

Apparatus and Method for applying
Plasticizers to Fibrous Filter Material

This invention relates to improvements in apparatus and method for applying a liquid plasticizer to a continuously moving tow or band of filamentary filter material. More particularly, the invention relates to an apparatus for applying plasticizer to fibrous filter material in which the rate of application of the plasticizer is independent of the tow-band weight or tow-band width.

10 Machines for making filter rods specifically used for cigarette filters are generally provided with apparatus for applying plasticizers to fibrous filter tow material. Plasticizers are softening agents which promote adherence between the filaments to form an integrated filament

15 network. Conventionally the means for adding plasticizer to moving filament tow in a filter rod making machine is by spraying plasticizer in the form of fine droplets against one side, usually the underside, of a travelling layer of fibrous filter material. Among patents which deal

20 with the addition of plasticizer to filter tow are U.S. Patents Nos. 3,387,992; 3,733,246; 3,741,846; 3,769,883; 3,865,016; 3,974,007; 4,019,942; 4,046,064 and UK Patent Application No. 2042375A. U.S. Patent No. 4,132,189 discloses apparatus, for applying plasticizer to a band

25 or sheet of cigarette filter material in which in one embodiment, a rotary brush is disposed, beneath a moving filter band, in a plasticizer receptacle to pick up

plasticizer and spray fling it upwardly to the underside of the filter band. A main plasticizer supply tank is connected to an intermediate tank by a conduit through which a centrifugal pump moves the plasticizer. The intermediate tank is connected to the plasticizer receptacle by another conduit and a variable speed pump is provided to move the plasticizer from the intermediate tank to the receptacle. The intermediate tank is also provided with an overflow conduit communicating with the main supply tank so that the level of plasticizer in the intermediate tank remains constant. The rate of flow of plasticizer from the intermediate tank to the receptacle having the rotary brush is controlled by the variable speed pump as a function of the speed at which the filter band moves past the brush. However, in operation, if the width or thickness of the filter band changes as it passes through the apparatus, different amounts of plasticizer will be added to the filter band and non-uniformity of plasticizer in the filter rod will result.

This invention provides an apparatus, for applying liquid plasticizer to the underside of a moving band or sheet of fibrous filter material, in which the application rate of the liquid plasticizer to the material is unaffected by filter material weight variation. It also provides a liquid plasticizer application device having means to self-regulate the plasticizer application rate independently of change in the width of the filter material to which the plasticizer is being added.

According to - 3 -

~~In a preferred embodiment of~~ the present invention there is provided an apparatus for applying a controlled amount of a liquid to a moving band of filamentary material comprising a housing through which the band passes defining a reservoir below and open to the path of the band; a brush type liquid applicator rotatably mounted below the path of the band for spraying liquid upwardly onto the band for absorption by the band; a dip roller rotatably mounted at the reservoir near the applicator brush and in contact with liquid collected in the reservoir to transfer liquid from the reservoir to the brush; a source of supply of the liquid; flow communication means for establishing liquid flow communication from the supply source to the reservoir; a pump with a constant volume rate of flow in said liquid flow communication means for so moving a constant volume of flow from said supply source to the reservoir equal to the amount to be ultimately absorbed by the band that, as the liquid not initially absorbed by the band drains back into the reservoir, the liquid level in the reservoir rises so that the dip roller, not having to carry the liquid as far from the raised liquid level in the reservoir to the applicator brush as when the liquid level was lower, increases the rate at which liquid is carried to the applicator brush for absorption by the band.

Preferably, the apparatus further comprises means for detecting the liquid level in the reservoir and preventing the liquid level from exceeding a predetermined

maximum and falling below a predetermined minimum.

It is to be understood that the description of the present invention given hereinafter is not by way of limitation and various modifications within
5 the scope of the present invention will occur to those skilled in the art upon reading the disclosure set forth hereinafter.

A preferred embodiment of the invention will now be described by way of example with reference to the
10 drawing which shows a diagrammatic representation of the invention.

With reference to the Figure, there is shown, in diagrammatic form, an advantageous embodiment of an apparatus, generally denoted as the numeral 210, for
15 applying a controlled amount of a liquid 212 to a moving tow or band 214 of filamentary material of the type used, for example, to manufacture cigarette filters.

