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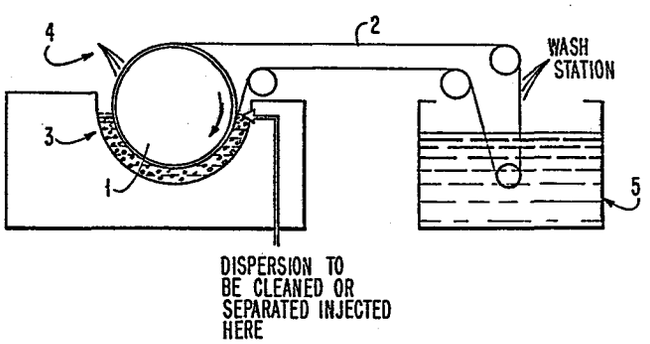
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(54) Process for separating finely divided magnetic particles from a liquid.

(57) Finely divided magnetic particles are separated from a liquid in which they are dispersed by means of a transfer member (2), eg a plastics belt supported and driven by a magnetic drum (1), to which they are attracted by a magnetic field.



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PROCESS FOR SEPARATING FINELY DIVIDED MAGNETIC PARTICLES FROM A LIQUID

This invention relates to a process for separating finely divided magnetic particles from a liquid in which they are dispersed.

In the preparation of magnetic particles to be used for magnetic recording, for example on disks or tapes, the particles at one time are normally dispersed in a large amount of a liquid, such as water. For example, see U.S.-A-4,280,918. It is necessary to separate the magnetic particles from the liquid in order to go on with the next step of the manufacturing process. In the past, this separation step has been a very difficult one. Filtration cannot be used, since the particles go through filters. Centrifuging is not desirable, since it causes the particles to form lumps. Heating to evaporate the liquid is not desirable, since it can cause chemical change in the particles. For the most part, in the past, separation has been accomplished by allowing the particles to settle in the liquid in the presence of a magnetic field and by then decanting the liquid. This is a very slow and unsatisfactory process.

The invention seeks to provide an improved process for separating magnetic particles from a liquid in which they are dispersed.

A process for separating finely divided magnetic particles from a liquid in which the particles are dispersed, is characterised, according to the invention, by magnetically attracting the particles to a transfer member moving through the liquid, magnetically maintaining the particles on the transfer member while the particles are removed from the liquid to a transfer station, and removing the particles from the transfer member at the transfer station.

In one preferred embodiment of the present invention, the process is carried out using a magnetic drum positioned to rotate above and

below the surface of the liquid in which the particles are dispersed. The drum rotates on an axis roughly in the same plane as the surface of the liquid. The process may then be summarized as comprising the steps of rotating a magnetic drum positioned so that the lower portion of the drum is below the surface of the liquid and the upper portion of the drum is above the surface, the drum driving a continuous transfer belt first below the surface of the liquid where the magnetic particles stick to the belt, then above the surface of the liquid, and then removing the solid particles from the transfer belt.

How the invention can be carried out will now be described, by way of example, with reference to the accompanying drawing which is a schematic representation, not to scale, of one type of apparatus which may be used to perform the process of the present invention.

Referring to the drawing, a magnetic drum 1 is used to carry a continuous transfer belt 2. The bottom of the drum is below the surface of a liquid containing dispersed magnetic particles, and the top is above the surface. As the belt goes through the liquid 3 the magnetic particles are magnetically attracted to the drum and stick to the belt, which raises them out of the liquid, where they may be washed at a wash station 4 and then deposited in a chamber 5 to be held in readiness for additional processing. During normal operation the dispersion may be continuously pumped between the apparatus and a storage tank, through an outlet not shown on the drawing.

The drum is conveniently made of stainless steel. Typically, the drum is a right circular cylinder containing bar magnets arranged in parallel rows on its surface, with each bar being 1 to 2 cm shorter than the cylinder. The magnets are so arranged that the north pole end of each magnet is between the south poles of the magnets on either side of it. The magnets may conveniently be, for example, ceramic magnets such as cobalt rare earth magnets. The bars are usually about 0.5 to 1 cm in thickness, and separated from each other by about 0.5 to 2 cm. When so

desired, the removal of the particles from the belt may be facilitated by using a doctor blade or roller.

