

## F03B

### MACHINES OR ENGINES FOR LIQUIDS

(positive-displacement engines for liquid [F03C](#); machines for liquids and gases F01; positive-displacement machines for liquids F04 (N) turbines in general 46F, rotary fluid gearing of the hydrokinetic type [F16H 41/00](#) )

#### Definition statement

*This subclass/group covers:*

Engines driven by liquids and machines for liquids, other than of positive-displacement type.

#### References relevant to classification in this subclass

*This subclass/group does not cover:*

Machines for liquids and gases	F01
Positive-displacement engines for liquid	<a href="#">F03C</a>
Positive-displacement machines for liquids	F04
Rotary fluid gearing of the hydrokinetic type	<a href="#">F16H 41/00</a>
Ocean thermal energy conversion (OTEC)	<a href="#">F03G 7/05</a>

#### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Hydraulic engineering, Barrages, Artificial Islands	<a href="#">E02B</a>
Wind motors	<a href="#">F03D</a>
Supplying or distributing electric power, Grid connection	<a href="#">H02J</a>
Structural association of turbines and electric generator	<a href="#">H02K 7/18</a>

Controlling electric generator	<a href="#">H02P</a>
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## 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**

### Definition statement

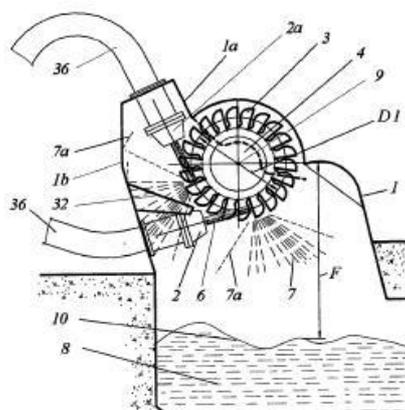
*This subclass/group covers:*

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.

In these engines the energy - usually potential - of the liquid is entirely transformed into kinetic energy (or momentum) in the nozzle system, before the liquid reaches the runner or rotor.

Another way of defining these engines is to say that in an impulse turbine the runner or rotor is not enclosed by a pressurised space or casing, but placed within a space which is normally at atmospheric pressure.

DE202004019537U



## F03B 3/00

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

### Definition statement

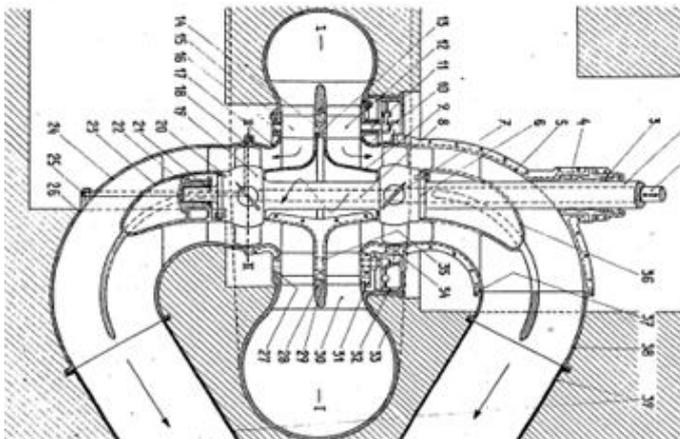
*This subclass/group covers:*

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

A reaction type machine or engine in which the potential energy of the liquid is transformed into mechanical energy partly in the stator and partly in the rotor, in other words the fluid is forced to accelerate by a decrease in the available cross reaction, in both sections. Both the stator and rotor spaces are completely filled with the liquid whilst in operation, at a pressure higher than atmospheric.

A special case is when all the energy is transformed in the rotor, the so called Hero's turbine.

