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**"AN APPARATUS FOR COATING SHEET MATERIALS".**

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Marg, New Delhi-110001, India, an Indian registered body  
incorporated under the Registration of Societies Act (Act  
XXI of 1960).**

**The following specification describes the nature of this invention.**

**PRICE: TWO RUPEES**

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This is an invention by Kummattithidal Santhanam Rajagopalan Narayanaswami Subramanian, Rengachari Srinivasan, Rengaswamy Kadhakrishnan, Narayanaswami Krithivasan, Meyyappa Sundram, Scientists and Melay Kriyat Kochu Janaki, Senior Laboratory Assistant, all from Central Electrochemical Research Institute, Karaikudi- 623 006, Tamilnadu, India and Indian citizens.

This invention relates to improvements in or relating to anticorrosion packaging paper.

Hitherto it has been proposed to prepare anticorrosion packaging paper based on chemicals such as dicyclohexylammonium nitrite, cyclohexylammonium carbonate, imine benzoates in suitable solvents. Also the method of coating using these chemicals is not made known.

This is open to the objection that these chemicals are not available indigenously and no coating unit could be fabricated due to lack of information.

The object of this invention is to obviate these disadvantages by formulating compositions based on indigenously available chemicals and working out a suitable equipment for coating on packaging papers.

To these ends the invention broadly consists in coating packaging materials with either non-aqueous solvent based chemicals or water soluble chemicals. The non-aqueous based chemicals consists of a formulation, containing a mixture of m. dinitrobenzene and Beta Naphthol in the ratio of 3:1 dissolved in benzene in the ratio of 1:1 to 1:2. The aqueous based chemicals consists of a mixture of urea, sodium nitrite and ammonium benzoate taken in the ratio of 1:1:1 and dissolved in water in the ratio of 1:2 to 1:1. The coating is carried out in an equipment consisting of a roller No. 1 in fig. 1, on which the paper to be coated is mounted, a roller No. 2 in

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fig. 1, on which the coated paper is wound up, a roller No. 3 in fig. 1, which drives the roller No.2 in fig.1 by friction and which in turn is driven by a motor No. 15 fig.1, rollers no. 4 and 5 in fig. 1 between which the paper passes through a trough No. 6 in fig 1 provided with an arrangement No. 7 in fig. 1 for adjusting the height of No. 6 in fig. 1 for controlling the coating weight containing the corrosion inhibiting chemicals dissolved in the solvent No. 14 in fig. 1, a set of heaters No. 13 in fig. 1 to vaporise the solvent, the components No. 4, 5,6,7, 13 and 14 being provided with an enclosure No. 8 in fig 1 from which a duct No. 9 in fig 1 conveys the vapours to a condenser No. 10 in fig 1 from where the non-condensables as well as the residual condensables are conveyed to a trap No. 11 in fig 1, by means of ducting No. 16 in fig. 1 and the said trap being connected to a vacuum pump or a blower No. 12 in fig 1, through a piping No. 17 in fig. 1 for coating of corrosion inhibiting chemicals on paper.

The following typical examples are given to illustrate the invention:

EXAMPLE 1

Corrosion inhibiting chemical was dissolved in benzene in the ratio of 1:1 and this solution was taken in the coating tank. The kraft paper was coated with this solution at a speed of 10 metres/minute and the coating weight was in the range of 30-36 gm/sq.mt.

EXAMPLE 2

Corrosion inhibiting chemical was obtained by mixing urea, sodium nitrite and ammonium benzoate in water

in the ratio of 1:1 and this solution was used to coat kraft paper. The coating weight was 25-35 gms per s.q.m.

