# 88 Wind-power and water-power engines

## 88 Machines or engines for liquids; Wind, spring, weight, or miscellaneous motors; Producing mechanical power or a reactive thrust, not otherwise provided for

**88a** **Water turbines and wheels**

**88b** **Water pressure engines, other water-power engines except water turbines and wheels**

**88c** **Wind-power engines**

**88d** **(IPC: F03G) Spring, weight, inertia, or like motors; Mechanical-power-producing devices or mechanisms, not otherwise provided or using energy sources not otherwise provided for**

**88e** **(IPC: F03H) Producing a reactive propulsive thrust, not otherwise provided for**

### 88a Water turbines and wheels (steam turbines 14c; gas and oil turbines 46f)

88a-1 Water-impact wheels
88a-2 Water-reaction wheels
88a-3 Water turbines with friction drive and propeller (screw) turbines
88a-4 Hydraulic turbines: impulse or speed water turbines
88a-5 Pressure water turbines: reaction turbines
88a-6 Water turbine regulation (60-16)
88a-7 Bearings for water turbines (14e-19/01; 47b-4 – 47b-12)
88a-8 Lubrication of water turbines (47e)
88a-9 Special seals for water turbines and the like
88a-10 Water wheels and accessories
88a-11 Components of water turbines and wheels (47f-1/01)
88a-12 Miscellaneous relating to water turbines and water power plants driven thereby

**88a-15/00** **(IPC: F03B 15/00) Controlling** (controlling in general 42r)
88a-15/02 . by varying liquid flow
88a-15/04 . . of turbines (specially adapted for turbines with jets of high-velocity liquid impinging on bladed or like rotors 88a-15/20)
88a-15/06 . . . Regulating, i.e. acting automatically
88a-15/08 . . . . by speed, e.g. by measuring electric frequency or liquid flow
88a-15/10 . . . . . without retroactive action
88a-15/12 . . . . . with retroactive action
88a-15/14 . . . . by or of water level
88a-15/16 . . . . by power output
88a-15/18 . . . . for safety purposes, e.g. preventing overspeed
88a-15/20 . . specially adapted for turbines with jets of high-velocity liquid impinging on bladed or like rotors (nozzles per se 85g)
88a-15/22 . . . for safety purposes

### 88b Water pressure engines, other water-power engines except water turbines and wheels (88a)

88b-1 Water engines with reciprocating pistons, also for swinging or rotary cylinders; radial engines; plants with hydraulically driven, continuously rotating or reciprocating servomotors

88b-2 Hydraulic or water-pressure engines with circularly swinging or rotary pistons
88b-3 Wave and tidal power engines
88b-4 Flow, buoyancy, oscillation, or other types of water-power engines

## 88c Wind-power engines

### Vertical-axis wind wheels

88c-1/01 General
88c-1/02 Oscillating blades with vertical axis
88c-1/03 Oscillating blades with horizontal axis
88c-1/04 with guide wheels [turbines]
88c-1/05 Protective covers
88c-1/06 Blades with power-driven adjustment
88c-1/07 Blades adjusted by the wind
88c-1/08 with sails
88c-1/09 Hollow, unfolding, telescopic blades

### Horizontal-axis wind wheels

88c-2/01 General
88c-2/02 Entire wind wheel adjustment
88c-2/03 Blade adjustment
88c-2/04 Vanes and blades turnable away from the wind by means of louvers or other setting devices
88c-2/05 Blade structures
88c-2/06 Head drives
88c-2/07 Auxiliary wind wheels for regulation
88c-2/08 Auxiliary wind wheels for other purposes
88c-2/09 Blades on endless belts
88c-2/10 Screw-shaped blades
88c-2/11 Intermediate transmission
88c-2/12 Wind wheels with oscillating blades

