

**CPC****COOPERATIVE PATENT CLASSIFICATION****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".

**F01K 1/00**

**Steam accumulators** (use of accumulators in steam engine plants [F01K 3/00](#))

**F01K 1/02**

- for storing steam otherwise than in a liquid

**F01K 1/04**

- for storing steam in a liquid, e.g. Ruth's type (in alkali to increase steam pressure [F22B 1/20](#))

**F01K 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](#))

**F01K 1/08**

- Charging or discharging of accumulators with steam (peculiar to multiple accumulators [F01K 1/12](#))

**F01K 1/10**

- specially adapted for superheated steam

**F01K 1/12**

- Multiple accumulators; Charging, discharging or regulating peculiar thereto

**F01K 1/14**

- Circulation

**F01K 1/16**

- Other safety or regulating means

**F01K 1/18**

- for steam pressure

**F01K 1/20**

- Other steam-accumulator parts, details, or accessories

**Steam engine plants****F01K 3/00**

**Plants characterised by the use of steam or heat accumulators, or intermediate steam heaters, therein** (regenerating exhaust steam [F01K 19/00](#))

**F01K 3/002**

- {Steam conversion}

**F01K 3/004**

- {Accumulation in the liquid branch of the circuit}

**F01K 3/006**

- {Accumulators and steam compressors}

**F01K 3/008**

- {Use of steam accumulators of the Ruth type for storing steam in water; Regulating thereof (Ruth accumulators per se [F01K 1/04](#))}

**F01K 3/02**

- Use of accumulators and specific engine types; Regulating thereof

**F01K 3/04**

- the engine being of multiple-inlet-pressure type

**F01K 3/06**

- the engine being of extraction or non-condensing type {([F01K 3/004](#) takes precedence)}

**F01K 3/08**

- Use of accumulators and the plant being specially adapted for a specific use

**F01K 3/10**

- for vehicle drive, e.g. for accumulator locomotives

**F01K 3/12**

- having two or more accumulators

- F01K 3/14
  - having both steam accumulator and heater, e.g. superheating accumulator (steam superheaters per se F22G)
- F01K 3/16
  - . Mutual arrangement of accumulator and heater
- F01K 3/18
  - having heaters (having both steam accumulator and heater F01K 3/14; steam heaters per se F22)
- F01K 3/181
  - . {using nuclear heat (F01K 3/26 takes precedence)}
- F01K 3/183
  - . . {one heater being a fired superheater}
- F01K 3/185
  - . {using waste heat from outside the plant (F02G 5/00 takes precedence)}
- F01K 3/186
  - . {using electric heat}
- F01K 3/188
  - . {using heat from a specified chemical reaction}
- F01K 3/20
  - . with heating by combustion gases of main boiler
- F01K 3/205
  - . . {more than one circuit being heated by one boiler}
- F01K 3/22
  - . . Controlling, e.g. starting, stopping (F01K 7/00, F01K 13/02 take precedence)
- F01K 3/24
  - . with heating by separately-fired heaters
- F01K 3/242
  - . . {delivering steam to a common mains}
- F01K 3/245
  - . . {delivering steam at different pressure levels (F01K 3/247 takes precedence)}
- F01K 3/247
  - . . . {one heater being an incinerator}
- F01K 3/26
  - . with heating by steam
- F01K 3/262
  - . . {by means of heat exchangers}
- F01K 3/265
  - . . . {using live steam for superheating or reheating}
- F01K 3/267
  - . . . {by mixing with steam e.g. LOFFLER-boiler}
- F01K 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**
- F01K 5/02
  - used in regenerative installation
- F01K 7/00**

**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); Regulating means peculiar to such systems, cycles, or processes; Use of withdrawn or exhaust steam for feed-water heating**
- F01K 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)
- F01K 7/025
  - . {Consecutive expansion in a turbine or a positive displacement engine}
- F01K 7/04
  - . Regulating means peculiar thereto
- F01K 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)
- F01K 7/08
  - . Regulating means peculiar thereto