FR935827



## F03B 3/08

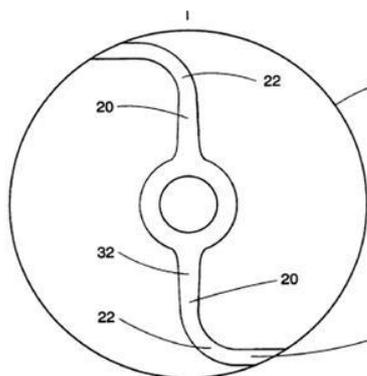
with pressure-velocity transformation exclusively in rotors

### Definition statement

*This subclass/group covers:*

Turbines in which all the potential energy of the liquid is transformed by acceleration in the rotor itself, causing the reaction which drives the turbine. The typical example is the Greek Hero's turbine - although that one was driven by steam. A rotating garden sprinkler uses this effect.

WO9612872



## F03B 5/00

Machines or engines characterised by non-bladed rotors, e.g. serrated, using friction

## F03B 7/00

Water wheels [N: of swinging flap type [F03B 17/06](#) ]

### Definition statement

*This subclass/group covers:*

Water wheels which convert the potential energy of the liquid due to height differences, in this case up to a few meters.

The channels conveying the fluid to the water wheel are open to atmosphere.

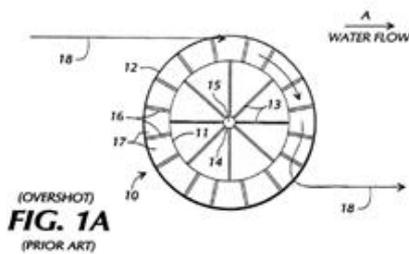
The traditional distinction between overshot and undershot water wheels refers to whether the point of introduction of the fluid onto the wheel is above or below the axis of rotation of the wheel. This distinction is not reflected (yet) in the classification.

Undershot water wheels use small gradients, but greater than the minimum incline which would still cause flow. They often have no buckets but blades.

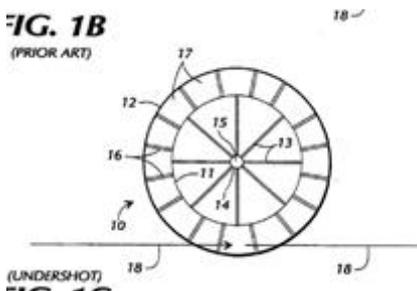
An Archimedes screw is also a water wheel in this sense when it extracts power from the potential difference on the fluid.

*Examples:*

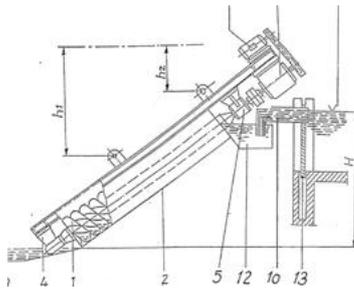
Overshot



Undershot



## Archimedes screw



### Special rules of classification within this group

When the device uses a flow with a minimal gradient, like a slow river, just enough to maintain the flow, documents should be classified in [F03B 17/06](#)

## F03B 9/00

### Endless-chain type machines or engines

#### Definition statement

*This subclass/group covers:*

Machines where the collecting and transmitting the energy of a fluid is done with the help of a flexible continuous member closing on itself, which is maintained in place whilst moving with the help of rotating elements.

The flexible continuous member can be made of hinged elements ( as a bicycle chain) or consist of an elongated member also closing on itself, like a rope loop or a belt.

This flexible continuous member closing on itself ( "sans-fin" in French, also internationally known) is held in place whilst it travels by usually two, sometimes more than two, rotating guiding elements, like pulleys or toothed wheels.

Usually the elements directly interacting with the fluid flow (collecting its energy), in the form of buckets or paddles, are attached to the flexible continuous member at regular intervals along its length.

Any device using these elements in [F03B](#) is either a water wheel ( [F03B 7/006](#) and subdivisions), or a in machine using only the kinetic energy of a liquid flow ([F03B 17/06](#) and subdivisions).The class [F03B 9/00](#) should therefore NOT be used. Instead use the corresponding water wheel or liquid flow machine classes.

Some examples of an endless chain water wheel are: WO2010139287, US920361, US2006290139, NL7905887, DE2221605, US1567971, GB172819, US379753

Some examples of a liquid flow application are: WO2010150406,

WO2008114942, US2008044229, US2007231129, DE102007003323, DE20021495U, JP60142064, US4184807, BE1017899, US1355386

### **Special rules of classification within this group**

This class should not be used. Any hydraulic motor involving an endless chain arrangement should be classified in either Water wheels [F03B 7/006](#) or in machines using liquid flow [F03B 17/06](#).

