

**CPC****COOPERATIVE PATENT CLASSIFICATION****D21C****PRODUCTION OF CELLULOSE BY REMOVING NON-CELLULOSE SUBSTANCES FROM CELLULOSE-CONTAINING MATERIALS; REGENERATION OF PULPING LIQUORS; APPARATUS THEREFOR****D21C 1/00****Pretreatment of the finely-divided materials before digesting** (of waste paper [D21C 5/02](#))**D21C 1/02**

- with water or steam

**D21C 1/04**

- with acid reacting compounds

**D21C 1/06**

- with alkaline reacting compounds

**D21C 1/08**

- with oxygen-generating compounds

**D21C 1/10**

- Physical methods for facilitating impregnation

**D21C 3/00****Pulping cellulose-containing materials** (digesters [D21C 7/00](#))**D21C 3/003**

- {with organic compounds ([D21C 3/20](#) and [D21C 3/222](#) take precedence)}

**D21C 3/006**

- {with compounds not otherwise provided for}

**D21C 3/02**

- with inorganic bases or alkaline reacting compounds, e.g. sulfate processes

**D21C 3/022**

- . {in presence of S-containing compounds}

**D21C 3/024**

- . {with NH<sub>3</sub> or H<sub>2</sub>O}

**D21C 3/026**

- . {in presence of O<sub>2</sub>, e.g. air}

**D21C 3/028**

- . {in presence of O<sub>3</sub>}

**D21C 3/04**

- with acids, acid salts or acid anhydrides {([D21C 3/003](#) and [D21C 3/222](#) take precedence)}

**D21C 3/045**

- . {in presence of O<sub>2</sub> or O<sub>3</sub>}

**D21C 3/06**

- . sulfur dioxide; sulfurous acid; bisulfites {sulfites}

**D21C 3/08**

- . . calcium bisulfite

**D21C 3/10**

- . . magnesium bisulfite

**D21C 3/12**

- . . sodium bisulfite

**D21C 3/14**

- . . ammonium bisulfite

**D21C 3/16**

- . nitrogen oxides; nitric acid {nitrates, nitrites}

**D21C 3/18**

- with halogens or halogen-generating compounds ([bleaching cellulose pulp D21C 9/12](#))

**D21C 3/20**

- with organic solvents {or in solvent environment}

**D21C 3/22**

- Other features of pulping processes

**D21C 3/222**

- . {Use of compounds accelerating the pulping processes}

**D21C 3/224**

- . {Use of means other than pressure and temperature}

**D21C 3/226**

- . {Use of compounds avoiding scale formation}

**D21C 3/228**

- . {Automation of the pulping processes}

**D21C 3/24**

- . Continuous processes

D21C 3/26	<ul style="list-style-type: none"> <li>. . Multistage processes</li> </ul>
D21C 3/263	<ul style="list-style-type: none"> <li>. . . {at least one stage being in presence of oxygen}</li> </ul>
D21C 3/266	<ul style="list-style-type: none"> <li>. . . {the same pulping agent being used in all stages (<a href="#">D21C 3/263</a> takes precedence)}</li> </ul>
D21C 3/28	<ul style="list-style-type: none"> <li>. . Prevention of foam</li> </ul>
<b>D21C 5/00</b>	<b>Other processes for obtaining cellulose, e.g. cooking cotton linters (obtaining fibres for spinning <a href="#">D01C</a>); {Processes characterised by the choice of cellulose-containing starting materials}</b>
D21C 5/005	<ul style="list-style-type: none"> <li>. {Treatment of cellulose-containing material with micro-organisms or enzymes}</li> </ul>
D21C 5/02	<ul style="list-style-type: none"> <li>. Working-up waste paper (<a href="#">mechanical part D21B 1/08</a>, <a href="#">D21B 1/32</a>)</li> </ul>
D21C 5/022	<ul style="list-style-type: none"> <li>. . {Chemicals therefor}</li> </ul>
D21C 5/025	<ul style="list-style-type: none"> <li>. . {De-inking}</li> </ul>
D21C 5/027	<ul style="list-style-type: none"> <li>. . . {Chemicals therefor}</li> </ul>
<b>D21C 7/00</b>	<b>Digesters</b>
D21C 7/02	<ul style="list-style-type: none"> <li>. Rotary digesters</li> </ul>
D21C 7/04	<ul style="list-style-type: none"> <li>. Linings</li> </ul>
D21C 7/06	<ul style="list-style-type: none"> <li>. Feeding devices</li> </ul>
D21C 7/08	<ul style="list-style-type: none"> <li>. Discharge devices</li> </ul>
D21C 7/10	<ul style="list-style-type: none"> <li>. Heating devices</li> </ul>
D21C 7/12	<ul style="list-style-type: none"> <li>. Devices for regulating or controlling</li> </ul>
D21C 7/14	<ul style="list-style-type: none"> <li>. Means for circulating the lye</li> </ul>
D21C 7/16	<ul style="list-style-type: none"> <li>. Safety devices</li> </ul>
<b>D21C 9/00</b>	<b>After-treatment of cellulose pulp, e.g. of wood pulp, or cotton linters; {Treatment of dilute or dewatered pulp or process improvement taking place after obtaining the raw cellulosic material and not provided for elsewhere (polysaccharides, derivatives thereof <a href="#">C08B</a>; paper-making <a href="#">D21B</a> to <a href="#">D21H</a>)}</b>
D21C 9/001	<ul style="list-style-type: none"> <li>. {Modification of pulp properties (<a href="#">purification D21C 9/08</a>)}</li> </ul>
D21C 9/002	<ul style="list-style-type: none"> <li>. . {by chemical means; preparation of dewatered pulp, e.g. in sheet or bulk form, containing special additives}</li> </ul>
D21C 9/004	<ul style="list-style-type: none"> <li>. . . {inorganic compounds}</li> </ul>
D21C 9/005	<ul style="list-style-type: none"> <li>. . . {organic compounds}</li> </ul>
D21C 9/007	<ul style="list-style-type: none"> <li>. . {by mechanical or physical means}</li> </ul>
D21C 9/008	<ul style="list-style-type: none"> <li>. {Prevention of corrosion or formation of deposits on pulp-treating equipment (<a href="#">D21C 9/08</a>, <a href="#">D21H 21/02</a> take precedence)}</li> </ul>
D21C 9/02	<ul style="list-style-type: none"> <li>. Washing; {Displacing cooking or pulp-treating liquors contained in the pulp by fluids, e.g. wash water or other pulp-treating agents}</li> </ul>
D21C 9/04	<ul style="list-style-type: none"> <li>. . in diffusers; {Washing of pulp of fluid consistency without substantially thickening}</li> </ul>
D21C 9/06	<ul style="list-style-type: none"> <li>. . in filters; {Washing of concentrated pulp, e.g. pulp mats, on filtering surfaces}</li> </ul>

