

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".

Guidance heading:

- 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
- 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