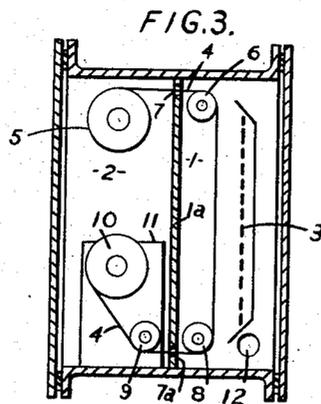
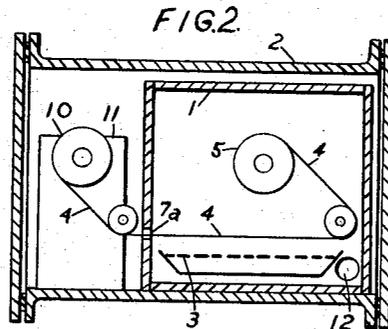
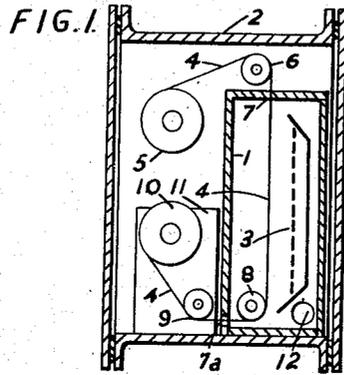


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METHOD OF ELIMINATING MOISTURE FROM THE SURFACE OF
MOISTURE ABSORBENT SHEET MATERIAL
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METHOD OF ELIMINATING MOISTURE FROM THE SURFACE OF MOISTURE- ABSORBENT SHEET MATERIAL

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4 Claims. (Cl. 34-16)

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This invention relates to methods of eliminating moisture from the surface of moisture absorbent sheet material on which metal is to be deposited by thermal evaporation in a vacuum, and to apparatus for so treating the material.

In applicant's United States Patent specification Number 2,402,269 there is described a method of eliminating moisture from a moisture absorbent sheet material e. g. paper by heating one surface of the material in a vacuum chamber by radiant heat, whereby the said surface is freed from moisture without so far drying the whole body of the material as to render it unduly brittle.

The main object of the present invention is to devise an improved method of treating moisture absorbent material (such as paper or transparent sheet material sold under the registered trade-mark "Cellophane") containing plasticizers, such as glycerine which have a very low vapour pressure at atmospheric temperature.

According to the present invention a roll of the absorbent material is gradually unwound and progressively exposed in web form in a vacuum chamber (heating chamber) at a moderate vacuum (e. g. at a pressure of from 0.05 to 0.5 mm. of mercury) to radiant heat and passed out of the heating chamber whilst hot to a communicating re-rolling chamber adapted to be vacuumized, the pressure in the vacuumized re-rolling chamber being maintained at a higher pressure than that in the vacuumized heating chamber, whereby one surface only of the web is freed of the plasticizer and the vapour of the plasticizer is prevented from gaining access to the re-rolling chamber.

By the present invention the heated material is re-rolled without exposing the treated surface when cooled to the vapour evolved from it during the heat treatment, and may be thereafter coated in a separate vacuum chamber with a metal by the known thermal evaporation methods. This deposition cannot be commercially performed in the re-rolling chamber because the low pressure required could not be economically maintained in the heating chamber.

The present invention also comprises apparatus for depriving one surface of a moisture absorbent material in web form of a plasticizer, such as glycerine, which has a very low vapour pressure at atmospheric temperature characterised by two chambers adapted to be vacuumized, one of said chambers (the heating chamber) containing a heater providing radiant heat for the web, and the other (the re-rolling chamber)

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containing a "take up" roll, the heating chamber communicating with the re-rolling chamber only by one or two slits in the wall of the heating chamber through which the web passes, the slit through which the web passes out of the heating chamber being situated so close to the heater that the web leaves the heating chamber whilst still hot, the two chambers being evacuated by exhausting means connected to the heating chamber so that the re-rolling chamber is evacuated solely by flow of gas from it into the heating chamber through the said slit or slits.

The supply roll may be in the heating chamber in which case only one slit will be required in the wall of the heating chamber or may be disposed together with the take up roll in the re-rolling chamber in which latter case two slits are required in the wall of the heating chamber.

By such arrangement the two chambers are simultaneously evacuated whilst maintaining a lower pressure in the heating chamber than in the re-rolling, whereby there is a continual flow of gas from the re-rolling to the heating chamber and vapour evolved in the latter cannot pass to the re-rolling chamber.

The re-rolled material is removed from the re-rolling chamber and then mounted in an independent vacuum chamber on which metal deposition is effected under a very much lower pressure.

In order that the invention may be more clearly understood reference will now be made to the accompanying diagrammatic drawings, which show by way of example preferred embodiments of the present invention.

In the drawings:

Figures 1 and 2 are sectional views showing the heating and re-rolling chambers, the supply roll being outside the heating chamber in Figure 1 and inside the heating chamber in Figure 2.

Figure 3 is a sectional view showing a modification of the arrangement shown in Figure 1.

The same reference numerals indicate similar parts in the two figures.

The vacuum chamber 1, herein termed the heating chamber, is enclosed within a chamber 2, herein termed the re-rolling chamber, the chamber 1 contains the source of radiant heat constituted by an electric heater 3.

Referring first to Figure 1, a web of material 4 (in the manufacture of which glycerine has been used as a plasticizer), emanating from a supply roll 5 in the re-rolling chamber, passes over a guide roll 6 and through a slit 7 in the wall of the heating chamber. In the heating

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chamber the face of the web intended eventually to be coated, by condensation thereon of the vapour of metal produced by thermal evaporation in a vacuum, passes in front of the heater 3, thence over a guide roll 8, and out of the heating chamber 1 through a second slit 7a in the wall of the chamber, thence over a guide roll 9 to the take-up roll 10, in the re-rolling chamber 2, driven by a clockwork motor indicated at 11.