But: pending IPC revision, classify both in this class (if endless chain) and Also in the appropriate section in water wheels ([F03B 7/006](#)), or in run-of-river ([F03B 17/064](#) or [F03B 17/066](#), as appropriate).

### **F03B 11/00**

**Parts or details not provided for in, or of interest apart from, the preceding groups (controlling [F03B 15/00](#) ), [N: e.g. wear-protection couplings, between turbine and generator]**

### **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](#); [N: combinations with wind energy converters [F03D 9/008](#) ])**

### **F03B 13/06**

**Stations or aggregates of water-storage type, [N: e.g. comprising a turbine and a pump] (turbines characterized by having means for functioning alternatively as pumps [F03B 3/10](#))**

### **Definition statement**

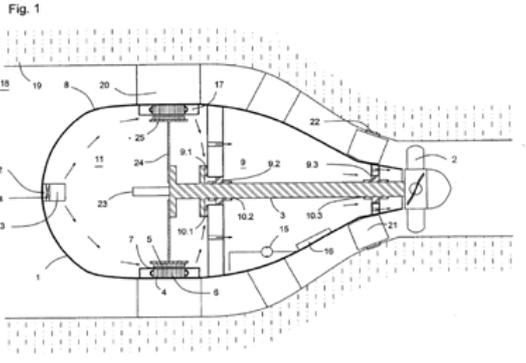
*This subclass/group covers:*

Illustrated example of subject matter classified in [F03B 11/00](#)

*Example:*

WO2010060504





## **F03B 13/16**

**using the relative movement between a wave-operated member, [N: i.e. a "wom"] and another member, [N: i.e. a reaction member or "rem"]**

### **Definition statement**

*This subclass/group covers:*

For a mechanical energy collection there must be a relative movement between a member directly acted upon by the waves (the Wave Operated Member or "wom" for short) and some other reaction structure or member relative to which the "wom" moves. This reaction structure is called REaction Member or "rem" (for short).

### **Special rules of classification within this group**

[F03B 13/18](#) and subgroups: the REM is fixed with respect to the sea bed or shore, there are then 4 basic possibilities reflected in the subgroups:

[F03B 13/188](#): Relative movement between WOM and REM happens because of flexibility of the WOM.

[F03B 13/1805](#): Relative movement between WOM and REM is a rotation

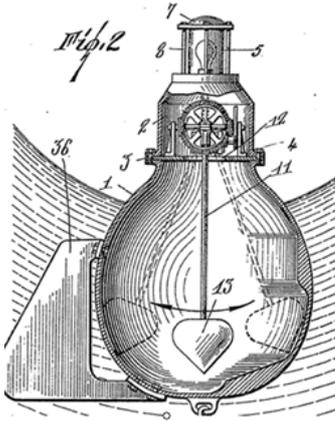
[F03B 13/1845](#): Relative movement between WOM and REM is a sliding movement

[F03B 13/1885](#): Relative movement between WOM and REM is allowed by the WOM being tied to the REM, in a movement with three degrees of freedom

[F03B 13/20](#): both members are movable relative to sea bed or shore, i.e. neither the WOM or the REM are motionless, the only constraint will be some form of anchoring to retain the whole device in the desired position.

Example :

GB297720



## F03B 13/22

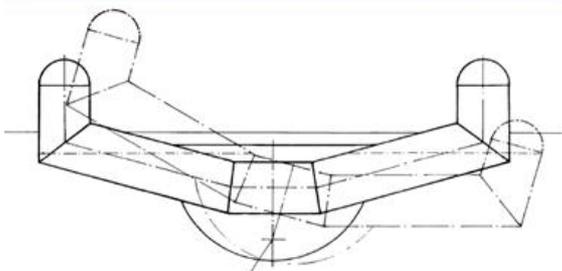
using the flow of water resulting from wave movements to drive a motor or turbine [N: ([F03B 13/144](#) takes precedence)]

### Definition statement

*This subclass/group covers:*

The waves indirectly cause a flow of liquid somewhere, which then drives a motor or turbine.

