

**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

**Guidance heading:** **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 overcritical 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 over-critical 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
- F01K 13/00** **General lay-out or general methods of operation of complete plants**
  - F01K 13/003 . {Arrangements for measuring or testing (in general [G01](#))}
  - F01K 13/006 . {Auxiliaries or details not otherwise provided for}

- F01K 13/02 . Regulating, e.g. stopping or starting
- F01K 13/025 . . {Cooling the interior by injection during idling or stand-by}
  
- F01K 15/00** **Adaptations of plants for special use** {F01K 7/02 takes precedence}
- F01K 15/02 . for driving vehicles, e.g. locomotives (arrangements in vehicles, see the relevant vehicle classes)
- F01K 15/025 . . {the vehicle being a steam locomotive}
- F01K 15/04 . . the vehicles being waterborne vessels
- F01K 15/045 . . . {Control thereof (F01K 3/22, F01K 7/00, F01K 13/02 take precedence)}
  
- F01K 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}
- F01K 17/005 . {by means of a heat pump (heat pumps systems per se F25B)}
- F01K 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)
- F01K 17/025 . . {in combination with at least one gas turbine, e.g. a combustion gas turbine}
- F01K 17/04 . for specific purposes other than heating (F01K 17/06 takes precedence)
- F01K 17/06 . Returning energy of steam, in exchanged form, to process, e.g. use of exhaust steam for drying solid fuel or plant
  
- F01K 19/00** **Regenerating or otherwise treating steam exhausted from steam engine plant** (plants characterised by use of means for storing steam in an alkali to increase steam pressure F01K 5/00; returning condensate to boiler F22D){F01K 3/006 takes precedence}
- F01K 19/02 . Regenerating by compression
- F01K 19/04 . . in combination with cooling or heating
- F01K 19/06 . . in engine cylinder
- F01K 19/08 . . compression done by injection apparatus, jet blower, or the like
- F01K 19/10 . Cooling exhaust steam other than by condenser; Rendering exhaust steam invisible
  
- F01K 21/00** **Steam engine plants not otherwise provided for**
- F01K 21/005 . {using mixtures of liquid and steam or evaporation of a liquid by expansion}
- F01K 21/02 . with steam-generation in engine-cylinders
- F01K 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)
- F01K 21/042 . . {pure steam being expanded in a motor somewhere in the plant (F01K 21/045 takes precedence)}
- 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

<b>F01K 23/00</b>	<b>Plants characterised by more than one engine delivering power external to the plant, the engines being driven by different fluids</b>
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 <a href="#">F02C 3/205</a> ; fluidised-bed apparatus per se <a href="#">B01J 8/18</a> ; fluidised-bed combustors <a href="#">F23C 10/00</a> ; fluidised-bed steam-boilers <a href="#">F22B 31/0007</a> )}
F01K 23/062	.... {the combustion bed being pressurised (pressurised fluid bed combustion per se <a href="#">F23C 10/16</a> )}
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 <a href="#">F02C 3/28</a> )}
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 ( <a href="#">F01K 17/025</a> takes precedence)
F01K 23/101	.... {Regulating means specially adapted therefor ( <a href="#">F01K 23/105</a> , <a href="#">F01K 23/108</a> 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 ( <a href="#">F01K 23/02</a> takes precedence)
F01K 23/14	.. including at least one combustion engine
F01K 23/16	.. all the engines being turbines ( <a href="#">F01K 23/14</a> takes precedence)
F01K 23/18	. characterised by adaptation for specific use
<b>F01K 25/00</b>	<b>Plants or engines characterised by use of special working fluids, not otherwise provided for; Plants operating in closed cycles and not otherwise provided for</b>
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 <a href="#">F01K 21/04</a> )
F01K 25/065	.. {with an absorption fluid remaining at least partly in the liquid state, e.g. water for ammonia ( <a href="#">F01K 5/00</a> 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