

CPC**COOPERATIVE PATENT CLASSIFICATION****F03B**

MACHINES OR ENGINES FOR LIQUIDS (positive-displacement engines for liquid [F03C](#); machines for liquids and gases [F01](#); positive-displacement machines for liquids [F04](#), rotary fluid gearing of the hydrokinetic type [F16H 41/00](#))

NOTES

1. Attention is drawn to the notes preceding Class [F01](#), especially as regards the definition of "reaction type".
2. This subclass comprises:
 - engines, other than of positive-displacement type, driven by liquids;
 - machines, other than of positive-displacement type, for liquids.

Non-positive-displacement machines or engines characterised by specified type, e.g. water turbines (adaptations of machines or engines for special use [F03B 13/00](#); controlling [F03B 15/00](#))

F03B 1/00

Engines of impulse type, i.e. turbines with jets of high-velocity liquid impinging on blades or like rotors, e.g. Pelton wheels; Parts or details peculiar thereto

[F03B 1/02](#)

- Buckets; Bucket-carrying rotors

[F03B 1/04](#)

- Nozzles (in general [B05B](#)); Nozzle-carrying members

F03B 3/00

Machines or engines of reaction type; Parts or details peculiar thereto

[F03B 3/02](#)

- with radial flow at high-pressure side and axial flow at low-pressure side of rotors, e.g. Francis turbines {(rotors per se [F03B 3/125](#))}

[F03B 3/04](#)

- with substantially axial flow throughout rotors, e.g. propeller turbines {(rotors per se [F03B 3/126](#))}

[F03B 3/06](#)

- . with adjustable blades, e.g. Kaplan turbines {(rotors per se [F03B 3/14](#))}

[F03B 3/08](#)

- with pressure-velocity transformation exclusively in rotors

[F03B 3/10](#)

- characterised by having means for functioning alternatively as pumps or turbines {(starting [F03B 15/005](#))}

[F03B 3/103](#)

- . {the same wheel acting as turbine wheel and as pump wheel}

[F03B 3/106](#)

- . {the turbine wheel and the pumps wheel being mounted in adjacent positions on the same shaft in a single casing}

[F03B 3/12](#)

- Blades; Blade-carrying rotors

[F03B 3/121](#)

- . {Blades, their form or construction}

[F03B 3/123](#)

- . . {specially designed as adjustable blades, e.g. for Kaplan-type turbines}

[F03B 3/125](#)

- . {Rotors for radial flow at high-pressure side and axial flow at low-pressure side, e.g. for Francis-type turbines}

[F03B 3/126](#)

- . {Rotors for essentially axial flow, e.g. for propeller turbines (with adjustable blades [F03B 3/14](#))}

[F03B 3/128](#)

- . {Mounting, demounting}

[F03B 3/14](#)

- . Rotors having adjustable blades {(blade form or construction [F03B 3/123](#))}

[F03B 3/145](#)

- . . {Mechanisms for adjusting the blades (if the regulation aspect is preponderant, see [F03B 15/00](#) and subgroups)}