The papers obtained were tested by vapour inhibiting ability test and continuous condensation test. The results are given here:

No.	Paper	VIA TEST	Observations of CCT
1.	Control	Rusting heavily all over	Rusting heavily all over
2.	Coated paper from non-aqueous solvent	One or two rust spots along the edges	Rusting along one edge
3.	Coated paper from aqueous bath	Practically no rusting	Practically no rusting

The following are among the main advantage of the invention:

1. Aqueous based and non-aqueous solvent based vapour phase inhibiting chemicals from indigenously available chemicals are formulated.
2. A coating machine to coat these chemicals on packaging materials is made.
3. Coating weight can be controlled by adjusting the speed of the roller.
4. Uniform coating can be obtained.

Dated this 18th day of December, 1978.

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and/or  $Yb$ , adding to said mixture one or more alkaline and/or alkaline earth halides in a total proportion of 0.5 to 15 % (and preferably 1 to 10% ) of the total weight of the mixture, and one or more oxygenated boron compounds, particularly alkaline or alkaline earth borates in proportion of 0.2 to 7% (and preferably 0.5 to 3%) of the total weight of the mixture, calcining said mixture between 850 and 1100°C (and preferably 900 to 1000°C) for at least 15 minutes.

The "composite" magnets obtained from the powders in accordance to the invention, have improved magnetic properties which distinguish them from those obtained from the prior art.

In fact, the applicant has found surprisingly that the association of these two kinds of mineralizers has a rather pronounced synergetic effect; in other words, the powders made in accordance with the invention make it possible to achieve for agglomerated magnets magnetic properties that are considerably superior to those that would be obtained if each mineralizer were used separately.

The conjunction of these two mineralizers lead to independent single domain one-micron-size particles, having a high shape anisotropy ratio particularly useful for mechanical orientation. Otherwise, the introduction of slight amounts of boron and fluor

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This is an invention by Kummattithidal Santhanam RAJAGOPALAN, Narayanaswamy SUREMANIAN, Rengachari SRINIVASAN, Rengaswamy RADHAKRISHNAN, Narayanaswami KRITHIVASAN, Meyyappa SUNDARAM, Scientists and Melay Kriyat KOCHU JAWAKI, Senior Laboratory Assistant, all from Central Electrochemical Research Institute, Karaikudi-623006, Tamil Nadu, India and all Indian citizens.

This invention relates to an apparatus for coating sheet materials like packaging paper with anti-corrosion chemicals. The paper used may be kraft paper or the like.

Hitherto it has been proposed to prepare anti-corrosion packaging paper based on chemicals such as dicyclohexylammonium nitrite, cyclo-hexylammonium carbonate, amine benzoates in suitable solvents but the method or apparatus of coating using these chemicals is not described or known in the art.

The object of the present invention is to fabricate a suitable apparatus or equipment for coating packaging paper.

The main finding of this invention is that desired chemicals based on both aqueous and non-aqueous solvents could be coated on to packaging papers employing transfer coating technique in preference to other known coating methods.

The apparatus of this invention is particularly suitable in that the packaging sheet materials can be coated with vapour phase inhibitor chemicals in the range of 10-30 g/m<sup>2</sup> coating weight by adjusting the speed of travel of the paper, either from aqueous or non-aqueous baths.

The invention broadly consists in coating packaging materials with either non-aqueous solvent based chemicals or water soluble chemicals. The coating is carried out in an apparatus employing transfer coating technique.

Accordingly the invention provides an apparatus for coating sheet material comprising provided within a housing, a coating roller, through containing coating chemicals and means to pass the sheet material over the upper edge of the coating roller dipping at its lower edge in the said trough containing the coating chemicals, the housing being connected to an exhaust pump and means to entrap solvent vapours for reuse.

According to another feature of the invention provides means to pass the sheet material over the coating roller comprises a set of roller placed outside the housing and drive means thereof.

