CPC COOPERATIVE PATENT CLASSIFICATION

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

ENGINES OR PUMPS

F01 MACHINES OR ENGINES IN GENERAL (combustion engines F02; machines for liquids F03, F04); ENGINE PLANTS IN GENERAL; STEAM ENGINES

F01K STEAM ENGINE PLANTS; STEAM ACCUMULATORS; ENGINE PLANTS NOT OTHERWISE PROVIDED FOR; ENGINES USING SPECIAL WORKING FLUIDS OR CYCLES (gas-turbine or jet-propulsion plants F02; nuclear power plants, engine arrangements therein G21D)

NOTE

Attention is drawn to the notes preceding class F01, especially as regards the definitions of "steam" and "special vapour".

1/00 **Steam accumulators** (use of accumulators in steam engine plants F01K 3/00)
1/02 . for storing steam otherwise than in a liquid
1/04 . for storing steam in a liquid, e.g. Ruth's type (in alkali to increase steam pressure F22B 1/20)
1/06 . . Internal fittings facilitating steam distribution, steam formation, or circulation (acting during charging or discharging F01K 1/08; fittings facilitating circulation through multiple accumulators F01K 1/14)
1/08 . Charging or discharging of accumulators with steam (peculiar to multiple accumulators F01K 1/12)
1/10 . specially adapted for superheated steam
1/12 . Multiple accumulators; Charging, discharging or control specially adapted therefor
1/14 . . Circulation
1/16 . Other safety or control means
1/18 . . for steam pressure
1/20 . Other steam-accumulator parts, details, or accessories

Steam engine plants

3/00 **Plants characterised by the use of steam or heat accumulators, or intermediate steam heaters, therein** (regenerating exhaust steam F01K 19/00)
3/002 . {Steam conversion}
3/004 . {Accumulation in the liquid branch of the circuit}
3/006 . {Accumulators and steam compressors}
3/008 . {Use of steam accumulators of the Ruth type for storing steam in water; Regulating thereof (Ruth accumulators per se F01K 1/04)}
3/02 . Use of accumulators and specific engine types; Control thereof
3/04 . . the engine being of multiple-inlet-pressure type
3/06 . the engine being of extraction or non-condensing type {(F01K 3/004 takes precedence)}
3/08 . Use of accumulators and the plant being specially adapted for a specific use
3/10 . . for vehicle drive, e.g. for accumulator locomotives
3/12 . having two or more accumulators
3/14 . having both steam accumulator and heater, e.g. superheating accumulator (steam superheaters per se F22G)
3/16 . . Mutual arrangement of accumulator and heater
3/18 . having heaters (having both steam accumulator and heater F01K 3/14; steam heaters per se F22)
3/181 . . {using nuclear heat (F01K 3/26 takes precedence)}
3/183 . . . {one heater being a fired superheater}
3/185 . . {using waste heat from outside the plant (F02G 5/00 takes precedence)}
3/186 . . {using electric heat}
3/188 . . {using heat from a specified chemical reaction}
3/20 . . with heating by combustion gases of main boiler
3/205 . . . {more than one circuit being heated by one boiler}
3/22 . . . Controlling, e.g. starting, stopping (F01K 7/00, F01K 13/02 take precedence)
3/24 . . with heating by separately-fired heaters
3/242 . . . {delivering steam to a common mains}
3/245 . . . {delivering steam at different pressure levels (F01K 3/247 takes precedence)}
3/247 . . . {one heater being an incinerator}
3/26 . . with heating by steam
3/262 . . . {by means of heat exchangers}
3/265 . . . . {using live steam for superheating or reheating}
3/267 . . . {by mixing with steam, e.g. LOFFLER-boiler}

5/00 **Plants characterised by use of means for storing steam in an alkali to increase steam pressure, e.g. of Honigmann or Koenemann type**
5/02 . used in regenerative installation

7/00 **Steam engine plants characterised by the use of specific types of engine** (F01K 3/02 takes precedence)**; Plants or engines characterised by their use of special steam systems, cycles or processes** (reciprocating-piston engines using uniflow principle F01B 17/04)**; Control means specially adapted for such systems, cycles or processes; Use of withdrawn or exhaust steam for feed-water heating**

7/02 . the engines being of multiple-expansion type (the engines being only of turbine type F01K 7/16; the engines using steam of critical or overcritical pressure F01K 7/32; the engines being of extraction or non-condensing type F01K 7/34)

