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(54) METHOD FOR PROLONGING THE LIFE OF A PRESS FELT

VERFAHREN ZUR VERLÄNGERUNG DER LEBENSDAUER EINES PRESSFILZ

PROCEDE POUR PROLONGER LA VIE UTILE D'UN FEUTRE DE PRESSE

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Description

[0001] The invention relates to method for treating a press felt which in the paper and cardboard industry is used in conjunction with press rollers to remove water from a paper web from which some of the water has already been removed by means of screening and/or vacuum.

[0002] Such a method is disclosed in EP-A-0496965.

[0003] In the production of paper and cardboard, a paper sheet is formed from pulp on a screen conveyor. The water must be removed from said paper sheet. The bulk of the water is removed on a screen belt conveyor using a source of vacuum beneath the screen. Water can be removed down to a solids content of about 20 % by this means. Further lowering of the pressure beneath the screen will have little effect on the solids content. In order further to increase the solids content to about 50 %, water is removed from the paper sheet by feeding said sheet together with one or two endless press felts between two rollers. Said press felts are designed to retain an open structure under pressure. In the pressure zone between the rollers, the press nip, the water is forced out of the paper into the open spaces in the press felt. Downstream of the press nip, the felt is separated from the paper web and, finally, the press water in the felt is removed by feeding the felt over a vacuum slit. The endless press felt is fed back into the press nip again. Harmful side effects can arise in the pressing section of a paper-making machine. For instance, the paper surface can be damaged by the rough felt surface and the paper web itself can be damaged if the felts are not able to cope with the press water. The latter occurs when the press felts have become too compacted and/or contaminated. Every time the paper web passes through the press nip the felts are filled with process water from the paper, which water contains fibres, fillers, chemicals and the like. These are deposited on and in the press felts, with an adverse effect on the felts. It is for this reason that, in practice, the press felts are periodically or continuously cleaned with water and/or acid detergents and/or alkaline detergents and/or organic solvents.

[0004] Despite this cleaning, a press felt has a fairly short life. At the end of the felt life, the felt will have been severely compacted and stained with contaminants. The felt can also have lost some of its fibres, can produce uneven removal of water or can have an adverse effect on the quality of the paper.

[0005] Press felts are expensive. The costs of the felts amount to about 1 % of the turnover of a paper or cardboard factory. In the Netherlands about 40 million guilders are spent every year by the paper and cardboard industry on press felts. Moreover, each replacement of a felt entails a loss of production hours. There is therefore a need for measures to prolong the life by maintaining the permeability or the open volume of the press felts above a specific minimum for a longer period.

[0006] The aim of the invention is to meet this need.

[0007] According to the invention, the method mentioned in the preamble is characterised in that for prolonging the life of the press felt a cocktail of enzymes is sprayed into and onto the press felt in order to remove water binders and water bound thereto, said cocktail at least containing cellulase to break down cellulose, and xylanase to break down hemicellulose, and in that after a specific period of action of the enzymes, the latter are rinsed out.

[0008] Preferably the cocktail further contains resinase to break down resins.

[0009] To break down starch and CMC the cocktail further may contain amilase.

[0010] Please note that JP-A-63120192 (Derwin publication 88-180920 XP002012345) discloses cleaning of felt for paper making by a detergent comprising alpha amilase.

[0011] Other compositions of enzymes which have a degrading action on water binder are also possible.

[0012] Before the enzyms are sprayed onto and into the press felt, washing with acid and basis is carried out to remove dissolved constituents, such as ink, lime, grease, pieces of fiber and the like. The press felt is then rinsed clean.

[0013] The invention will now be explained in more detail with reference to the figure.

[0014] The figure shows a diagrammatic representation of an illustrative embodiment of a paper-making machine.

[0015] The paper-making machine shown comprises a pulp feed 1, a screening section 2, a pressing section 3, a drying section 4 and a winding section 5.