The invention also provides means to adjust the height of the trough containing the coating chemicals to adjust the dip of the coating roller therein to obtain desired amount of coating of the chemicals

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on the sheet materials. The sheet materials used may be paper and the coating chemicals in the trough may be corrosion inhibiting chemicals dissolved in a solvent therefor. According to another feature of the invention, these are provided within the housing heating means to vapourise the solvent from the coated paper. The invention also provides means to entrap the solvent vapours consist of a duct connecting said housing with a condenser unit, a trap and a vacuum pump. The apparatus of this invention is further described in details with reference to the drawings accompanying the provisional specification. This consists of a roller 1 on which the paper to be coated is mounted, roller 2 on which the coated paper is wound up, roller 3 which drives the roller 2 by friction and which in turn is driven by a motor 15, rollers 4 and 5 between which the paper passes through a trough 6 provided with means 7 for adjusting the height of a trough 6 for controlling the weight of coating containing the corrosion inhibiting chemicals dissolved in the solvent 14 a set of heaters 13 to vapourise the solvent. The apparatus parts 4, 5, 6, 7, 13 and 14 are provided with a housing 8 from which the duct 9 conveys the vapours to a condenser 10 from where the non-condensables as well as the residual condensables are conveyed to a trap 11 by means of duct 16 and the said trap is connected to a vacuum pump or a blower 12 through a piping 17 for coating of corrosion inhibiting chemicals on the paper.

By the use of the apparatus of this invention the weight of the coating chemicals on the sheet material can be controlled by adjusting the speed of the travel of the paper on the coating roller. A very uniform coating is obtained, of the chemicals on the paper being treated in the apparatus of this invention. The apparatus also enables to obtain a continuous coating on to the sheet material like kraft paper, of corrosion inhibiting chemicals by controlling the speed of the movement of the paper on the coating roller and by

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adjusting the height of the trough containing the coating chemicals to control the dip of the coating roller to pick up the chemicals therefrom for the treatment of the paper on its upper turn. The means are also provided to adjust the tension of the movement of the sheet material on the rollers and also to fill the trough with the coating chemicals and to control its overflow in operation of the apparatus.

The following examples are given to further illustrate the invention.

EXAMPLE 1

Corrosion inhibiting chemical as per I.P. No. 101924 was used. The solution was taken in the coating tank. The kraft paper was coated with this solution at the speed of 10 metres/minute and the coating weight was in the range of 30-36 gms/sq.m.

EXAMPLE 2

Corrosion inhibiting chemical which is being patented was dissolved in water and this solution was taken in the coating tank. The kraft paper was coated with the solution at the speed of 5 metres/minute and the coating weight was in the range of 15-20 gm/sq.m.

The papers obtained were tested by vapour inhibiting ability test and continuous condensation test. The results are given below:

No.	Paper	Observations of VIA test	CCT
1	Control	Heavily rusted all over	Heavily rusted all over
2	Coated paper from non-aqueous bath	Practically no rusting	Practically no rusting
3	Coated paper from aqueous bath	Practically no rusting	Practically no rusting



WE CLAIM:

1. An apparatus for coating sheet material comprising provided within a housing, a coating roller, a trough containing coating chemicals and means to pass the sheet material over the upper edge of the said coating roller dipping at its lower edge in the said trough containing the coating chemicals, the said housing being connected to an exhaust pump and means to entrap solvent vapours for reuse.
2. The apparatus as claimed in claim 1 wherein the means to pass the sheet material over the coating roller comprises a set of rollers placed outside the said housing and drive means therefor.
3. The apparatus as claimed in claims 1 and 2 wherein the means are provided to adjust the height of the trough containing the coating chemicals to adjust the dip of the coating roller therein to obtain desired amount of coating of the chemicals on the sheet material.
4. The apparatus as claimed in claims 1 to 3 wherein heating means are provided within the housing to vapourise the solvent from the coated paper.
5. The apparatus as claimed in claim 1 wherein the means to entrap the solvent vapour consists of a duct connecting the said housing with a condenser unit, a trap and a vacuum pump.
6. The apparatus for coating sheet material substantially as herein described and illustrated.

Dated this 9th day of January, 1980.

