

F03D

WIND MOTORS

Definition statement

This place covers:

Mechanisms for converting the energy of wind into useful mechanical power.

In particular:

Wind motors with rotation axis substantially parallel to the flow of air entering the machine.

Wind motors with rotation axis substantially at right angle to the flow of air entering the machine.

Other wind motors.

Controlling wind motors.

Adaptations of wind motors for special use.

Combinations of wind motors with apparatus driven thereby.

Wind motors specially adapted for installation in particular locations.

Assembly, mounting or commission of wind motors.

Arrangements specially adapted for transporting wind motor components.

Transmission of mechanical power.

Monitoring or testing of wind motors.

Other details, component parts, or accessories of wind motors.

Relationships with other classification places

[F03D](#) covers mechanisms for converting natural wind energy into useful mechanical energy, and the transmission of such mechanical energy to its point of use. Electrical power generation aspects of wind motors (e.g. dynamo-electric conversion and electric generators) are classified in [H02P](#). Circuit arrangements or systems for supplying or distributing electric power are classified in [H02J](#). Electric generators structurally associated with wind turbines are classified in [H02K 7/183](#). [F05B](#) concerns a CPC internal scheme for indexing only relating, among others, to wind motors covered by subclass [F03D](#).

References

Limiting references

This place does not cover:

| | |
|--|----------------------|
| Circuit arrangements or systems for supplying or distributing electronic power | H02J |
| Control or regulation of electric generators, or dynamo-electric converters | H02P |

Informative references

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

| | |
|-----------------------------|---------------------------|
| Vehicles for transportation | B60P 3/40 |
|-----------------------------|---------------------------|

| | |
|--|----------------------------|
| Propulsive devices of ships or other waterborne vessels directly acted on by wind, using the Magnus effect | B63H 9/02 |
| Rotors for airplanes and helicopters | B64C 27/00 |
| Handling by cranes, hoisting, lifting | B66C |
| Machines or engines for liquids, Water turbines | F03B |
| Ventilators | F04D 25/08 |
| Dynamo-electric machines | H02K |
| Structural association of electric generator with mechanical driving motor in dynamo-electric machines, e.g. turbine | H02K 7/18 |

Special rules of classification

In this subclass, it is desirable to allocate the indexing codes of subclass [F05B](#), if applicable.

The subclass [F05B](#) is used for indexing as follows:

[F05D 2200/00](#): mathematical features

[F05D 2210/00](#): working fluid

[F05D 2220/00](#): application

[F05D 2230/00](#): manufacture

[F05D 2240/00](#): components

[F05D 2250/00](#): geometry

[F05D 2260/00](#): function

[F05D 2270/00](#): control

[F05D 2300/00](#): materials

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

| | |
|---------------|---|
| Motor | An apparatus for producing mechanical motion from any other form of energy; the motion may be continuous or in separate strokes |
| Rotor | The wind-engaging parts of the wind motor and the rotary member carrying them |
| Rotation axis | The axis of rotation of the rotor |

Synonyms and Keywords

In patent documents, the following abbreviations are often used:

| | |
|------|------------------------------|
| HAWT | Horizontal Axis Wind Turbine |
| VAWT | Vertical Axis Wind Turbine |

In patent documents, the following words/expressions are often used as synonyms:

- "wind turbine", and "windmill"
- "azimuth angle", and "yaw angle"

- "rotor hub", "rotor cone" and "spinner"

In patent documents, the following words/expressions are often used with the meaning indicated:

| | |
|------------------|---|
| Axial flow | Air flow parallel to the rotation axis. |
| Savonius turbine | A wind turbine with at least two scoop-shaped wind-engaging surfaces. |
| Darrius turbine | A vertical axis wind turbine equipped with aerofoils mounted on a rotating shaft. |

F03D 1/00

Wind motors with rotation axis substantially parallel to the air flow entering the rotor (controlling thereof [F03D 7/02](#))

Definition statement

This place covers:

Wind motors having their rotation axis substantially parallel to the flow of air entering the machine. When the flow has been guided into a direction other than the original wind direction, the final flow into the wind motor should be considered for classification.