DE102008016839



## F03B 13/262

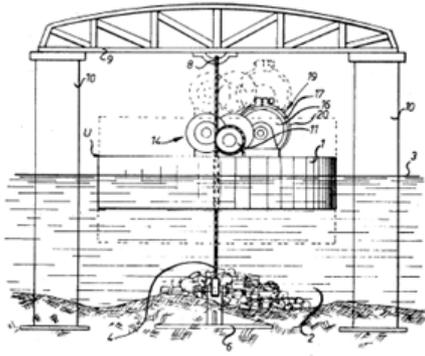
[N: using the relative movement between a tide-operated member and another member]

### Definition statement

*This subclass/group covers:*

Normally it is some form of a (large and heavy) float which moves up and down with the tide, this movement being converted by various means in a usable form of energy.

US3567953



## F03B 13/268

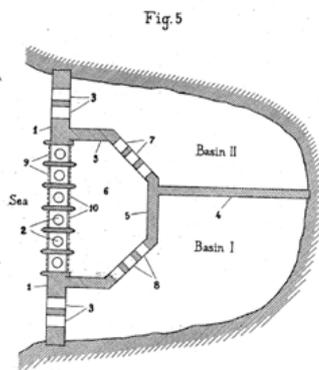
[N: making use of a dam]

### Definition statement

*This subclass/group covers:*

The tide is collected in a basin closed by dams with sluices, which are open when the tide is rising. At the highest point of the tide the sluices are closed. The trapped water is then allowed to escape through turbines back to sea level until the tide turns again.

US1785896



## F03B 15/00

Controlling (controlling in general G05 [N: in the l.d.T dispersed]) [N: regulation of plants characterised by the use of siphons [F03B 13/086](#) ]

## F03B 17/00

Other machines or engines

## F03B 17/005

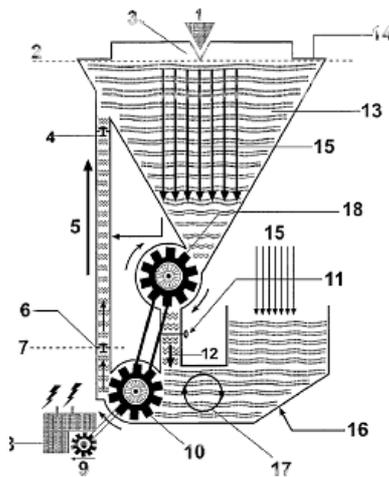
Installations wherein the liquid circulates in a closed loop;  
([F03B 13/06](#) takes precedence); Alleged perpetua mobilia of  
this or similar kind (perpetua mobilia using hydrostatic thrust  
or buoyancy [F03B 17/04](#) )]

### Definition statement

*This subclass/group covers:*

Turbines driven by fluid with (height) potential energy, which drives a generator to produce electricity, and a pump which returns the fluid to the original height.

WO2004094816



### F03B 17/02

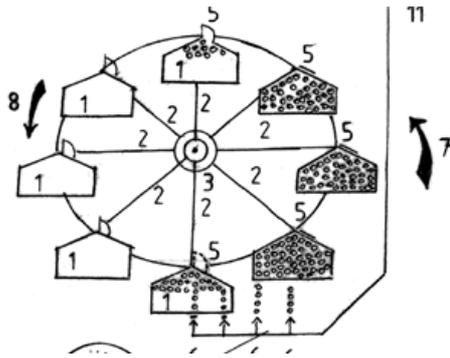
using hydrostatic thrust

### Definition statement

*This subclass/group covers:*

Turbines in which the conversion of energy is made thanks to the hydrostatic vertical thrust of objects lighter than water experienced when submerged. Often uses additional compressed air in which case the device is a motor.