The apparatus 210 comprises a housing 216 through
20 which the band of tow 214 passes. A reservoir 218 in the housing below is open to the path of the band 214. A brush-type liquid applicator 220 is rotatably mounted within the housing 216 above the level of the liquid 212 in the reservoir 218 and below the path of
25 the band 214. A dip roller 222 is rotatably mounted at the reservoir 218 near the applicator brush 220 and in contact with the liquid 212 collected in the reservoir

218. The dip roller 22 is rotatably driven at a constant angular velocity to transfer liquid from the reservoir to the applicator brush 220. The applicator brush 220 is rotatably driven in the opposite
5 rotational direction from that to the dip roller 222, and as it rotates it sprays a mist of liquid upwardly onto the band 214 passing above, for absorption by the band. A supply source 224 of liquid 212 is in
10 flow communication with the reservoir 218 by means of a liquid supply conduit 226 which has an inlet end 228 open to the interior of the source 224 and an outlet end 230 open to the interior of the reservoir 218. The liquid 212 is moved through the liquid supply con-
15 duit 226 from the source 224 to the reservoir 218 by means of a pump 232 with a constant volume rate of flow. The pump 232 can be virtually any convenient type of positive displacement pump, for example, a gear pump. The pump 232 is appropriately controlled
20 to deliver liquid 212 to the reservoir 218 equal to the amount of liquid to be ultimately absorbed by the band 214. In a gear pump, the amount of liquid pumped can be selectively changed by altering the pump rotational speed. Initially, the band will not absorb all
25 of the liquid it is desired to be applied thereto, and the liquid not absorbed drains therefrom back into the reservoir 218. As the level of liquid 212 in the reservoir rises, the dip roller 222 does not have

to carry liquid as far from the raised liquid level to the applicator brush 220 as it had to initially when the liquid level was lower. Thus, the dip roller 222 carries an excess of liquid to the applicator brush 220 and the tow 214. The amount of liquid absorbed by the band eventually is brought into equilibrium with the amount of liquid supplied by the pump 232.

As a safety measure, the apparatus 210 also includes means 48 for detecting the liquid level in the reservoir 18. As illustrated in the Figure, the level detecting means 48 comprises a float activated switch 50 operatively connected to a signal device or to the power supply 52 to the apparatus 210. If the liquid level in the reservoir exceeds a predetermined maximum or falls below a predetermined minimum, the level detecting means is activated, setting off the signal or switching off the apparatus 210. The production of a defective band 214 is thus avoided.

Thus, it can be seen that the apparatus of the present invention is capable of supplying an overabundance of liquid to the tow without any waste of liquid to assure that the tow is saturated with the proper amount of liquid.

CLAIMS:

1. An apparatus for applying a controlled amount of a liquid to a moving band of filamentary material, comprising,

5 a housing through which said band passes defining a reservoir below and open to the path of said band,

a brush type liquid applicator rotatably mounted below the path of said band for spraying liquid upwardly onto said band for absorption by said band,

10 a dip roller rotatably mounted at said reservoir near the applicator brush and in contact with liquid collected in said reservoir to transfer liquid from said reservoir to said applicator brush,

a source of supply of the liquid; ^{communication} ~~flow communication~~ means for establishing liquid flow communication from 15 said supply source to said reservoir,

a pump with a constant volume rate of flow in said liquid flow communication means for so moving a constant volume of flow from said supply source to said reservoir equal to the amount of liquid to be ultimately absorbed 20 by said band that, as the liquid not initially absorbed by said band drains back into said reservoir, the liquid level in said reservoir rises so that said dip roller, not having to carry the liquid as far from the raised liquid level in said reservoir to said applicator brush 25 as when the liquid level was lower, increases the rate



at which liquid is carried to said applicator brush
for absorption to said band.

2. The apparatus of claim 1, further comprising
means for detecting the liquid level in the reservoir
5 and preventing the liquid level from exceeding a
predetermined maximum and falling below a predetermined
minimum.

3. An apparatus for supplying a controlled amount
of a liquid to a moving band of filamentary material
10 substantially as described herein with reference to
and as illustrated in ~~Figure 3 of~~ the accompanying
drawing.

