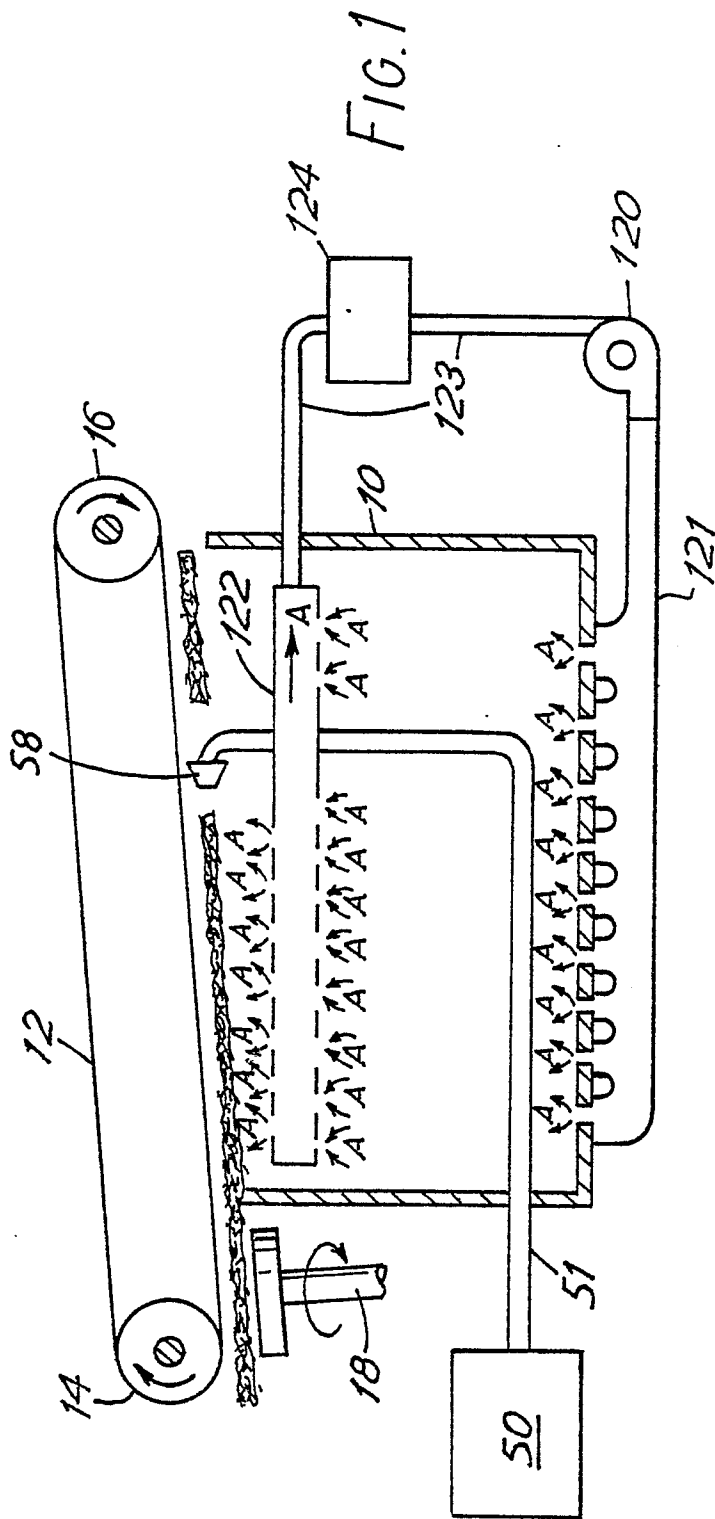


FIG. 3

