

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](#))

NOTE

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. diffusers (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}