DE10200903



## F03B 17/025

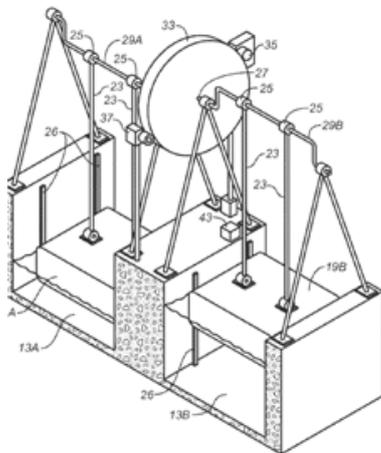
[N: and reciprocating motion]

### Definition statement

*This subclass/group covers:*

Floats which usually follow alternative water levels. Also containers (floats) which are alternatively filled and emptied within a water basin. All these devices are motors.

WO201106632



## F03B 17/04

**Alleged perpetua mobilia [N: (with closed loop circulation or similar [F03B 17/005](#) )]**

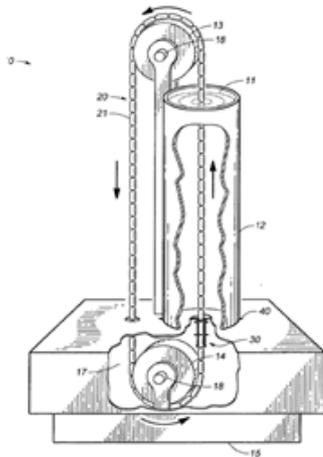
### Definition statement

*This subclass/group covers:*

Perpetua mobilia of alleged kind, i.e. devices where the hydrostatic thrust effect is used to supposedly drive a device continuously, without input of energy, or of additional energy after the start, even when the concept

perpetual is not explicitly mentioned.

US2010223922



## F03B 17/06

using liquid flow [N: with predominantly kinetic energy conversion], e.g. of swinging-flap type, [N: "run-of-river", "ultra-low head" ([F03B 13/264](#) takes precedence)

### Definition statement

*This subclass/group covers:*

Machines or engines using liquid flow with predominantly kinetic energy conversion, e.g. of swinging-flap type, "run-of-river", "ultra-low head".

The term "liquid flow" is meant here to refer to fluid flows with minimal gradient, little more than that necessary for maintaining the flow, like for instance in calm rivers. The energy being converted is thus the kinetic energy of the flow, rather than its potential (height) energy, as in older, conventional hydro(electric) schemes involving large height differences, or even medium to small height ("head") differences, used in water wheel type devices.

### Special rules of classification within this group

When the water flow is caused by the tides [F03B 13/264](#),

### Glossary of terms

*In this subclass/group, the following terms (or expressions) are used with the meaning indicated:*

Rotation axis	Rotational axis of the device converting the kinetic energy.
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## Synonyms and Keywords

In patent documents the following expressions/words "run-of-river" and "ultra low head" are often used as synonyms.

## F03B 17/063

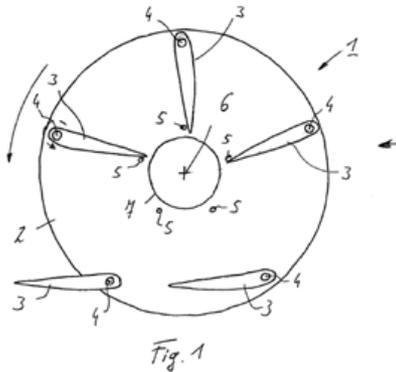
[N: the flow engaging parts having no movement relative to the rotor during its rotation]

### Definition statement

*This subclass/group covers:*

Machines or engines in which the flow engaging parts, i.e. the elements in contact with the flow, transferring its kinetic energy to the rest of the converting device, are permanently and rigidly fixed to the rest of the structure of the converter.

DE10200900759



## F03B 17/065

[N: the flow engaging parts having a cyclic movement relative to the rotor during its rotation]

### Definition statement

*This subclass/group covers:*

Machines or engines in which the concept "cyclic movement" refers to the relative movement of the flow engaging parts with respect to the rest of the converter structure, where the parts adopt different positions depending on the rotational position of the whole converter structure as it rotates about its axis, returning to the original position after each revolution. When coupled to the movement of rotation then [F03B 17/067](#).

WO03029646