[0016] By means of the pulp feed 1, a paper sheet 7, from which the water has to be removed, is formed on a conveyor 6 made from screen belt. The bulk of the water is removed on the screen conveyor 6, the water being removed by vacuum means 8. The vacuum level is, for example, at about 0.5 bar and in the screening section water can be removed from the paper sheet to give a solids content of about 20 %.

[0017] Further removal of water to produce a solids content of about 50 % must take place in the pressing section 3. The pressing section comprises at least one pair of press rollers and at least one endless press felt. The press felt usually consists of one or more base mats of woven relatively thick threads and one or more thin layers of short fibres which are anchored to the base mats by needle-punching. Further water is removed from the paper web by feeding the paper web 7 together with one or two press felts through the nip between two rollers, water from the paper being forced into the open spaces in the felt. The press felt must retain its open structure under pressure. The press water in the felt is removed by passing the felt over a vacuum slit.

[0018] The pressing section shown in the figure comprises four endless press felts 9, 10, 11 and 12, two pairs of press rollers 13 and 14 and a combination of a press roller 15, a shoe 16 and a conveyor 17, which runs be-

tween shoe and press roller, to protect the press felt 11.

[0019] Each time they pass through the press nip passage between two rollers, the felts are filled with process water from the paper. Said water contains, inter alia, fibres, fillers, stickies and chemicals. These contaminating substances are transferred into and onto the press felts, causing the latter to compact and remove water less efficiently. The strength characteristics are also adversely affected by accelerated compaction. It is for this reason that the press felts are regularly or continuously cleaned with water, acid and/or alkaline detergents and organic solvents. These liquids are supplied via spray nozzles 18. In order to detach pieces of fibre and lime with the spray, the liquid can be sprayed under relatively high pressure (for example 20 bar) onto and into the press felts. The bulk of the liquid sprayed onto and into the press felts is removed therefrom by means of vacuum slits 19.

[0020] Even with optimum cleaning of the press felts and a good choice of felt material, it is found that the press felts have to be replaced very regularly. The felts will compact and become stained with contaminating substances. Furthermore, the felts can lose some of their fibres, produce irregular removal of water and have an adverse effect on the quality of the paper. The worn felts are changed during a planned production shutdown. It is important to know whether the felts will last until the next maintenance shut-down. Frequently, the life is estimated on the basis of experience with previous worn felts. A good method for measuring the impairment of the water absorption capacity of press felts is to determine the vacuum level in the vacuum slits 19. During use of a press felt, the vacuum in the vacuum slits increases. This is because the permeability of the press felt decreases as a result of compacting and contamination.

[0021] To achieve good removal of water from the paper sheet, a press felt must be able to store all of the press water and the water must easily be able to flow into the felt. This means that the open volume under pressure must have a relatively high value and that the permeability of the felt must be above a relatively high minimum value. What this comes down to is that the basic structure of a felt must be fairly incompressible and the fine top layer (BATT) must be readily permeable.

[0022] Despite the well-considered choice of the press felt materials and the careful cleaning by means of liquids which are sprayed onto and into the felts via the spray nozzles 8, the press felts nevertheless become contaminated fairly rapidly.

[0023] In order nevertheless appreciably to prolong the life, for example to double the life, during a shutdown and after the press felt has been washed with acids and bases via the spray nozzles 18 and rinsed out with water, a mixture of enzymes which removes the water binders, and water bound thereto, from the press felt is sprayed onto and into the press felt via spray nozzles 20 (or also via the spray nozzles 18 or other spray nozzles). During this treatment the press felt moves slowly. The enzyme mixture preferably contains cellulose degraders (cellulase), hemicellulose degraders (xylanase), resin degraders (resinase), starch and CMC degraders (amylase) and anti-slime enzymes (levan hydrolase). Following this treatment the enzymes are rinsed out of the felt. Finally, the rinse water is removed by means of the vacuum slits 19.

