

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

Definition statement

This place covers:

This subclass covers general aspects of, or methods for, preheating or accumulating feed water for steam generation. All devices in a power plant or a steam boiler for heating water in liquid form, like economisers or water preheaters and accumulating water for preheating purposes, controlling and regulating the water level in said water accumulators, feed-water supply like automatic water feeding and controlling methods are covered. Furthermore safety feed water supply and arrangements of feed water pumps are also covered.

Relationships with other classification places

Water heaters in general are classified in [F24H](#). Generation of steam or vapour is classified in [F22B](#), devices and methods for superheating steam in [F22G](#). Steam engine plants where engine aspects predominate are classified in [F01K](#), domestic central heating systems using steam are classified in [F24D](#), heat exchange or heat transfer in general is classified in [F28](#).

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Cooking vessels	A47J 27/00
Apparatus for making beverages	A47J 31/00
Baking, Roasting, Grilling, Frying	A47J 37/00
Machines for cleaning floors, carpets, furniture, walls, or wall coverings with arrangements for steam generation	A47L 11/4086
Water heater arrangements for cleaning windows	A47L 15/4285
Bathing devices for special therapeutic or hygienic purposes	A61H 33/00
Degasification of liquids or water	B01D 19/00 , C02F 1/20
Cleaning by methods involving the use or presence of liquid steam	B08B 3/00
Treatment of water, waste water, or sewage	C02F 1/00
Washing machines with steam generation	D06F 39/40
Hand irons	D06F 75/00
Use of steam extracted from the engine for feed-water purposes	F01K 7/34
Use of two or more feed-water heaters in series	F01K 7/40
Use of desuperheaters for feed water heating	F01K 7/42
Water heaters for domestic or space-heating systems	F28D 21/0005
Controlling in general	G05
Water heaters heated by electric, magnetic or electromagnetic fields	H05B 6/804

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Economiser	heat exchanger for heating feed water normally beyond the boiling point improving the boiler's efficiency
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F22D 1/00

Feed-water heaters, i.e. economisers or like preheaters

Definition statement

This place covers:

General aspects and constructional features of devices or heat exchangers for heating water normally beyond the boiling point in order to improve the boiler's efficiency arranged in a flow path up stream of an evaporator. This group covers also economisers and preheaters with water tube arranged in the boiler furnace, in fire tubes or in flue ways, with water tubes arranged outside the boiler furnace and heated for example in a separate heat exchanger. Furthermore also water and air preheating systems, combinations of exhaust-steam and smoke-gas water preheater and preheaters incorporating thermal de-aeration are covered.

Relationships with other classification places

Heat exchangers and types thereof are classified in [F28C](#) and [F28D](#), details of heat-exchange and heat-transfer apparatus are classified in [F28F](#).

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Control of feed-water heaters	F22D 5/00
Thermal de-aeration of water per se	B01D 19/00
Liebig degassing water	C02F 1/20
Valves for venting	F16K 24/04
Heat exchange apparatus in boiler for heating air supplied for combustion	F22B 31/08
Safety devices for boilers in general	F22B 37/42
Hollow fire-bars, grates, or the like used as water tubes	F23H 3/02

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Economiser	feed water heater
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F22D 1/02

with water tubes arranged in the boiler furnaces, fire tubes or flue ways

References**Informative references**

Attention is drawn to the following places, which may be of interest for search:

Heat-exchange tubes in general	F28F 1/00
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F22D 1/10

in horizontal arrangement

References**Informative references**

Attention is drawn to the following places, which may be of interest for search:

Internally cooled grates for combustion chambers	F23H 3/02
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F22D 1/14

Safety or venting devices

References**Informative references**

Attention is drawn to the following places, which may be of interest for search:

Safety devices for boilers in general	F22B 37/42
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F22D 1/30

with stages, steps, baffles, dishes, circular troughs, or other means to cause interrupted or cascading fall of water

References**Informative references**

Attention is drawn to the following places, which may be of interest for search:

De-aeration apparatus	C02F
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F22D 1/40**Combinations of exhaust-steam and smoke-gas preheaters****References****Application-oriented references**

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Feed-water heaters, e.g. preheaters, for locomotives	F22D 1/42
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F22D 1/50**incorporating thermal de-aeration of feed-water (de-aeration produced in the course of direct heat transfer [F22D 1/28](#))****References****Limiting references**

This place does not cover:

De-aeration produced in the course of direct heat transfer	F22D 1/28
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Informative references

Attention is drawn to the following places, which may be of interest for search:

Degasification of liquids in general	B01D 19/00
Degassing of water in general	C02F 1/20
Devices for venting enclosures, e.g. valves	F16K 24/04

F22D 3/00**Accumulators for preheated water****Definition statement**

This place covers:

Accumulators and storage vessels for water which is heated in an economiser arranged within the combustion chamber or combined with steam accumulators and thereby heated by steam or connected directly to boilers by water conduits. Water accumulators with preheated water specially adapted for locomotives and control devices are also covered by this group.