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(I.N.S.MAMAK)

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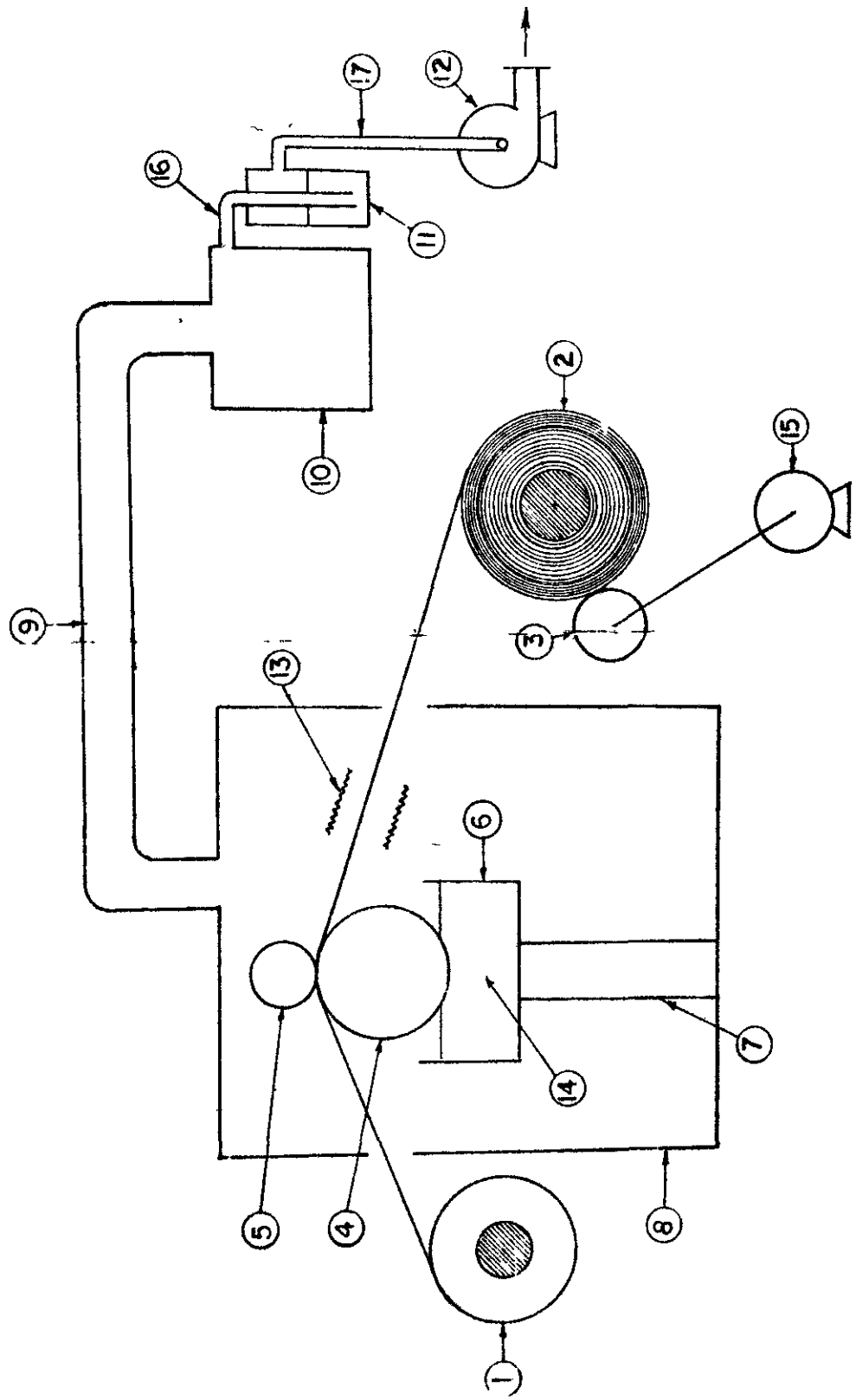


FIG. I

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C.S.I.R.