[0024] Surprisingly, it has now been found that the most important cause of the press felt becoming unusable can be combatted by means of the said enzyme treatment. To date, the "bound water" factor was left out of consideration in research into the wear of the press felt. By determining the so-called pollution load in the dry state, the swell water was unjustifiably left out of consideration. Research has now shown that paper fibres and starches absorb more than their own weight of water, so that a greater volume is not available for water storage and water permeation than that which would be measured in the dry state.

[0025] Incidentally, enzymes require a certain reaction time, for example a few tens of minutes under favourable conditions. The temperature must not rise above 39°. Detergents can be useful to intensify the enzyme action.

[0026] Following the removal of water in the pressing section 3, the paper web passes to the drying section 4 and, finally, is wound onto a roll 5.

[0027] The effect of the enzyme treatment is two-fold: the irregularities in the available open volume of the press felts, as a consequence of fluctuations in the percentage bound water, are evened out, and the open volume in general is increased by the removal of the water binders and bound water.

[0028] The enzyme treatment must be carried out periodically, for example weekly, depending on the contamination.

[0029] The economic advantages of the enzyme treatment are very substantial. Significant savings are achieved by, for example, doubling the life by means of the invention.

[0030] Various variants are possible within the scope of the claims.

Claims

1. Method for treating a press felt (9, 10, 11, 12) which in the paper and cardboard industry is used in conjunction with press rollers (13, 14, 15, 16) to remove water from a paper web (7) from which some of the water has already been removed by means of screening and/or vacuum, characterised in that for prolonging the life of the press felt a cocktail of enzymes is sprayed into and onto the press felt in order to remove water binders and water bound thereto, said cocktail at least containing cellulase to break down cellulose, and xylanase to break down

hemicellulose, and in that after a specific period of action of the enzymes, the latter are rinsed out.

2. Method according to Claim 1, characterised in that the cocktail further contains resinase to break down resins.

3. Method according to Claim 1 or 2, characterised in that the cocktail further contains amilase to break down starch and CMC.

4. Method according to one of the preceding claims, characterised in that the cocktail further contains levan hydrolase as anti-slime agent.

Patentansprüche

1. Verfahren zur Behandlung eines Preßfilzes (9, 10, 11, 12), der in der Papier- und Kartonagenindustrie in Verbindung mit Quetschwalzen (13, 14, 15, 16) verwendet wird, um Wasser aus einer Papierbahn (7) zu entfernen, aus der schon etwas des Wassers mittels Siebung und/oder Unterdruck entfernt worden ist, dadurch gekennzeichnet, daß zur Verlängerung der Lebensdauer des Preßfilzes ein Cocktail von Enzymen in und auf den Preßfilz gesprüht wird, um Wasserbindemittel und daran gebundenes Wasser zu entfernen, wobei der Cocktail mindestens Cellulase, um Cellulose zu zerlegen, und Xylanase, um Hemicellulose zu zerlegen, aufweist und daß nach einer spezifischen Wirkungsdauer der Enzyme die letztgenannten ausgewaschen werden.

2. Verfahren nach Anspruch 1, dadurch gekennzeichnet, daß der Cocktail ferner Resinase enthält, um Harze zu zerlegen.

3. Verfahren nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß der Cocktail ferner Amilase enthält, um Stärke und Carboxymethycellulose (CMC) zu zerlegen.

4. Verfahren nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß der Cocktail ferner Levan-Hydrolase als schleimminimierendes Mittel enthält.