References**Informative references**

Attention is drawn to the following places, which may be of interest for search:

Control of feed water heaters; water-level and feeding	F22D 5/00
Plants characterised by the use of steam or heat accumulators	F01K 3/004
Vehicles being a steam locomotive	F01K 17/025
Steam boilers of fire-box type, locomotive boilers	F22B 13/06

F22D 3/08**specially adapted for locomotives****References****Informative references***Attention is drawn to the following places, which may be of interest for search:*

Locomotive boilers	F22B 13/06
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F22D 3/10**Control devices****References****Informative references***Attention is drawn to the following places, which may be of interest for search:*

Controlling water feed to boilers, or water level	F22D 5/00
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F22D 5/00**Controlling water feed or water level; Automatic water feeding or water-level regulators****Definition statement***This place covers:*

Devices and methods for controlling the supply of feed water and the feed water level using intermediate compartments, pivoting buckets, receptacles outside of the boiler and devices with float actuated valves, responsive to thermal expansion and contraction, with electric switches. Also, regulators with varying the speed or delivery pressure of feed pumps and automatic feed-control systems are covered by said group.

Relationships with other classification places

Documents concerning measuring volume, volume flow, mass flow or liquid level are classified in [G01F](#) and documents concerning level control in general in [G05D 9/00](#).

References**Informative references***Attention is drawn to the following places, which may be of interest for search:*

Control devices for feed water heaters with water tubes arranged in the boiler furnace	F22D 1/12
Arrangements of feed water pumps	F22D 11/02
Control devices of plants characterised by condensers	F01K 9/023
Steam traps	F16T
Control system for two or more steam generators including feeding	F22B 35/008
Applications and arrangements of alarm or automatic safety devices for steam boilers	F22B 37/42

Level indicators per se	G01F 23/00
Level control in general	G05D 9/00

F22D 5/26

Automatic feed-control systems

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Automatic safety devices for steam boilers in general	F22B 37/42
Controlling flow in general	G05D 7/00

F22D 5/34

Applications of valves

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Valves per se	F16K
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F22D 7/00

Auxiliary devices for promoting water circulation

Definition statement

This place covers:

Devices in for promoting or enhancing water circulation like saddles, deflecting plates, Venturi arrangements, injectors for water or steam, rotary devices like for example pumps, said devices also specially adapted for locomotive boilers. Control devises of said devices are also covered by said group.

Relationships with other classification places

Pumps in general are classified in [F04B](#), [F04C](#), [F04D](#) and [F04F](#).

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Control devices for feed water heaters with water tubes arranged in the boiler furnace	F22D 1/12
Vehicles being a steam locomotive	F01K 17/025
Adaptation of boilers for promoting water circulation	F22B 37/34

F22D 11/00

Feed-water supply not provided for in other main groups

Definition statement

This place covers:

All other aspects of feed water supply, which are not covered by the other main groups, like for example emergency feed water supply, arrangements of feed water cleaning, when the water is cleaned between condenser and boiler and arrangements of feed water pumps

Relationships with other classification places

Pumps in general are classified in [F04B](#), [F04C](#), [F04D](#) and [F04F](#)

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Feed water heater with direct heat transfer like mixing water with steam	F22D 1/28
Water and air preheating systems	F22D 1/36
Auxiliary devices or apparatus for promoting water circulation	F22D 7/00
Arrangements or modifications of condensate or air pumps	F01K 9/02
Regenerating steam by compression done by an injection apparatus	F01K 19/08
Treating live steam, other than thermo-dynamically, cleaning and filtering	F01K 21/06
Applications and arrangements of alarm or automatic safety devices for steam boilers	F22B 37/42

Special rules of classification

Only feed water supply devices and methods for which there is no entry in the main group [F22D 7/00](#) are to be classified in [F22D 11/00](#).

F22D 11/003

{Emergency feed-water supply}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Safety devices for boilers in general	F22B 37/42
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F22D 11/02**Arrangements of feed-water pumps****References*****Informative references***

Attention is drawn to the following places, which may be of interest for search:

Pumps per se	F04
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