- F03B 3/16
 - Stators
- F03B 3/18
 - . Stator blades; Guide conduits or vanes, e.g. adjustable [{\(Conduits in dams or the like F03B 13/08; arrangement of valves F03B 11/004\)}](#)
- F03B 3/183
 - . . . [{Adjustable vanes, e.g. wicket gates}](#)
- F03B 3/186
 - . . . [{Spiral or volute casings}](#)
- F03B 5/00****Machines or engines characterised by non-bladed rotors, e.g. serrated, using friction**
- F03B 7/00****Water wheels [{\(of swinging flap type F03B 17/06\)}](#)**
- F03B 7/003
 - [{with buckets receiving the liquid}](#)
- F03B 7/006
 - [{of the endless-chain type}](#)
- F03B 9/00****Endless-chain machines or engines**
- F03B 9/005
 - [{with buckets receiving the liquid}](#)
- F03B 11/00****Parts or details not provided for in, or of interest apart from, the preceding groups [\(controlling F03B 15/00\)](#), [{e.g. wear-protection couplings, between turbine and generator}](#)**
- F03B 11/002
 - [{Injecting air or other fluid \(F03D 11/0025, F03B 11/04, F03B 15/00 take precedence\)}](#)
- F03B 11/004
 - [{Valve arrangements \(F03B 3/10 takes precedence; adjustable wicket gates F03B 3/183; valves in general F16K\)}](#)
- F03B 11/006
 - [{Sealing arrangements \(F03B 3/14, F03B 3/183, F03B 13/083 takes precedence; sealings in general F16J\)}](#)
- F03B 11/008
 - [{Measuring or testing arrangements \(in general G01\)}](#)
- F03B 11/02
 - Casings [{\(Spiral or volute casings F03B 3/186\)}](#)
- F03B 11/025
 - . [{Covers}](#)
- F03B 11/04
 - for diminishing cavitation or vibration, e.g. balancing
- F03B 11/06
 - Bearing arrangements
- F03B 11/063
 - . [{Arrangements for balancing axial thrust}](#)
- F03B 11/066
 - . . . [{in vertical axis machines}](#)
- F03B 11/08
 - for removing foreign matter, e.g. mud
- F03B 13/00****Adaptations of machines or engines for special use; Combinations of machines or engines with driving or driven apparatus [\(if the apparatus aspects are predominant, see the relevant subclasses for such apparatus, e.g. H02K 7/18\)](#); **Power stations or aggregates** [\(incorporating only machines or engines of positive-displacement type F03C; hydraulic engineering aspects E02B; {combinations with wind energy converters F03D 9/008}\)](#)**
- F03B 13/02
 - Adaptations for drilling wells
- F03B 13/04
 - Adaptations for use in dentistry [{for driving tools or the like having relatively small outer diameter, e.g. pipe cleaning tools}](#)
- F03B 13/06
 - Stations or aggregates of water-storage type, [{e.g. comprising a turbine and a pump}](#) [\(turbines characterised by having means for functioning alternatively as pumps F03B 3/10\)](#)

- F03B 13/08 . Machine or engine aggregates in dams or the like; Conduits therefor, {e.g. diffusors (bulb groups [F03B 13/105](#))}
- F03B 13/083 . . {The generator rotor being mounted as turbine rotor rim}
- F03B 13/086 . . {Plants characterised by the use of siphons; their regulation (siphon weirs [E02B 7/18](#); siphons in general [F04F 10/00](#))}
- F03B 13/10 . Submerged units incorporating electric generators or motors
- F03B 13/105 . . {Bulb groups}
- F03B 13/12 . characterised by using wave or tide energy
- F03B 13/14 . . using wave energy
- F03B 13/141 . . . {with a static energy collector}
- F03B 13/142 {which creates an oscillating water column}
- F03B 13/144 {which lifts water above sea level}
- F03B 13/145 {for immediate use in an energy converter}
- F03B 13/147 {for later use}
- F03B 13/148 . . . {using the static pressure increase due to the wave}
- F03B 13/16 . . . using the relative movement between a wave-operated member, {i.e. a "wom"} and another member, {i.e. a reaction member or "rem"}
- F03B 13/18 where the other member, {i.e. rem} is fixed, at least at one point, with respect to the sea bed or shore
- F03B 13/1805 {and the wom is hinged to the rem}
- F03B 13/181 {for limited rotation}
- F03B 13/1815 {with an up-and-down movement}
- F03B 13/182 {with a to-and-fro movement}
- F03B 13/1825 {for 360° rotation}
- F03B 13/183 {of a turbine-like wom}
- F03B 13/1835 {of an endless-belt type wom}
- F03B 13/184 {of a water-wheel type wom}
- F03B 13/1845 {and the wom slides relative to the rem}
- F03B 13/185 {not vertically}
- F03B 13/1855 {where the connection between wom and conversion system takes tension and compression ([F03B 13/187](#), [F03B 13/1875](#) take precedence)}
- F03B 13/186 {the connection being of the rack-and-pinion type}
- F03B 13/1865 {where the connection between wom and conversion system takes tension only ([F03B 13/187](#), [F03B 13/1875](#) take precedence)}
- F03B 13/187 {and the wom directly actuates the piston of a pump}
- F03B 13/1875 {and the wom is the piston or the cylinder in a pump}
- F03B 13/188 {and the wom is flexible or deformable}
- F03B 13/1885 {and the wom is tied to the rem}
- F03B 13/189 {acting directly on the piston of a pump}
- F03B 13/1895 {where the tie is a tension/compression member}