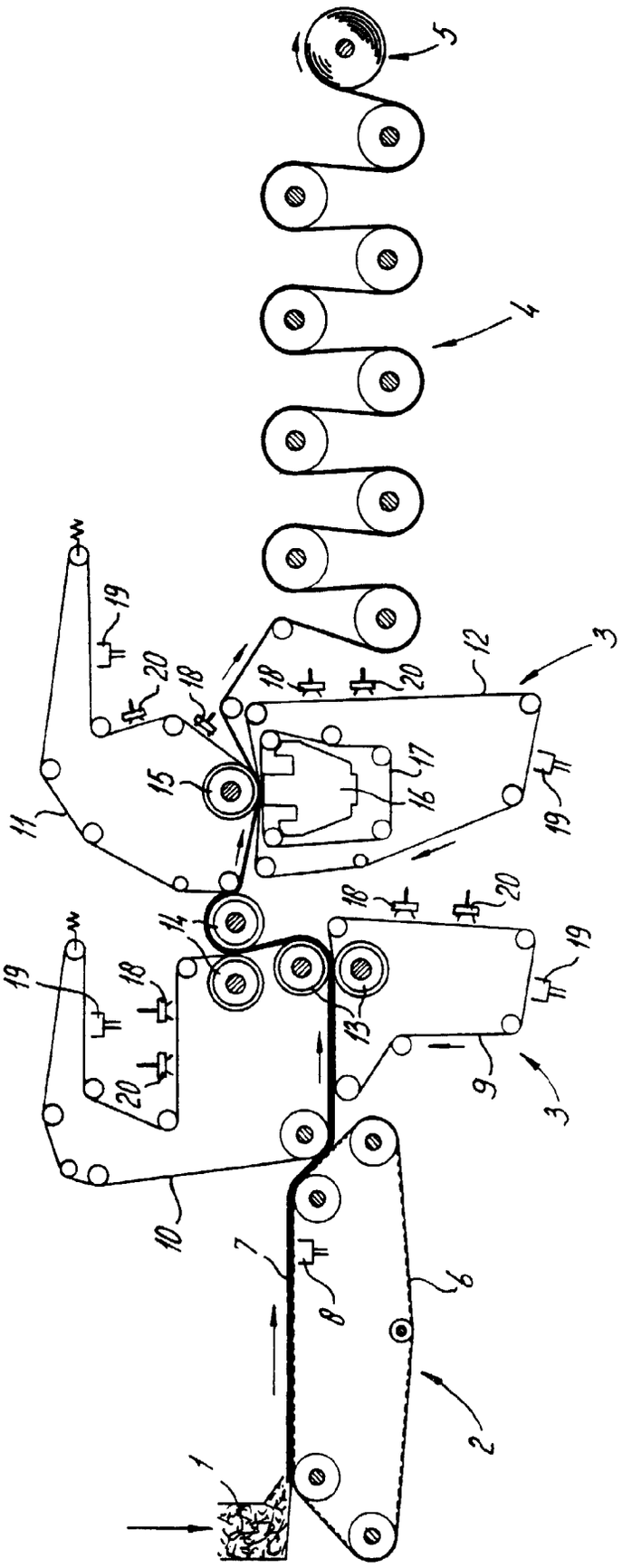
Revendications

1. Procédé pour traiter un feutre de presse (9, 10, 11, 12) qui, dans l'industrie du papier et du carton, est utilisé conjointement à des rouleaux presseurs (13, 14, 15, 16) pour extraire de l'eau d'une bande de papier (7) d'où une partie de l'eau a déjà été extraite par filtrage et/ou vide, caractérisé en ce que pour prolonger la vie utile du feutre de presse un cocktail d'enzymes est pulvérisé dans et sur le feutre de presse afin d'extraire des liants d'eau et l'eau liée à ceux-ci, ledit cocktail contenant au moins de la cellulase pour dégrader la cellulose, et de la xylanase pour dégrader l'hémicellulose, et en ce qu'après une durée spécifique d'action des enzymes, ces derniers sont extraits par rinçage.

2. Procédé selon la revendication 1, caractérisé en ce que le cocktail contient en outre de la résinase pour dégrader des résines.

3. Procédé selon la revendication 1 ou 2, caractérisé en ce que le cocktail contient en outre de l'amilase pour dégrader l'amidon et le glycolate de cellulose sodique.

4. Procédé selon l'une quelconque des revendications précédentes, caractérisé en ce que le cocktail contient en outre de l'hydrolase levan en tant qu'agent anti-viscosité.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