- F01K 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](#))
- F01K 7/12
  - . of condensing type
- F01K 7/14
  - . . Regulating means peculiar thereto
- F01K 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](#))
- F01K 7/165
  - . {Regulating means specially adapted therefor}
- F01K 7/18
  - . the turbine being of multiple-inlet-pressure type
- F01K 7/20
  - . . Regulating means peculiar thereto
- F01K 7/22
  - . the turbines having inter-stage steam heating
- F01K 7/223
  - . . {Inter-stage moisture separation}
- F01K 7/226
  - . . {Inter-stage steam injection}
- F01K 7/24
  - . . Regulating or safety means peculiar thereto
- F01K 7/26
  - . the turbines having inter-stage steam accumulation
- F01K 7/28
  - . . Regulating means peculiar thereto
- F01K 7/30
  - . the turbines using exhaust steam only
- F01K 7/32
  - the engines using steam of critical or overcritical pressure
- F01K 7/34
  - the engines being of extraction or non-condensing type; Use of steam for feed-water heating (feed-water heaters in general [F22D](#))
- F01K 7/345
  - . {Control or safety-means particular thereto}
- F01K 7/36
  - . the engines being of positive-displacement type
- F01K 7/38
  - . the engines being of turbine type
- F01K 7/40
  - . Use of two or more feed-water heaters in series
- F01K 7/42
  - . Use of desuperheaters for feed-water heating
- F01K 7/44
  - . Use of steam for feed-water heating and another purpose
- F01K 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)
- F01K 9/003
  - {condenser cooling circuits}
- F01K 9/006
  - {Vacuum-breakers}
- F01K 9/02
  - Arrangements or modifications of condensate or air pumps
- F01K 9/023
  - . {Control thereof}
- F01K 9/026
  - . {Returning condensate by capillarity}
- F01K 9/04
  - with dump valves to by-pass stages
- F01K 11/00**

**Plants characterised by the engines being structurally combined with boilers or condensers**
- F01K 11/02
  - the engines being turbines
- F01K 11/04
  - the boilers or condensers being rotated in use

<b>F01K 13/00</b>	<b>General lay-out or general methods of operation of complete plants</b>
F01K 13/003	<ul style="list-style-type: none"> <li>• {Arrangements for measuring or testing (in general <a href="#">G01</a>)}</li> </ul>
F01K 13/006	<ul style="list-style-type: none"> <li>• {Auxiliaries or details not otherwise provided for}</li> </ul>
F01K 13/02	<ul style="list-style-type: none"> <li>• Regulating, e.g. stopping or starting</li> </ul>
F01K 13/025	<ul style="list-style-type: none"> <li>• . {Cooling the interior by injection during idling or stand-by}</li> </ul>
<b>F01K 15/00</b>	<b>Adaptations of plants for special use {(F01K 7/02 takes precedence)}</b>
F01K 15/02	<ul style="list-style-type: none"> <li>• for driving vehicles, e.g. locomotives (arrangements in vehicles, see the relevant vehicle classes)</li> </ul>
F01K 15/025	<ul style="list-style-type: none"> <li>• . {the vehicle being a steam locomotive}</li> </ul>
F01K 15/04	<ul style="list-style-type: none"> <li>• . the vehicles being waterborne vessels</li> </ul>
F01K 15/045	<ul style="list-style-type: none"> <li>• . . {Control thereof (F01K 3/22, F01K 7/00, F01K 13/02 take precedence)}</li> </ul>
<b>F01K 17/00</b>	<b>Using steam or condensate extracted or exhausted from steam engine plant (for heating feed-water <a href="#">F01K 7/34</a>; returning condensate to boiler <a href="#">F22D</a> {F01K 7/36 takes precedence})</b>
F01K 17/005	<ul style="list-style-type: none"> <li>• {by means of a heat pump (heat pumps systems per se <a href="#">F25B</a>)}</li> </ul>
F01K 17/02	<ul style="list-style-type: none"> <li>• for heating purposes, e.g. industrial, domestic (F01K 17/06 takes precedence; domestic- or space-heating systems, e.g. central-heating systems, in general <a href="#">F24D 1/00</a>, <a href="#">F24D 3/00</a>, <a href="#">F24D 9/00</a>)</li> </ul>
F01K 17/025	<ul style="list-style-type: none"> <li>• . {in combination with at least one gas turbine, e.g. a combustion gas turbine}</li> </ul>
F01K 17/04	<ul style="list-style-type: none"> <li>• for specific purposes other than heating (F01K 17/06 takes precedence)</li> </ul>
F01K 17/06	<ul style="list-style-type: none"> <li>• Returning energy of steam, in exchanged form, to process, e.g. use of exhaust steam for drying solid fuel or plant</li> </ul>
<b>F01K 19/00</b>	<b>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 <a href="#">F01K 5/00</a>; returning condensate to boiler <a href="#">F22D</a>)</b>
F01K 19/02	<ul style="list-style-type: none"> <li>• Regenerating by compression</li> </ul>
F01K 19/04	<ul style="list-style-type: none"> <li>• . in combination with cooling or heating</li> </ul>
F01K 19/06	<ul style="list-style-type: none"> <li>• . in engine cylinder</li> </ul>
F01K 19/08	<ul style="list-style-type: none"> <li>• . compression done by injection apparatus, jet blower, or the like</li> </ul>
F01K 19/10	<ul style="list-style-type: none"> <li>• Cooling exhaust steam other than by condenser; Rendering exhaust steam invisible</li> </ul>
<b>F01K 21/00</b>	<b>Steam engine plants not otherwise provided for</b>
F01K 21/005	<ul style="list-style-type: none"> <li>• {using mixtures of liquid and steam or evaporation of a liquid by expansion}</li> </ul>
F01K 21/02	<ul style="list-style-type: none"> <li>• with steam-generation in engine-cylinders</li> </ul>
F01K 21/04	<ul style="list-style-type: none"> <li>• 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, <a href="#">F02B 47/02</a> take precedence; injecting water or steam into a gas turbine plant <a href="#">F02C 3/305</a>; direct-contact steam generators in general <a href="#">F22B</a>)</li> </ul>
F01K 21/042	<ul style="list-style-type: none"> <li>• . {pure steam being expanded in a motor somewhere in the plant (F01K 21/045 takes precedence)}</li> </ul>