### Special arrangements and components of wind-power engines

88c-3/01 Streamlined form, Magnus effect, Flettner type, Savonius type (62c)
88c-3/02 Floats and pumps in the delivery reservoir
88c-3/03 Speed control, also by electrical means
88c-3/04 Tangentially impacted wheels
88c-3/05 Group wind wheels, large wind-power plants
88c-3/06 Chimneys
88c-3/07 Storage
88c-3/08 Oscillating installations
88c-3/09 Electrical operation
88c-3/10 Funnel hub cone
88c-3/11 Lubricating devices
88c-3/12 Wind-power engines on vehicles, e.g. on ships (65f1-6), locomotives, bicycles
88c-3/13 Turntables
88c-3/14 Governing by means of tail vanes
88c-3/15 Governing by means of centrifugal weights
88c-3/16 Brakes
88c-3/17 Unusual forms
88c-3/18 Utilisation of the suction pressure, utilisation of turbulence
88c-3/19 Framework structures

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| **88d** | **(IPC: F03G) Spring, weight, inertia, or like motors; Mechanical-power-producing devices or mechanisms, not otherwise provided or using energy sources not otherwise provided for** |
| | **Note:**<br>**In this subclass, the term "motors" means mechanisms for producing mechanical power from potential energy of solid bodies.** |
| **88d-1/00** | **Spring motors** (spring-driven toys 77f; springs in general 47a3; precision time mechanisms, e.g. for clocks or watches, 83) |
| 88d-1/02 | . characterised by shape or material of spring, e.g. helical, spiral, coil |
| 88d-1/04 | . . using rubber springs |
| 88d-1/06 | . Other parts or details |
| 88d-1/08 | . . for winding |
| 88d-1/10 | . . for producing output movement other than rotary, e.g. vibratory |
| **88d-3/00** | **Other motors, e.g. gravity or inertia motors** |
| 88d-3/02 | . using wheels with circumferentially-arranged compartments co-operating with solid falling bodies (88d-3/04 takes precedence) |
| 88d-3/04 | . driven by sand or like fluent solid material |
| 88d-3/06 | . using pendulums |
| 88d-3/08 | . using flywheels |
| **88d-5/00** | **Devices for producing mechanical power from muscle energy** (driving cycles 63k) |
| 88d-5/02 | . of endless-walk type, e.g. treadmills |
| 88d-5/04 | . . Horsemills or the like |
| 88d-5/06 | . other than of endless-walk type |
| 88d-5/08 | . . for combined actuation by different limbs, e.g. hand and leg |
| **88d-7/00** | **Mechanical-power-producing mechanisms, not otherwise provided for or using energy sources not otherwise provided for** |
| 88d-7/02 | . using solar energy |
| 88d-7/04 | . using pressure differences or thermal differences occurring in nature (88d-7/06 takes precedence) |
| 88d-7/06 | . using expansion or contraction of bodies due to heating, cooling, moistening, drying, or the like (using thermal expansion of non-vaporising liquids 14h) |
| 88d-7/08 | . recovering energy derived from swinging, rolling, pitching, or like movements, e.g. from the vibrations of a machine |
| 88d-7/10 | . Alleged perpetua mobilia (of buoyancy principle 88b) |
| **88e** | **(IPC: F03H) Producing a reactive propulsive thrust, not otherwise provided for** (from combustion products 46g; details of reaction propulsion for aircraft 62; nuclear reactors specially adapted for reaction propulsion 21g-21/28; ammunition 72d-19; fireworks 78d) |
| **88e-1/00** | **Electrophysical reactive propulsion** |
| 88e-1/02 | . Plasma propulsion (generating and influencing gaseous plasma 21g-61/00) |
| **88e-3/00** | **Photon propulsion** |
| **88e-5/00** | **Nuclear reactive propulsion** |
| **88e-1/00** | **Using plasma to produce a reactive propulsive thrust** (generating plasma 21g-61/00) |
| **88e-3/00** | **Using photons to produce a reactive propulsive thrust** |
| **88e-5/00** | **Producing a reactive propulsive thrust, not otherwise provided for** |