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

WARNING
In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.

1/00 Feed-water heaters, i.e. economisers or like preheaters
  1/003 . { Feed-water heater systems (F22D 1/325, F22D 1/36 and F22D 1/40 take precedence) }
  1/006 . { with heating tubes (F22D 1/24 takes precedence) }
  1/02 . with water tubes arranged in the boiler furnace, fire tubes, or flue ways (heat-exchange tubes in general F28F)
  1/04 . . the tubes having plain outer surfaces, e.g. in vertical arrangement
  1/06 . . . in horizontal arrangement
  1/08 . . . the tubes having fins, ribs, gills, corrugations, or the like on their outer surfaces, e.g. in vertical arrangement
  1/10 . . . . in horizontal arrangement (hollow fire-bars, grates, or the like used as water tubes F23H 3/02)

1/12 . . Control devices, e.g. for regulating steam temperature

1/14 . . Safety or venting devices (safety devices for boilers in general F22B 37/42)

1/16 . with water tubes arranged otherwise than in the boiler furnace, fire tubes, or flue ways

1/18 . . and heated indirectly

1/20 . . and directly connected to boilers

1/22 . . and provided for rotary movements

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

1/28 . for direct heat transfer, e.g. by mixing water and steam

1/30 . . with stages, steps, baffles, dishes, circular troughs, or other means to cause interrupted or cascading fall of water (de-aeration apparatus C02F)

1/32 . arranged to be heated by steam, e.g. bled from turbines

1/325 . . { Schematic arrangements or control devices therefor }

1/34 . . and returning condensate to boiler with main feed supply

1/36 . Water and air preheating systems

1/38 . . Constructional features of water and air preheating systems

1/40 . Combinations of exhaust-steam and smoke-gas preheaters (for locomotives F22D 1/42)

1/42 . . specially adapted for locomotives

1/44 . . Smoke-gas preheaters

1/46 . . Exhaust-steam preheaters

1/48 . . Details

1/50 . . 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)

3/00 Accumulators for preheated water

3/02 . . arranged within combustion chambers

3/04 . . combined with steam accumulators

3/06 . . directly connected to boilers

3/08 . . specially adapted for locomotives (locomotives boilers F22B 13/06)

3/10 . . Control devices (controlling water feed to boilers, or water level F22D 5/00)

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)

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

5/04 . . with pivoting buckets

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
with float-actuated valves
and with pistons or membranes unitary with the
feed inlet valves
and with dipping tubes
responsive to thermal expansion and contraction,
e.g. of solid elements
of fluids
for varying the speed or delivery pressure of feed
pumps
without floats
with floats
with electric switches
Automatic feed-control systems (automatic safety
devices F22B 37/42; controlling in general G05)
responsive to amount of steam withdrawn;
responsive to steam pressure
responsive to both water level and amount of
steam withdrawn or steam pressure
influencing the speed or delivery pressure of the
feed pumps
Applications of valves (valves per se F16K)
for feeding a number of steam boilers designed
for different ranges of temperature and pressure

Auxiliary devices for promoting water circulation
(adaptation of boilers for promoting water circulation
F22B 37/34)
Saddles or like directing plates fitted to furnace
tubes
Injectors for water or steam
Rotary devices, e.g. propellers
Arrangements of pumps, e.g. outside the boilers
within the boilers
Control devices
 specially adapted for locomotive boilers

Feed-water supply not provided for in other main
groups
{Emergency feed-water supply (safety devices for
boilers in general F22B 37/42)}
{Arrangements of feedwater cleaning with a boiler}
Arrangements of feed-water pumps (F22D 11/06
takes precedence; pumps per se F04)
with means to eliminate steam formation
for returning condensate to boiler