Title (en)

Process and apparatus for obtaining natural fibres, in particular bamboo fibres, for use as a reinforcing material

Title (de)

Verfahren und Anordnung zur Gewinnung von Naturfasern, insbesondere Bambusfasern, die den Zweck der Verstärkung erfüllen

Title (fr)

Procédé et dispositif de préparation de fibres naturelles, en particulier de fibres de bambou, pour utilisation comme matière de renforcement

Publication

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Application

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Priority

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Abstract (en)

[origin: EP0971065A2] To recover a yield of natural fibers, and especially bamboo fibers, the bamboo is initially chopped (1) into a loose material. The chopped material is either washed (2) and then softened (9) by a structured loosening pressure steam action or is passed directly to the softening station (9). The material is broken down into fibers (11) in one or more stages, followed by flow drying and sorting (14). A mass flow (16) is taken as a product of the fiber forming station (9) from the flow drying and sorting station (14), to be taken by one or more of the fiber forming stages with the other mass flow (16) to be taken out from the finished product (15). The raw bamboo fed to the initial chopping station (1) moves slowly, to be chopped in a drawing cutting action, to give chopped lengths of max. 5 cm. The loose chopped bamboo is washed (2) to separate dirt and other clinging plant protection and/or preservation agents. The water (6) used for the washing is passed through a mechanical water cleaning station (7) to be heated to ≤ 50 degrees C, to be mixed with further recirculating water (3) from a complex water cleaning system (5) and additional fresh water (19). The ratio of the recirculating water to the used water is 1:1 to 1:10. The material is softened (9) by wet steam at a pressure of 1-10 bar and at a temp. of 100-180 degrees C in a dwell time of up to 1 hr. The steam pressure, temp. and the dwell time are adjusted separately or together, to give the required fiber length and thickness distribution. The material can be steeped for softening, as an alternative to the pressure steam processing, with or without a material washing action. The moisture generated at the softening stage (9) is passed directly to the coarse fiber forming stage (11) which acts on the extruder principle with a press and shearing action. Also, in the fine fiber forming stage using conventional disk or roller mills together with subsequent or parallel squeeze and shear actions, the processing gives a combination of coarse and fine fiber formation. It produces fibers with a dia. and length of 15 mu m ≤ dF ≤ 30 mu m, 1mm ≤ lF ≤ 6mm and fiber bundles in a dia. and length of 0.5mm ≤ dF ≤ 1.5 mm, 6mm ≤ lF ≤ 15...20mm. The oversize material from the coarse (11) and/or fine fiber formation is passed to the flow dryer with the sorting (14) to be taken next to the finished material (15) and also winnowed for return to the appropriate fiber forming station to be converted into fibers. The raw material is also given an additional chemical or other treatment process to increase its resistance to alkali and/or for any specific material modification. The additives are fed into the grinding and fiber forming zones by special dosing, for mixing with the bamboo fiber material from the grinding zone, or by addition at a forced mixer in front of the drying station (14). According to end use, the chopped bamboo material is reduced to coarse and fine fibers to give bamboo fibers/fiber bundles of a variable length and thickness of dF ≤ 15..30 mu m at 1mm ≤ lF ≤ 4mm up to fiber bundles of dF ≤ 0.5..1.5mm and 8mm ≤ lF ≤ 15...60mm. The system can have a single-stage fiber forming operation, with the distribution of the fiber bundle length and thickness set at the mill by a combination of mechanical operating speed, the structure of the sieve plate and the pneumatic take-off to match the following spiral swing sieve at the sorting station. The fiber formation can be through a screw extruder, using two screws in the housing rotating against each other with a low rotating speed of ≤ 100 min-1, using a constant or variable screw pitch along the axial direction. The back-up can be varied by throttling the outlet cross section of the extruder by10-50%. Material compounds are removed by the evaporation of the water content in the material by increasing the pressure and temp. by the friction and compression heat of the ground material to form fine material components. An Independent claim is included where the outflow of soiled water (4) from the washing stage (2) is fed to a complex water cleaning stage (5). The softening stage (9) has a feed for saturated steam (8), and an outlet for soiled condensation (10), passed to the mechanical water cleaner with an assembly (7) to use derived heat, to be returned to the washing station (2) as clean water. The assembly (7) has an outlet for separated impurities (12) and generated heat (13). Preferred Features: The softening stage (9) is a continuous reactor, or it is a softening stage with or without material washing. The chopping station (1) has beating shears, drum choppers and the like. The coarse fiber forming station (11) has a beating or chipping mill, etc. The sorting station has a fine fiber forming stage, in parallel with systems such as disk mills, screw extruders or micro-eddy mills, and a drying stage (14) such as a flow or bed dryer. The prodn. line can include a final sorting stage to give different fine material fractions.

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- [Y] GB 2303152 A 19970212 - ASK CORP [JP]
- [Y] US 4857145 A 19890815 - VILLAVICENCIO EDUARDO J [MX]
- [A] DE 19501618 A1 19950921 - THUERINGISCHES INST TEXTIL [DE]
- [A] FR 2636350 A1 19900316 - CLAAS SAULGAU GMBH [DE]

Cited by

EP2457714A1; EP1130139A1; US2016311467A1; EP2322713A1; EP1213393A1; CN102242404A; CN116984898A; DE102010062153A1; WO2014096355A1; WO03089699A1; WO03070656A1; WO2014086975A1

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