- F01K 21/045 . . {Introducing gas and steam separately into the motor, e.g. admission to a single rotor through separate nozzles}
- F01K 21/047 . . {having at least one combustion gas turbine}
- F01K 21/06 . Treating live steam, other than thermo-dynamically, e.g. for fighting deposits in engine
  
- F01K 23/00** **Plants characterised by more than one engine delivering power external to the plant, the engines being driven by different fluids**
- F01K 23/02 . the engine cycles being thermally coupled
- F01K 23/04 . . condensation heat from one cycle heating the fluid in another cycle
- F01K 23/06 . . combustion heat from one cycle heating the fluid in another cycle
- F01K 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](#))}
- F01K 23/062 . . . . {the combustion bed being pressurised (pressurised fluid bed combustion per se [F23C 10/16](#))}
- F01K 23/064 . . . {in combination with an industrial process e.g. chemical, metallurgical (particularly adapted for a specific process see the relevant classes)}
- F01K 23/065 . . . {the combustion taking place in an internal combustion piston engine, e.g. a diesel engine}
- F01K 23/067 . . . {the combustion heat coming from a gasification or pyrolysis process, e.g. coal gasification (gas turbines with fuel gasifiers [F02C 3/28](#))}
- F01K 23/068 . . . . {in combination with an oxygen producing plant, e.g. an air separation plant}
- F01K 23/08 . . . with working fluid of one cycle heating the fluid in another cycle
- F01K 23/10 . . . with exhaust fluid of one cycle heating the fluid in another cycle ([F01K 17/025](#) takes precedence)
- F01K 23/101 . . . . {Regulating means specially adapted therefor ([F01K 23/105](#), [F01K 23/108](#) take precedence)}
- F01K 23/103 . . . . {with afterburner in exhaust boiler}
- F01K 23/105 . . . . . {Regulating means specially adapted therefor}
- F01K 23/106 . . . . {with water evaporated or preheated at different pressures in exhaust boiler}
- F01K 23/108 . . . . . {Regulating means specially adapted therefor}
- F01K 23/12 . the engines being mechanically coupled ([F01K 23/02](#) takes precedence)
- F01K 23/14 . . including at least one combustion engine
- F01K 23/16 . . all the engines being turbines ([F01K 23/14](#) takes precedence)
- F01K 23/18 . characterised by adaptation for specific use
  
- F01K 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**
- F01K 25/005 . {the working fluid being steam, created by combustion of hydrogen with oxygen}
- F01K 25/02 . the fluid remaining in the liquid phase

- F01K 25/04
  - the fluid being in different phase, e.g. foamed
- F01K 25/06
  - using mixtures of different fluids (plants using mixtures of steam and gas [F01K 21/04](#))
- F01K 25/065
  - . {with an absorption fluid remaining at least partly in the liquid state, e.g. water for ammonia ([F01K 5/00](#) takes precedence)}
- F01K 25/08
  - using special vapours
- F01K 25/085
  - . {the vapour being sulfur}
- F01K 25/10
  - . the vapours being cold, e.g. ammonia, carbon dioxide, ether
- F01K 25/103
  - . . {Carbon dioxide ([F01K 25/065](#) takes precedence)}
- F01K 25/106
  - . . {Ammonia ([F01K 25/065](#) takes precedence)}
- F01K 25/12
  - . the vapours being metallic, e.g. mercury
- F01K 25/14
  - . using industrial or other waste gases
- F01K 27/00**
  - Plants for converting heat or fluid energy into mechanical energy, not otherwise provided for**
- F01K 27/005
  - {by means of hydraulic motors}
- F01K 27/02
  - Plants modified to use their waste heat, other than that of exhaust, e.g. engine-friction heat