- F03B 13/20
 - . . . wherein both members {i.e. **wom and rem**} are movable relative to the sea bed or shore
- F03B 13/22
 - . . . using the flow of water resulting from wave movements to drive a motor or turbine {(F03B 13/144 takes precedence)}
- F03B 13/24
 - . . . to produce a flow of air, e.g. to drive an air turbine {(F03B 13/142 takes precedence)}
- F03B 13/26
 - . . . using tide energy
- F03B 13/262
 - . . . {using the relative movement between a tide-operated member and another member}
- F03B 13/264
 - . . . {using the horizontal flow of water resulting from tide movement}
- F03B 13/266
 - . . . {to compress air}
- F03B 13/268
 - . . . {making use of a dam}
- F03B 15/00**
 - Controlling** (controlling in general G05 {regulation of plants characterised by the use of siphons F03B 13/086})
- F03B 15/005
 - . {Starting, also of pump-turbines}
- F03B 15/02
 - . by varying liquid flow
- F03B 15/04
 - . . of turbines (rotors having adjustable blades F03B 3/06, F03B 3/14; adjustable guide vanes F03B 3/18; specially adapted for turbines with jets of high-velocity liquid impinging on bladed or like rotors F03B 15/20)
- F03B 15/06
 - . . . Regulating, i.e. acting automatically
- F03B 15/08
 - by speed, e.g. by measuring electric frequency or liquid flow
- F03B 15/10
 - without retroactive action
- F03B 15/12
 - with retroactive action
- F03B 15/14
 - by or of water level
- F03B 15/16
 - by power output
- F03B 15/18
 - for safety purposes, e.g. preventing over-speed
- F03B 15/20
 - . . specially adapted for turbines with jets of high-velocity liquid impinging on bladed or like rotors (nozzles F03B 1/04)
- F03B 15/22
 - . . . for safety purposes
- F03B 17/00**
 - Other machines or engines**
- F03B 17/005
 - . {Installations wherein the liquid circulates in a closed loop (F03B 13/06 takes precedence); Alleged perpetua mobilia of this or similar kind (perpetua mobilia using hydrostatic thrust or buoyancy F03B 17/04)}
- F03B 17/02
 - . using hydrostatic thrust
- F03B 17/025
 - . . {and reciprocating motion}
- F03B 17/04
 - . . Alleged perpetua mobilia {(with closed loop circulation or similar F03B 17/005)}
- F03B 17/06
 - . using liquid flow {with predominantly kinetic energy conversion}, e.g. of swinging-flap type, {"run-of-river", "ultra-low head" (F03B 13/264 takes precedence)}
- F03B 17/061
 - . . {with rotation axis substantially in flow direction}
- F03B 17/062
 - . . {with rotation axis substantially at right angle to flow direction}

- F03B 17/063 . . . {the flow engaging parts having no movement relative to the rotor during its rotation}
- F03B 17/064 {and a rotor of the endless-chain type}
- F03B 17/065 . . . {the flow engaging parts having a cyclic movement relative to the rotor during its rotation}
- F03B 17/066 {and a rotor of the endless-chain type}
- F03B 17/067 {the cyclic relative movement being positively coupled to the movement of rotation}
- F03B 17/068 {and a rotor of the endless-chain type}