Vacuum or pressurized air may be applied to help removal of filtrate or cake as desired. Furthermore, the drum immersion depth should be adjustable to various types of slurry. Wash liquid can be sprayed on to the drum or belt to improve the efficiency.

A preferred material for the belt is polyethylene terephthalate.

Typical magnetic particles separable by the present invention are silica coated magnetic iron oxide particles which are needle shaped, having a length of 0.5 microns or less. At the beginning of the process they are dispersed in water along with non-magnetic material such as colloidal silica. The magnetic particles are usually present in the liquid at about 5% by weight concentration before the process of the invention is performed. Following the process, their concentration is up to 30% on the belt. The particles have also been separated from non-magnetic materials and are ready for use in the making of disks or tapes for magnetic recording media.

CLAIMS

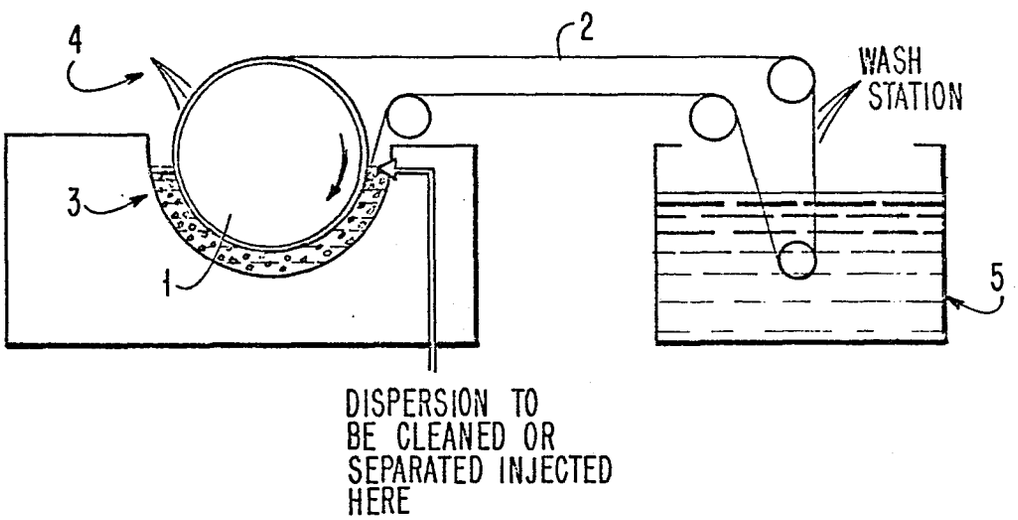
1. A process for separating finely divided magnetic particles from a liquid in which the particles are dispersed, characterized by magnetically attracting the particles to a transfer member (2) moving through the liquid, magnetically maintaining the particles on the transfer member (2) while the particles are removed from the liquid to a transfer station, and removing the particles from the transfer member at the transfer station.

2. A process as claimed in claim 1, in which the transfer member is a belt (2) driven by a rotatable magnetic drum (1) positioned so that the lower portion of the drum is below the surface of the liquid and the upper portion of the drum is above the surface, the arrangement being such that the drum first drives the transfer belt below the surface of the liquid where the magnetic particles are attracted to the belt and then drives the belt above the surface of the liquid to the transfer station.

3. A process as claimed in claim 1 or claim 2, in which the magnetic particles are silica coated iron oxide particles.

4. A process as claimed in any preceding claim, in which the particles are needle-shaped and less than 0.5 microns in length.

5. A process as claimed in any preceding claim, in which the transfer member is made of polyethylene terephthalate.


4
2
WASH
STATION
3
1
5
DISPERSION TO
BE CLEANED OR
SEPARATED INJECTED
HERE