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# (54) COATING OF PARTICULATE OR FIBROUS MATERIALS

(71) We, NEUSIEDLER AKTIENGESELLSCHAFT FUR PAPIER FABRIKATION, an Austrian body corporate, of 1121 Vienna, Schönbrunner Schloss strasse 42, Austria,
do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement: —

The invention relates to particulate or fibrous materials which are suitable as fillers for mixtures, such as paper-making pulp.

The most diverse mineral and synthetic fillers are used in industry, such as kaolin, gypsum, $CaCO_3$, $TiO_2$, micro-capsules of polyvinylidene, urea-formaldehyde, pigments and the like, these being selected in order to obtain advantageous results in the course of manufacture and/or to affect the properties of the end product.

When the fillers are used, however, certain disadvantages also arise; for example, it is known in the paper industry that wear of the endless wire is caused mainly by the filler content of the paper-making pulp. All measures which improve the retention of the filler in the paper reduce the wear of the wire and thus prolong the working life of the wire.

We have now found that advantages are obtained by coating particles or fibres with regenerated cellulose in a certain way.

According to the present invention, there is provided a method of coating a particulate or fibrous material, which comprises slurrying particles or fibres in a dilute aqueous solution of a regeneratable cellulose derivative (such as, for example, cellulose xanthate) and adding to the slurry a precipitant capable of converting the derivative to regenerated cellulose so as to individually envelop the particles or fibres with a discrete coating of regenerated cellulose.

The dilute solution of the cellulose derivative preferably has concentration of 0·001 to 5% by weight (such as about 0·5% by weight) of the cellulose derivative.

In order to ensure good dispersion of the particles or fibres in the solution it is sometimes desirable that the slurrying is effected in the presence of at least one dispersing agent (such as, for example, a poly-salt).

The precipitant is preferably added to the slurry very slowly, so as to effect controlled coacervation of the cellulose derivative to produce a discrete cellulose coating on the individual particles or fibres. For statistical reasons, this coacervation is most favoured in an optimum concentration range of particles or fibres, cellulose derivative and precipitant.

The precipitation is carried out in such a way that what is formed is not a heterogeneous mixture of particulate or fibrous material and regenerated cellulose, but separate particles or fibres each individually enveloped by a discrete coating of regenerated cellulose. The absence of a separate cellulose phase will be described hereinafter with reference to Figures 2 to 5 of the accompanying drawings.

A preferred precipitant is an approximately 25% aqueous solution of sulphuric acid containing approximately 250 grams per litre of sodium sulphate and approximately 100 grams per litre of zinc sulphate.

As the precipitation reaction proceeds, the slurry undergoes definite characteristic changes in viscosity and colour. The coated material is preferably filtered off and thoroughly washed.

When the material to be coated according to the invention is particulate, it is preferably of mineral particles, such as kaolin (most preferred), gypsum, titanium dioxide of calcium carbonate. The particles preferably have a particle size of 0·01 to 100 microns, more preferably 0·1 to 10 microns. The coated particulate material is particularly useful as a filler for

use in paper-making pulp; other possible uses are in textile printing, in the rubber industry and in paper coating.

When the particulate material which is coated according to the invention is based on kaolin particles, the regenerated cellulose coating is preferably present in an amount of up to 5% by weight, based on the weight of kaolin.

When the material which is coated according to the invention is fibrous, such fibres are preferably synthetic. When the synthetic fibres are hydrophobic, their hydrophobicity is reduced according to the invention. Such fibrous material can be used as an additive to paper-making pulp, for making papers or paper-like sheets, or for making non-woven fabrics.

In a specific, and preferred, embodiment of the invention, the material which has been coated according to the invention is added to a cellulosic paper-making pulp, which is dewatered to form paper in a conventional way. The regenerated cellulose coating is chemically very similar to paper-making pulp; the material is accordingly retained in the paper not only by the weak interaction forces between the material and the pulp, but also by interactions between the pulp and the regenerated cellulose.

Reference will now be made to the accompanying drawings, in which:

Figure 1 diagrammatically represents a paper-making installation;

Figures 2 and 3 show micrographs of uncoated kaolin particles, and micrographs of coated kaolin particles produced according to the invention are shown in Figures 4 and 5.

Referring to Figure 1, a vessel which contains paper-making pulp is designated as 1. This pulp leaves the vessel at 2 and passes on to a circulating endless wire 3. The wet pulp 4 is drained in a known manner, various devices 5 to provide support and suction being fitted underneath the wire, and then taken up conventionally (as shown by arrow 6) for further treatment. In general, significant proportions of pulp and fillers are also flushed out with the water. Consequently, the filler particles also reach the space between the endless wire 3 and devices 5 provided underneath the endless wire and increase friction in that space.

