

# CPC COOPERATIVE PATENT CLASSIFICATION

## F MECHANICAL ENGINEERING; LIGHTING; HEATING; WEAPONS; BLASTING (NOTE omitted)

### LIGHTING; HEATING

#### F22 STEAM GENERATION (NOTE omitted)

#### F22D PREHEATING, OR ACCUMULATING PREHEATED, FEED-WATER FOR STEAM GENERATION; FEED-WATER SUPPLY FOR STEAM GENERATION; CONTROLLING WATER LEVEL FOR STEAM GENERATION; AUXILIARY DEVICES FOR PROMOTING WATER CIRCULATION WITHIN STEAM BOILERS

1/00	<b>Feed-water heaters, i.e. economisers or like preheaters</b>	1/42	. specially adapted for locomotives
		1/44	. . Smoke-gas preheaters
1/003	. {Feed-water heater systems (F22D 1/325, F22D 1/36 and F22D 1/40 take precedence)}	1/46	. . Exhaust-steam preheaters
1/006	. {with heating tubes (F22D 1/24 takes precedence)}	1/48	. . Details
1/02	. with water tubes arranged in the boiler furnace, fire tubes or flue ways	1/50	. incorporating thermal de-aeration of feed-water (de-aeration produced in the course of direct heat transfer F22D 1/28)
1/04	. . the tubes having plain outer surfaces, e.g. in vertical arrangement	<b>3/00</b>	<b>Accumulators for preheated water</b>
1/06	. . . in horizontal arrangement	3/02	. arranged within combustion chambers
1/08	. . the tubes having fins, ribs, gills, corrugations, or the like on their outer surfaces, e.g. in vertical arrangement	3/04	. combined with steam accumulators
		3/06	. directly connected to boilers
1/10	. . . in horizontal arrangement	3/08	. specially adapted for locomotives
1/12	. . Control devices, e.g. for regulating steam temperature	3/10	. . Control devices
1/14	. . Safety or venting devices	<b>5/00</b>	<b>Controlling water feed or water level; Automatic water feeding or water-level regulators</b>
1/16	. with water tubes arranged otherwise than in the boiler furnace, fire tubes, or flue ways	5/02	. 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	. . and heated indirectly		
1/20	. . and directly connected to boilers	5/04	. with pivoting buckets
1/22	. . and provided for rotary movements	5/06	. 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
1/24	. with fire tubes or flue ways traversing feed-water vessels		
1/26	. 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	5/08	. with float-actuated valves
		5/10	. . and with pistons or membranes unitary with the feed inlet valves
1/28	. for direct heat transfer, e.g. by mixing water and steam	5/12	. . and with dipping tubes
1/30	. . with stages, steps, baffles, dishes, circular troughs, or other means to cause interrupted or cascading fall of water	5/14	. responsive to thermal expansion and contraction, e.g. of solid elements
			. . of fluids
1/32	. arranged to be heated by steam, e.g. bled from turbines	5/16	. for varying the speed or delivery pressure of feed pumps
		5/18	
1/325	. . {Schematic arrangements or control devices therefor}	5/20	. . without floats
		5/22	. . with floats
1/34	. . and returning condensate to boiler with main feed supply	5/24	. with electric switches
		5/26	. Automatic feed-control systems
1/36	. Water and air preheating systems	5/28	. . responsive to amount of steam withdrawn; responsive to steam pressure
1/38	. . Constructional features of water and air preheating systems	5/30	. . responsive to both water level and amount of steam withdrawn or steam pressure
1/40	. Combinations of exhaust-steam and smoke-gas preheaters	5/32	. . influencing the speed or delivery pressure of the feed pumps

## F22D

- 5/34 . . Applications of valves
- 5/36 . . for feeding a number of steam boilers designed for different ranges of temperature and pressure

### **7/00 Auxiliary devices for promoting water circulation**

- 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}
- 11/006 . {Arrangements of feedwater cleaning with a boiler}
- 11/02 . Arrangements of feed-water pumps
- 11/04 . . with means to eliminate steam formation
- 11/06 . . for returning condensate to boiler