- D21C 9/08
  - Removal of fats, resins, pitch or waxes; {Chemical or physical purification, i.e. refining, of crude cellulose by removing non-cellulosic contaminants, optionally combined with bleaching (fats, waxes [C11B](#); natural resins [C09F 1/00](#); hemicellulose [C08B 37/14](#); purification by mechanical means [D21D 5/00](#))}
- D21C 9/083
  - • {with inorganic compounds ([D21C 9/086](#) takes precedence)}
- D21C 9/086
  - • {with organic compounds or compositions comprising organic compounds}
- D21C 9/10
  - Bleaching; {Apparatus therefor}
- D21C 9/1005
  - • {Pretreatment of the pulp, e.g. degassing the pulp}
- D21C 9/101
  - • {in solvent medium}
- D21C 9/1015
  - • {with use of means other than pressure, temperature}
- D21C 9/1021
  - • {Electrochemical processes}
- D21C 9/1026
  - • {Other features in bleaching processes}
- D21C 9/1031
  - • • {Pulse, dynamic, displacement processes}
- D21C 9/1036
  - • • {Use of compounds accelerating or improving the efficiency of the processes}
- D21C 9/1042
  - • • {Use of chelating agents}
- D21C 9/1047
  - • • {Conserving the bleached pulp}
- D21C 9/1052
  - • • {Controlling the process}
- D21C 9/1057
  - • {Multistage, with compounds cited in more than one sub-group [D21C 9/10](#), [D21C 9/12](#), [D21C 9/16](#)}
- D21C 9/1063
  - • {with compounds not otherwise provided for, e.g. activated gases}
- D21C 9/1068
  - • {with O<sub>2</sub> (closed, see [D21C 9/147](#))}
- D21C 9/1073
  - • {with O<sub>3</sub> (closed, see [D21C 9/153](#))}
- D21C 9/1078
  - • {with Mn-containing compounds}
- D21C 9/1084
  - • {with reducing compounds}
- D21C 9/1089
  - • • {with dithionites}
- D21C 9/1094
  - • • {with H<sub>2</sub>}
- D21C 9/12
  - • with halogens or halogen-containing compounds ([D21C 9/16](#) takes precedence)
- D21C 9/123
  - • • {with Cl<sub>2</sub>O}
- D21C 9/126
  - • • {with perhalogeno compounds}
- D21C 9/14
  - • • with ClO<sub>2</sub> or chlorites
- D21C 9/142
  - • • • {with ClO<sub>2</sub>/Cl<sub>2</sub> in a multistage process involving ClO<sub>2</sub>/Cl<sub>2</sub> exclusively}
- D21C 9/144
  - • • • {with ClO<sub>2</sub>/Cl<sub>2</sub> and other bleaching agents in a multistage process}
- D21C 9/147
  - • with oxygen or its allotropic modifications ([D21C 9/16](#) takes precedence)
- D21C 9/153
  - • • with ozone
- D21C 9/16
  - • with per compounds
- D21C 9/163
  - • • {with peroxides}
- D21C 9/166
  - • • {with peracids}

