

# CPC COOPERATIVE PATENT CLASSIFICATION

## F22D PREHEATING, OR ACCUMULATING PREHEATED, FEED-WATER; FEED-WATER SUPPLY; CONTROLLING WATER LEVEL; AUXILIARY DEVICES FOR PROMOTING WATER CIRCULATION WITHIN BOILERS (chemical treatment of water, e.g. purification, [C02F](#); enclosed heat-exchange apparatus in general [F28D](#); controlling in general [G05](#))

<b>1/00</b>	<b>Feed-water heaters, i.e. economisers or like preheaters</b>	<b>1/50</b>	<ul style="list-style-type: none"> <li>incorporating thermal de-aeration of feed-water (de-aeration produced in the course of direct heat transfer <a href="#">F22D 1/28</a>; thermal de-aeration of water per se <a href="#">B01D 19/00</a>, <a href="#">C02F 1/20</a>; valves for venting <a href="#">F16K 24/04</a>)</li> </ul>
1/003	<ul style="list-style-type: none"> <li>{<a href="#">Feed-water heater systems</a> (<a href="#">F22D 1/325</a>, <a href="#">F22D 1/36</a> and <a href="#">F22D 1/40</a> take precedence)}</li> </ul>	<b>3/00</b>	<b>Accumulators for preheated water</b>
1/006	<ul style="list-style-type: none"> <li>{<a href="#">with heating tubes</a> (<a href="#">F22D 1/24</a> takes precedence)}</li> </ul>	3/02	<ul style="list-style-type: none"> <li>arranged within combustion chambers</li> </ul>
1/02	<ul style="list-style-type: none"> <li>with water tubes arranged in the boiler furnace, fire tubes, or flue ways (<a href="#">heat-exchange tubes in general</a> <a href="#">F28F</a>)</li> </ul>	3/04	<ul style="list-style-type: none"> <li>combined with steam accumulators</li> </ul>
1/04	<ul style="list-style-type: none"> <li>the tubes having plain outer surfaces, e.g. in vertical arrangement</li> </ul>	3/06	<ul style="list-style-type: none"> <li>directly connected to boilers</li> </ul>
1/06	<ul style="list-style-type: none"> <li>in horizontal arrangement</li> </ul>	3/08	<ul style="list-style-type: none"> <li>specially adapted for locomotives (<a href="#">locomotives boilers</a> <a href="#">F22B 13/06</a>)</li> </ul>
1/08	<ul style="list-style-type: none"> <li>the tubes having fins, ribs, gills, corrugations, or the like on their outer surfaces, e.g. in vertical arrangement</li> </ul>	3/10	<ul style="list-style-type: none"> <li>Control devices (<a href="#">controlling water feed to boilers, or water level</a> <a href="#">F22D 5/00</a>)</li> </ul>
1/10	<ul style="list-style-type: none"> <li>in horizontal arrangement (<a href="#">hollow fire-bars, grates, or the like used as water tubes</a> <a href="#">F23H 3/02</a>)</li> </ul>	<b>5/00</b>	<b>Controlling water feed or water level; Automatic water feeding or water-level regulators (steam traps</b>
1/12	<ul style="list-style-type: none"> <li>Control devices, e.g. for regulating steam temperature</li> </ul>		<a href="#">F16T</a> ; measuring or indicating instruments <a href="#">G01</a> ; for indicating water level <a href="#">G01F</a> ; level control in general <a href="#">G05D 9/00</a> )
1/14	<ul style="list-style-type: none"> <li>Safety or venting devices (<a href="#">safety devices for boilers in general</a> <a href="#">F22B 37/42</a>)</li> </ul>	5/02	<ul style="list-style-type: none"> <li>with an intermediate compartment from which the water is fed by gravity after mechanically moving the compartment, the movement being controlled according to water level</li> </ul>
1/16	<ul style="list-style-type: none"> <li>with water tubes arranged otherwise than in the boiler furnace, fire tubes, or flue ways</li> </ul>	5/04	<ul style="list-style-type: none"> <li>with pivoting buckets</li> </ul>
1/18	<ul style="list-style-type: none"> <li>and heated indirectly</li> </ul>	5/06	<ul style="list-style-type: none"> <li>with receptacles external to, but in free communication with, the boilers and adapted to move up and down in accordance with change in water level</li> </ul>
1/20	<ul style="list-style-type: none"> <li>and directly connected to boilers</li> </ul>	5/08	<ul style="list-style-type: none"> <li>with float-actuated valves</li> </ul>
1/22	<ul style="list-style-type: none"> <li>and provided for rotary movements</li> </ul>	5/10	<ul style="list-style-type: none"> <li>and with pistons or membranes unitary with the feed inlet valves</li> </ul>
