

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

Attention is drawn to the notes preceding Class [F01](#), especially as regards the definition of "reaction type".

This subclass comprises:

- engines, other than of positive-displacement type, driven by liquids;
- machines, other than of positive-displacement type, for liquids.

Guidance heading: **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 3/12C](#)) }

F03B 3/04 . with substantially axial flow throughout rotors, e.g. propeller turbines { (rotors per se [F03B 3/14D](#)) }

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 }

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| 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 |

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| | 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 } |