7/025 . . {Consecutive expansion in a turbine or a positive displacement engine}

7/04 . . Control means specially adapted therefor

7/06 . the engines being of multiple-inlet-pressure type (F01K 7/02 takes precedence; the engines being only of turbine type F01K 7/16; the engines using steam of critical or over-critical pressure F01K 7/32; the engines being of extraction or non-condensing type F01K 7/34)

7/08 . . Control means specially adapted therefor

7/10 . characterised by the engine exhaust pressure (the engines being only of turbine type F01K 7/16; the engines using steam of critical or over-critical pressure F01K 7/32; the engines being of extraction or non-condensing type F01K 7/34)

7/12 . . of condensing type

7/14 . . . Control means specially adapted therefor

7/16 . the engines being only of turbine type (the engines using steam of critical or overcritical pressure F01K 7/32; the engines being of extraction or non-condensing type F01K 7/34)

7/165 . . {Controlling means specially adapted therefor}

7/18 . . the turbine being of multiple-inlet-pressure type

7/20 . . . Control means specially adapted therefor

7/22 . . the turbines having inter-stage steam heating

7/223 . . . {Inter-stage moisture separation}

7/226 . . . {Inter-stage steam injection}

7/24 . . . Control or safety means specially adapted therefor

7/26 . . the turbines having inter-stage steam accumulation

7/28 . . . Control means specially adapted therefor

7/30 . . the turbines using exhaust steam only

7/32 . the engines using steam of critical or overcritical pressure

7/34 . the engines being of extraction or non-condensing type; Use of steam for feed-water heating (feed-water heaters in general F22D)

7/345 . . {Control or safety-means particular thereto}

7/36 . . the engines being of positive-displacement type

7/38 . . the engines being of turbine type

7/40 . . Use of two or more feed-water heaters in series

7/42 . . Use of desuperheaters for feed-water heating

7/44 . . Use of steam for feed-water heating and another purpose

9/00 **Plants characterised by condensers arranged or modified to co-operate with the engines** (by condensers structurally combined with engines F01K 11/00; steam condensers per se F28B) (F01K 23/04 takes precedence)

9/003 . {condenser cooling circuits}

9/006 . {Vacuum-breakers}

9/02 . Arrangements or modifications of condensate or air pumps

9/023 . . {Control thereof}

9/026 . . {Returning condensate by capillarity}

9/04 . with dump valves to by-pass stages

11/00 **Plants characterised by the engines being structurally combined with boilers or condensers**

11/02 . the engines being turbines

11/04 . the boilers or condensers being rotated in use

13/00 **General layout or general methods of operation of complete plants**

13/003 . {Arrangements for measuring or testing (in general G01)}

13/006 . {Auxiliaries or details not otherwise provided for}

13/02 . Controlling, e.g. stopping or starting

13/025 . . {Cooling the interior by injection during idling or stand-by}

15/00 **Adaptations of plants for special use {**(F01K 7/02 takes precedence)**}**

15/02 . for driving vehicles, e.g. locomotives (arrangements in vehicles, see the relevant vehicle classes)

15/025 . . {the vehicle being a steam locomotive}

15/04 . . the vehicles being waterborne vessels

15/045 . . . {Control thereof (F01K 3/22, F01K 7/00, F01K 13/02 take precedence)}

17/00 **Using steam or condensate extracted or exhausted from steam engine plant** (for heating feed-water F01K 7/34; returning condensate to boiler F22D {F01K 7/36 takes precedence})

17/005 . {by means of a heat pump (heat pumps systems per se F25B)}

17/02 . for heating purposes, e.g. industrial, domestic (F01K 17/06 takes precedence; domestic- or space-heating systems, e.g. central-heating systems, in general F24D 1/00, F24D 3/00, F24D 9/00)

17/025 . . {in combination with at least one gas turbine, e.g. a combustion gas turbine}

17/04 . for specific purposes other than heating (F01K 17/06 takes precedence)

17/06 . Returning energy of steam, in exchanged form, to process, e.g. use of exhaust steam for drying solid fuel or plant

19/00 **Regenerating or otherwise treating steam exhausted from steam engine plant** ({F01K 3/006 takes precedence} plants characterised by use of means for storing steam in an alkali to increase steam pressure F01K 5/00; returning condensate to boiler F22D)