1/24	<ul style="list-style-type: none"> <li>with fire tubes or flue ways traversing feed-water vessels</li> </ul>	5/12	<ul style="list-style-type: none"> <li>and with dipping tubes</li> </ul>
1/26	<ul style="list-style-type: none"> <li>with means, other than tubes, to separate water and heating medium, e.g. bulk heaters without internal flues or tubes, jacketed smoke-boxes or flue or flues</li> </ul>	5/14	<ul style="list-style-type: none"> <li>responsive to thermal expansion and contraction, e.g. of solid elements</li> </ul>
1/28	<ul style="list-style-type: none"> <li>for direct heat transfer, e.g. by mixing water and steam</li> </ul>	5/16	<ul style="list-style-type: none"> <li>of fluids</li> </ul>
1/30	<ul style="list-style-type: none"> <li>with stages, steps, baffles, dishes, circular troughs, or other means to cause interrupted or cascading fall of water (<a href="#">de-aeration apparatus</a> <a href="#">C02F</a>)</li> </ul>	5/18	<ul style="list-style-type: none"> <li>for varying the speed or delivery pressure of feed pumps</li> </ul>
1/32	<ul style="list-style-type: none"> <li>arranged to be heated by steam, e.g. bled from turbines</li> </ul>	5/20	<ul style="list-style-type: none"> <li>without floats</li> </ul>
1/325	<ul style="list-style-type: none"> <li>{<a href="#">Schematic arrangements or control devices therefor</a>}</li> </ul>	5/22	<ul style="list-style-type: none"> <li>with floats</li> </ul>
1/34	<ul style="list-style-type: none"> <li>and returning condensate to boiler with main feed supply</li> </ul>	5/24	<ul style="list-style-type: none"> <li>with electric switches</li> </ul>
1/36	<ul style="list-style-type: none"> <li>Water and air preheating systems</li> </ul>	5/26	<ul style="list-style-type: none"> <li>Automatic feed-control systems (<a href="#">automatic safety devices</a> <a href="#">F22B 37/42</a>; <a href="#">controlling in general</a> <a href="#">G05</a>)</li> </ul>
1/38	<ul style="list-style-type: none"> <li>Constructional features of water and air preheating systems</li> </ul>	5/28	<ul style="list-style-type: none"> <li>responsive to amount of steam withdrawn; responsive to steam pressure</li> </ul>
1/40	<ul style="list-style-type: none"> <li>Combinations of exhaust-steam and smoke-gas preheaters (<a href="#">for locomotives</a> <a href="#">F22D 1/42</a>)</li> </ul>	5/30	<ul style="list-style-type: none"> <li>responsive to both water level and amount of steam withdrawn or steam pressure</li> </ul>
1/42	<ul style="list-style-type: none"> <li>specially adapted for locomotives</li> </ul>	5/32	<ul style="list-style-type: none"> <li>influencing the speed or delivery pressure of the feed pumps</li> </ul>
1/44	<ul style="list-style-type: none"> <li>Smoke-gas preheaters</li> </ul>	5/34	<ul style="list-style-type: none"> <li>Applications of valves (<a href="#">valves per se</a> <a href="#">F16K</a>)</li> </ul>
1/46	<ul style="list-style-type: none"> <li>Exhaust-steam preheaters</li> </ul>	5/36	<ul style="list-style-type: none"> <li>for feeding a number of steam boilers designed for different ranges of temperature and pressure</li> </ul>
1/48	<ul style="list-style-type: none"> <li>Details</li> </ul>		

**7/00 Auxiliary devices for promoting water circulation**  
 (adaptation of boilers for promoting water circulation  
[F22B 37/34](#))

- 7/02 . Saddles or like directing plates fitted to furnace tubes
- 7/04 . Injectors for water or steam
- 7/06 . Rotary devices, e.g. propellers
- 7/08 . . Arrangements of pumps, e.g. outside the boilers
- 7/10 . . . within the boilers
- 7/12 . Control devices
- 7/14 . specially adapted for locomotive boilers

**11/00 Feed-water supply not provided for in other main groups**

- 11/003 . {Emergency feed-water supply (safety devices for  
 boilers in general [F22B 37/42](#))}
- 11/006 . {Arrangements of feedwater cleaning with a boiler}
- 11/02 . Arrangements of feed-water pumps ([F22D 11/06](#)  
 takes precedence; pumps *per se* [F04](#))
- 11/04 . . with means to eliminate steam formation
- 11/06 . . for returning condensate to boiler