The pulp 4 being conveyed on the endless wire 3 contains mainly pulp fibres, fillers and water. The fillers, coated according to the invention, consist, for example, of kaolin particles which are enveloped by regenerated cellulose. This regenerated cellulose interacts with the pulp fibres and retains the major part of these fibres in the pulp 4. Thus, more fillers remain in the paper, the proportion of filler particles which are sucked out in the course of draining the pulp 4 being reduced so that the friction of the endless wire 3 against the devices 5 is also reduced.

With regard to the improved retention of fillers which have been coated according to the invention, we have found that it is possible to increase the retention by about 25%.

We have found that, with a retention improved by about 25%, the endless wires only have to be changed about every 3 weeks, whilst, without fillers which have been coated according to the invention, endless wires wear out more quickly; they should be changed approximately weekly.

When the particulate material which has been coated according to the invention is of kaolin, it is a white powder which has interesting properties with respect to whiteness, ink-and-water retention and the ability to be retained in a matrix, such as, for example, a paper. Moreover, when kaolin which has been coated according to the invention is employed in paper, the paper has low two-sidedness with respect to ink and sizes. The resulting paper can be sized advantageously.

In an example, powdered kaolin was coated with regenerated cellulose in an amount of about 3%, based on the weight of kaolin.

Compared with the starting kaolin, the powder had somewhat different properties, namely:

1. about twice the bulk volume
2. about twice the water-binding capacity
3. a whiteness which is about 7 points higher than that of untreated kaolin and a whiteness which is about 3 points higher than that of cellulosic paper-making pulp.

The absence of a distinct separate cellulose phase was established by electron and optical microscopy: the results for kaolin according to the invention are shown in Figures 4 and 5 of the accompanying drawings and the results for untreated kaolin are shown in Figures 2 and 3 of the accompanying drawings.

As can be seen, there is no new morphological phase in Figures 4 and 5; the cellulose is therefore not present as a separate phase but only as an envelope for the individual particles.

WHAT WE CLAIM IS:—

1. A method of coating a particulate or fibrous material, which comprises slurrying particles of fibres in a dilute aqueous solution of a regeneratable cellulose derivative and adding to the slurry a precipitant capable of converting the derivative to regenerated cellulose so as to individually

envelop the particles with a discrete coating of regenerated cellulose.

2. A method according to claim 1, in which the particles are of kaolin, gypsum, titanium dioxide or calcium carbonate.

3. A method according to claim 1 or 2, in which the particles have a particle size of 0·01 to 100 microns.

4. A method according to claim 3, in which the particle size is from 0·1 to 10 microns.

5. A method according to any claims 1 to 4, in which the dilute aqueous solution contains 0·001 to 5% by weight of the cellulose derivative.

6. A method according to any of claims 1 to 5, in which the cellulose derivative is cellulose xanthate.

7. A method according to any of claims 1 to 6, in which the slurrying is effected in the presence of at least one dispersing agent.

8. A method according to any of claims 1 to 7, in which the precipitant is an approximately 25% by weight aqueous solution of sulphuric acid containing approximately 250 grams per litre of sodium sulphate and approximately 100 grams per litre of zinc sulphate.

9. A material which has been coated by a method according to any of claims 1 to 8.

10. A method of making paper, which comprises dewatering a cellulosic papermaking pulp containing a material according to claim 9.

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1574068 COMPLETE SPECIFICATION
5 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 1