The arrangement is similar in Figure 2, except that the supply roll 5 is in the heating chamber 1, and there is, therefore, only one slit, 7a, in the wall thereof through which slit the strip 4 passes out of the heating chamber into the re-rolling chamber.

The vacuum in the heating chamber 1 is maintained at a lower pressure than the vacuum in the re-rolling chamber, so that any flow of air or vapour between the two chambers is in the direction which is from the re-rolling chamber 2 to the heating chamber 1; this effect is brought about by evacuating the two chambers through a single passage 12 located in the wall of the heating chamber 1 and connected directly to the pumping apparatus. A suitable vacuum in the heating chamber is a pressure of about 0.1 mm. of mercury.

It may be noted that the web of material passes out of the chamber 1 while it is still too hot to engender condensation thereon of glycerine vapour evolved from the face of the web 1 exposed to the heater.

In another form of apparatus shown in Figure 3 for carrying out the invention, the two chambers 1, 2, are formed by a partition wall 1a within a single vacuum chest which partition divides the chest into the two chambers 1, 2. The vacuum pump 12 is connected to the heating chamber, and the re-rolling chamber 2 is evacuated by flow of gas through two slits, 7, 7a in the partition 1a into the heating chamber 1.

Similarly, the construction shown in Figure 2 may be modified by dividing the outer chamber by a partition and arranging the supply roll in the heating chamber, as will be readily understood.

By using such forms of apparatus glycerine is effectively vapourised from one surface of absorbent material, for example paper or that transparent material sold on the open market under the registered trade-mark "Cellophane," and the vapour is removed from the material whilst hot, so that there is no possibility of glycerine vapours condensing on the cooled material as it is being re-rolled.

I claim:

1. A method of eliminating moisture from the surface of a moisture absorbent sheet material, on which surface metal is to be deposited by thermal evaporation in a vacuum, comprising progressively unrolling and exposing a web of moisture absorbent sheet material to radiant heat in a vacuumised heating chamber, passing the said material into a vacuumised re-rolling chamber communicating with said heating chamber only by a restricted opening or openings sufficient to permit of passage of the material from one said chamber to the other, and rolling the said material into roll form in said re-rolling chamber whilst it is still hot from heat exposure in said heating chamber, the vacuum in said heating chamber being maintained by connecting said heating chamber to an evacuating pump, and the said re-rolling chamber being vacuumised solely by flow of gas therefrom

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into said heating chamber through said opening or openings, said flow of gas thereby precluding egress of moisture from said heating chamber through said opening or openings into said re-rolling chamber.

2. An apparatus of the kind described, comprising a vacuumised heating chamber, a vacuumised re-rolling chamber immediately adjoining said heating chamber, a supply roll for supplying moisture absorbent material to be treated, a radiant heat source in said heating chamber, restricted aperture means for establishing communication between said heating chamber and said re-rolling chamber, means for progressively conducting a web of moisture absorbent material gradually unwound from said supply roll past said heat source with one surface thereof exposed to said heat source and through said aperture means into said re-rolling chamber, said aperture means being disposed in such proximity to said heat source that said material enters said re-rolling chamber whilst still hot, a take-up roll in said re-rolling chamber for converting said hot material into roll form, and exhausting means connected to said heating chamber for maintaining a desired vacuum therein, said re-rolling chamber being vacuumised solely by flow of gas therefrom through said aperture means into said heating chamber, said flow of gas thereby precluding egress of moisture from said heating chamber through said aperture means into said re-rolling chamber.

3. An apparatus of the kind described, comprising a vacuumised heating chamber, a vacuumised re-rolling chamber, one of said chambers being disposed within the other said chamber, a supply roll in said re-rolling chamber for supplying moisture absorbent material to be treated, a radiant heat source in said heating chamber, first restricted aperture means permitting of the passage of said material from said re-rolling chamber into said heating chamber, second restricted aperture means for passing said material out of said heating chamber into said re-rolling chamber, means for progressively conducting a web of moisture absorbent material gradually unwound from said supply roll through said first aperture means past said heat source with one surface thereof exposed to said heat source and through said second aperture means into said re-rolling chamber, said second aperture means being disposed in such proximity to said heat source that said material enters said re-rolling chamber whilst still hot, a take-up roll in said re-rolling chamber for converting said hot material into roll form, and exhausting means connected to said heating chamber for maintaining a desired vacuum therein, said re-rolling chamber being vacuumised solely by flow of gas therefrom through said aperture means into said heating chamber, said flow of gas thereby precluding egress of moisture from said heating chamber through said aperture means into said re-rolling chamber.

4. An apparatus of the kind described, comprising a vacuumised heating chamber, a vacuumised re-rolling chamber, one of said chambers being disposed within the other said chamber, a supply roll in said heating chamber for supplying moisture absorbent material to be treated, a radiant heat source in said heating chamber, restricted aperture means for establishing communication between said heating chamber and said re-rolling chamber, means for

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progressively conducting a web of moisture absorbent material gradually unwound from said supply roll past said heat source with one surface thereof exposed to said heat source and through said aperture means into said re-rolling chamber, said aperture means being disposed in such proximity to said heat source that said material enters said re-rolling chamber whilst still hot, a take-up roll in said re-rolling chamber for converting said hot material into roll form, and exhausting means connected to said heating chamber for maintaining a desired vacuum therein, said re-rolling chamber being vacuumised solely by flow of gas therefrom through said aperture means into said heating chamber, said flow of gas thereby precluding

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egress of moisture from said heating chamber through said aperture means into said re-rolling chamber.

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