

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](#))

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

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