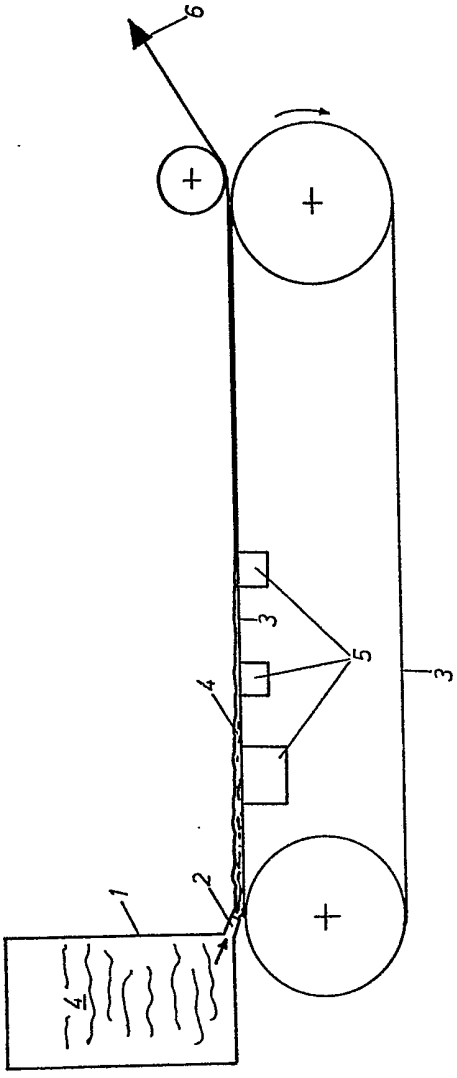
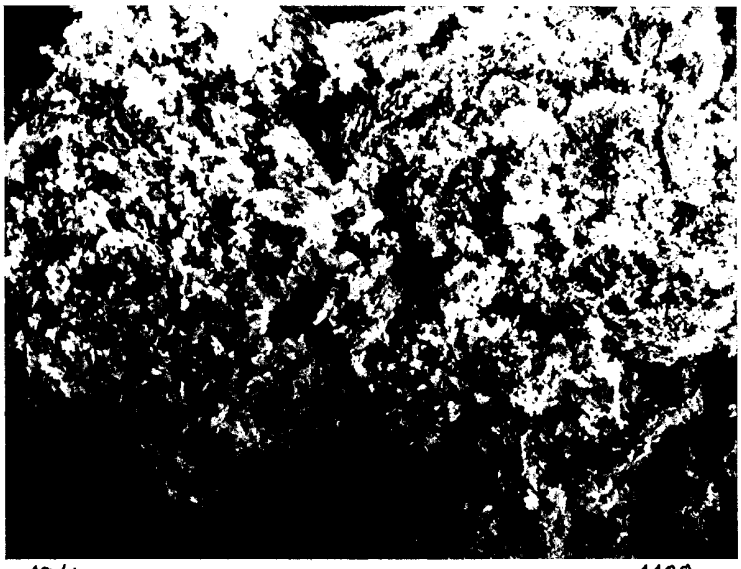


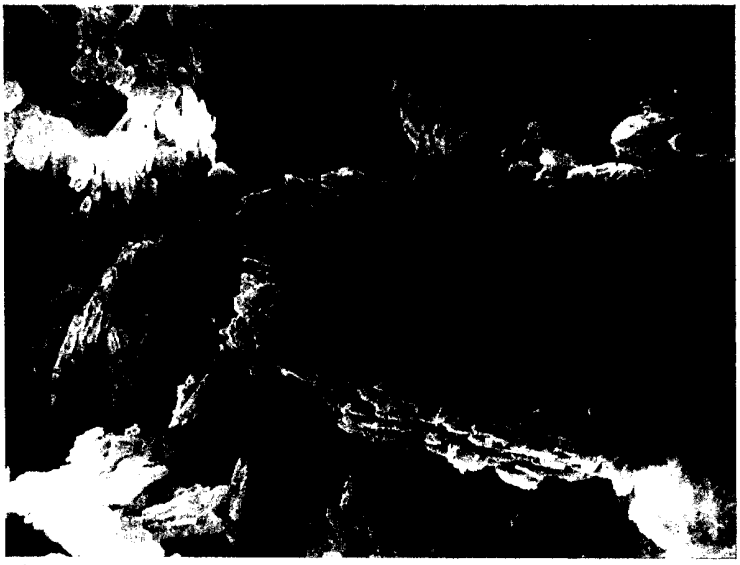

Fig. 1


FIG 2



19/1 1100 x

FIG 3

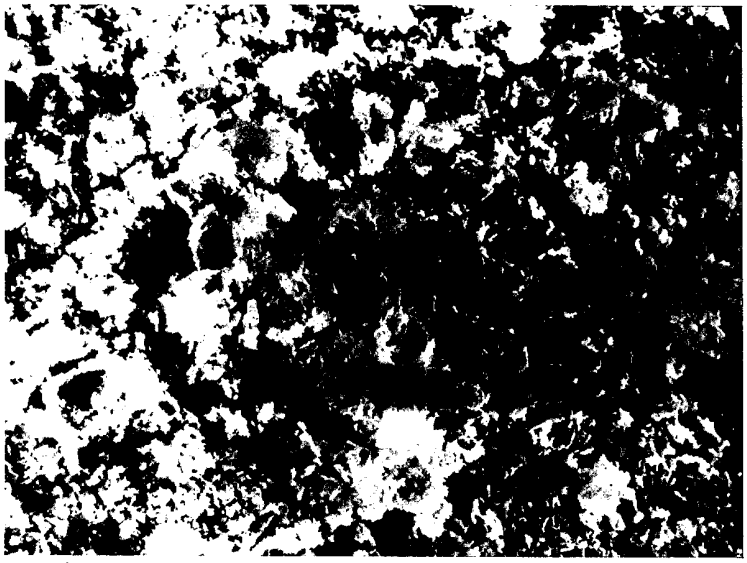


19/3 7600x

20/10 15 000x

FIG 4

19/7 7900x



19/10 1100x

FIG 5

20/9 7600x