

CPC COOPERATIVE PATENT CLASSIFICATION

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

ENGINES OR PUMPS

F01 MACHINES OR ENGINES IN GENERAL; 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".

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.

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|-------------|---|-------------|---|
| 1/00 | Steam accumulators (use of accumulators in steam engine plants F01K 3/00) | 3/08 | . Use of accumulators and the plant being specially adapted for a specific use |
| 1/02 | . for storing steam otherwise than in a liquid | 3/10 | . . for vehicle drive, e.g. for accumulator locomotives |
| 1/04 | . for storing steam in a liquid, e.g. Ruth's type (in alkali to increase steam pressure F22B 1/20) | 3/12 | . having two or more accumulators |
| 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) | 3/14 | . having both steam accumulator and heater, e.g. superheating accumulator (steam superheaters per se F22G) |
| 1/08 | . Charging or discharging of accumulators with steam (peculiar to multiple accumulators F01K 1/12) | 3/16 | . . Mutual arrangement of accumulator and heater |
| 1/10 | . specially adapted for superheated steam | 3/18 | . having heaters (having both steam accumulator and heater F01K 3/14 ; steam heaters per se F22) |
| 1/12 | . Multiple accumulators; Charging, discharging or control specially adapted therefor | 3/181 | . . {using nuclear heat (F01K 3/26 takes precedence)} |
| 1/14 | . . Circulation | 3/183 | . . . {one heater being a fired superheater} |
| 1/16 | . Other safety or control means | 3/185 | . . {using waste heat from outside the plant (F02G 5/00 takes precedence)} |
| 1/18 | . . for steam pressure | 3/186 | . . {using electric heat} |
| 1/20 | . Other steam-accumulator parts, details, or accessories | 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 |

Steam engine plants

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|-------------|---|
| 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) |

- 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 supercritical 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 supercritical 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 supercritical 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 supercritical 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 supercritical 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
 - 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 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}
- 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