19/02 . Regenerating by compression

19/04 . . in combination with cooling or heating

19/06 . . in engine cylinder

19/08 . . compression done by injection apparatus, jet blower, or the like

19/10 . Cooling exhaust steam other than by condenser; Rendering exhaust steam invisible

21/00 **Steam engine plants not otherwise provided for**

21/005 . {using mixtures of liquid and steam or evaporation of a liquid by expansion}

21/02 . with steam-generation in engine-cylinders
21/04 . using mixtures of steam and gas; Plants generating or heating steam by bringing water or steam into direct contact with hot gas ({F01K 25/005, F02B 47/02 take precedence; injecting water or steam into a as gas turbine plant F02C 3/305}; direct-contact steam generators in general F22B)
21/042 . . {pure steam being expanded in a motor somewhere in the plant (F01K 21/045 takes precedence)}
21/045 . . {Introducing gas and steam separately into the motor, e.g. admission to a single rotor through separate nozzles}
21/047 . . {having at least one combustion gas turbine}
21/06 . Treating live steam, other than thermodynamically, e.g. for fighting deposits in engine

23/00 Plants characterised by more than one engine delivering power external to the plant, the engines being driven by different fluids

23/02 . the engine cycles being thermally coupled
23/04 . . condensation heat from one cycle heating the fluid in another cycle
23/06 . . combustion heat from one cycle heating the fluid in another cycle
23/061 . . . {with combustion in a fluidised bed (plants with a fluidised-bed combustor comprising only gas-turbines F02C 3/205; fluidised-bed apparatus per se B01J 8/18; fluidised-bed combustors F23C 10/00; fluidised-bed steam-boilers F22B 31/0007)}
23/062 . . . . {the combustion bed being pressurised (pressurised fluid bed combustion per se F23C 10/16)}
23/064 . . . {in combination with an industrial process, e.g. chemical, metallurgical (particularly adapted for a specific process see the relevant classes)}
23/065 . . . {the combustion taking place in an internal combustion piston engine, e.g. a diesel engine}
23/067 . . . {the combustion heat coming from a gasification or pyrolysis process, e.g. coal gasification (gas turbines with fuel gasifiers F02C 3/28)}
23/068 . . . . {in combination with an oxygen producing plant, e.g. an air separation plant}
23/08 . . . with working fluid of one cycle heating the fluid in another cycle
23/10 . . . with exhaust fluid of one cycle heating the fluid in another cycle (F01K 17/025 takes precedence)
23/101 . . . . {Regulating means specially adapted therefor (F01K 23/105, F01K 23/108 take precedence)}
23/103 . . . . {with afterburner in exhaust boiler}
23/105 . . . . . {Regulating means specially adapted therefor}
23/106 . . . . {with water evaporated or preheated at different pressures in exhaust boiler}
23/108 . . . . . {Regulating means specially adapted therefor}
23/12 . the engines being mechanically coupled (F01K 23/02 takes precedence)
23/14 . . including at least one combustion engine
23/16 . . all the engines being turbines (F01K 23/14 takes precedence)
23/18 . characterised by adaptation for specific use

25/00 Plants or engines characterised by use of special working fluids, not otherwise provided for; Plants operating in closed cycles and not otherwise provided for

25/005 . {the working fluid being steam, created by combustion of hydrogen with oxygen}
25/02 . the fluid remaining in the liquid phase
25/04 . the fluid being in different phases, e.g. foamed
25/06 . using mixtures of different fluids (plants using mixtures of steam and gas F01K 21/04)
25/065 . . {with an absorption fluid remaining at least partly in the liquid state, e.g. water for ammonia (F01K 5/00 takes precedence)}
25/08 . using special vapours
25/085 . . {the vapour being sulfur}
25/10 . . the vapours being cold, e.g. ammonia, carbon dioxide, ether
25/103 . . . {Carbon dioxide (F01K 25/065 takes precedence)}
25/106 . . . {Ammonia (F01K 25/065 takes precedence)}
25/12 . . the vapours being metallic, e.g. mercury
25/14 . . using industrial or other waste gases

27/00 Plants for converting heat or fluid energy into mechanical energy, not otherwise provided for

27/005 . {by means of hydraulic motors}
27/02 . Plants modified to use their waste heat, other than that of exhaust, e.g. engine-friction heat