- D21C 9/18
  - De-watering (de-watering in general [F26B](#)); {Elimination of cooking or pulp-treating liquors from the pulp} ([D21C 9/002](#), [D21C 9/02](#) take precedence; paper-making machines [D21F](#); strainers in digesters [D21C 7/00](#); presses in general [B30B](#))
- D21C 9/185
  - . {comprising at least one step where the pulp is suspended in a gaseous medium, e.g. flash drying}
- D21C 11/00**
  - Regeneration of pulp liquors {or effluent waste waters}**
- D21C 11/0007
  - {Recovery of by-products, i.e. compounds other than those necessary for pulping, for multiple uses or not otherwise provided for (volatile compounds obtained by decomposition of spent liquors in order to regenerate them [D21C 11/125](#); compounds obtained by fractionating the liquors in order to regenerate them [D21C 11/0042](#))}
- D21C 11/0014
  - {Combination of various pulping processes with one or several recovery systems (cross-recovery)}
- D21C 11/0021
  - {Introduction of various effluents, e.g. waste waters, into the pulping, recovery and regeneration cycle (closed-cycle)}
- D21C 11/0028
  - . {Effluents derived from the washing or bleaching plants}
- D21C 11/0035
  - {Introduction of compounds, e.g. sodium sulfate, into the cycle in order to compensate for the losses of pulping agents}
- D21C 11/0042
  - {Fractionating or concentration of spent liquors by special methods (concentration by evaporation [D21C 11/10](#))}
- D21C 11/005
  - . {Treatment of liquors with ion-exchangers}
- D21C 11/0057
  - {Oxidation of liquors, e.g. in order to reduce the losses of sulfur compounds, followed by evaporation or combustion if the liquor in question is a black liquor (deodorisation of gases [D21C 11/08](#); combustion [D21C 11/12](#), [D21C 11/14](#))}
- D21C 11/0064
  - {Aspects concerning the production and the treatment of green and white liquors, e.g. causticizing green liquor}
- D21C 11/0071
  - . {Treatment of green or white liquors with gases, e.g. with carbon dioxide for carbonation; Expulsion of gaseous compounds, e.g. hydrogen sulfide, from these liquors by this treatment (stripping); Optional separation of solid compounds formed in the liquors by this treatment (oxidation of liquors (black, green or white) [D21C 11/0057](#); treatment of pulp gases [D21C 11/06](#))}
- D21C 11/0078
  - . {Treatment of green or white liquors with other means or other compounds than gases, e.g. in order to separate solid compounds such as sodium chloride and carbonate from these liquors; Further treatment of these compounds (fractionating of spent liquors [D21C 11/0042](#))}
- D21C 11/0085
  - {Introduction of auxiliary substances into the regenerating system in order to improve the performance of certain steps of the latter, the presence of these substances being confined to the regeneration cycle (introduction of compounds in order to make up for the losses of pulping agents [D21C 11/0035](#); conventional causticizing of green liquors [D21C 11/0064](#); fractionating of spent liquors [D21C 11/0042](#))}
- D21C 11/0092
  - . {Substances modifying the evaporation, combustion, or thermal decomposition processes of black liquor (treatment of solid substances (ash) separated from combustion gases [D21C 11/066](#); avoiding scale-forming during evaporation [D21C 11/106](#))}
- D21C 11/02
  - of {acid, neutral or alkaline} sulfite lye
- D21C 11/04
  - of alkali lye

- D21C 11/06
  - Treatment of pulp gases; Recovery of the heat content of the gases; {Treatment of gases arising from various sources in pulp and paper mills; Regeneration of gaseous SO<sub>2</sub>, e.g. arising from liquors containing sulfur compounds}
- D21C 11/063
  - • {Treatment of gas streams comprising solid matter, e.g. the ashes resulting from the combustion of black liquor (evaporation of pulp liquors by direct contact with gases [D21C 11/103](#); post-combustion of gases [D21C 11/127](#))}
- D21C 11/066
  - • • {Separation of solid compounds from these gases; further treatment of recovered products}
- D21C 11/08
  - • Deodorisation {Elimination of malodorous compounds, e.g. sulfur compounds such as hydrogen sulfide and mercaptans, from gas streams (oxidation of liquors [D21C 11/0057](#); post-combustion of gases [D21C 11/127](#))}
- D21C 11/10
  - Concentrating spent liquor by evaporation (evaporators [B01D](#))
- D21C 11/103
  - • {Evaporation by direct contact with gases, e.g. hot flue gases}
- D21C 11/106
  - • {Prevention of incrustations on heating surfaces during the concentration, e.g. by elimination of the scale-forming substances contained in the liquors}
- D21C 11/12
  - Combustion of pulp liquors
- D21C 11/122
  - • {Treatment, e.g. dissolution, of the smelt}
- D21C 11/125
  - • {Decomposition of the pulp liquors in reducing atmosphere or in the absence of oxidants, i.e. gasification or pyrolysis}
- D21C 11/127
  - • • {with post-combustion of the gases}
- D21C 11/14
  - • Wet combustion; {Treatment of pulp liquors without previous evaporation, by oxidation of the liquors remaining at least partially in the liquid phase, e.g. by application of pressure (oxidation of black, green or white liquors [D21C 11/0057](#))}