References

Limiting references

This place does not cover:

| | |
|----------------------------|---------------------------|
| Controlling of wind motors | F03D 7/02 |
|----------------------------|---------------------------|

Informative references

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

| | |
|---------------|----------------------------|
| Solar updraft | F03G 6/045 |
|---------------|----------------------------|

F03D 1/04

having stationary wind-guiding means, e.g. with shrouds or channels ([F03D 9/35](#) takes precedence)

Definition statement

This place covers:

Wind motors having stationary wind-guiding means. The nacelle can be the wind guiding means, tip-shrouds are excluded.

References

Limiting references

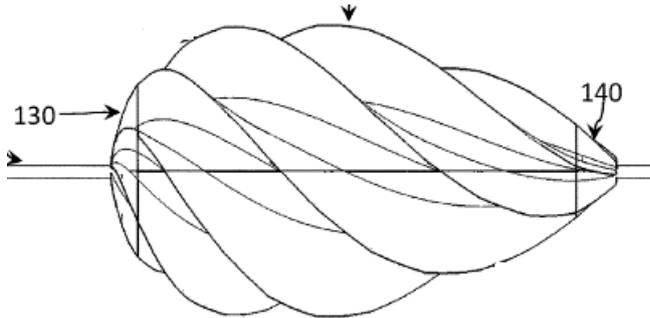
This place does not cover:

| | |
|--|---------------------------|
| Wind motors specially adapted for installation within towers | F03D 9/35 |
|--|---------------------------|

F03D 1/0608**{characterised by their aerodynamic shape}****Definition statement***This place covers:*

Rotors characterised by their shape or form which is defining the aerodynamic property of the rotor.

Illustrative example of subject matter classified in this group:

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

| | |
|---|----------------------------|
| Rotors characterised by their construction elements | F03D 1/065 |
|---|----------------------------|

F03D 1/065**{characterised by their construction elements ([F03D 13/10](#) takes precedence)}****Definition statement***This place covers:*

Rotors characterised by their construction and structural configuration, in particular:

- Construction and structural aspects of blades.
- Construction and structural aspects of the hub.
- Structural aspects of the link between the rotor hub and the blade, e.g. pitch arrangements.
- Assembly of blade or hub elements.

References**Limiting references***This place does not cover:*

| | |
|--|-----------------------------|
| Assembly of wind motors; Arrangements for erecting wind motors | F03D 13/10 |
| Installing rotor or blade | F03D 13/104 |

Informative references

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

| | |
|---|-------------------------------|
| Rotors characterised by their aerodynamic shape | F03D 1/0608 |
| Shaping, joining or repairing plastics | B29C |
| Manufacturing of plastic blades | B29D 99/0025 |
| Moulded wind turbine blades | B29L 2031/085 |

F03D 1/0664

{Pitch arrangements (controlling blade pitch [F03D 7/0224](#))}

References**Limiting references**

This place does not cover:

| | |
|-------------------------|-----------------------------|
| Controlling blade pitch | F03D 7/0224 |
|-------------------------|-----------------------------|

Informative references

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

| | |
|--|-----------------------------|
| Ring gears associated with pitch bearing | F03D 80/701 |
|--|-----------------------------|

F03D 1/0669

{Hydraulic actuators}

Definition statement

This place covers:

Hydraulic mechanisms to control the pitch angle of the blade, e.g. hydraulic motors, cylinders, layout or linkage.

References**Informative references**

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

| | |
|---|-----------------------------|
| Power-supply to auxiliary components, e.g. reservoir tanks, pumps or circuits | F03D 80/003 |
|---|-----------------------------|

F03D 1/0671

{Electric actuators, e.g. motors}

Definition statement

This place covers:

Electrical mechanisms to control the pitch angle of the blade, e.g. electric motors, electric circuit layout or linkage.

References

Informative references

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

| | |
|--|-----------------------------|
| Power-supply to auxiliary components, e.g. batteries, electrical circuits, converters or back-up systems | F03D 80/003 |
|--|-----------------------------|

F03D 1/0675

{of the blades}

Definition statement

This place covers:

Blades made of several panels or skins.

F03D 1/0677

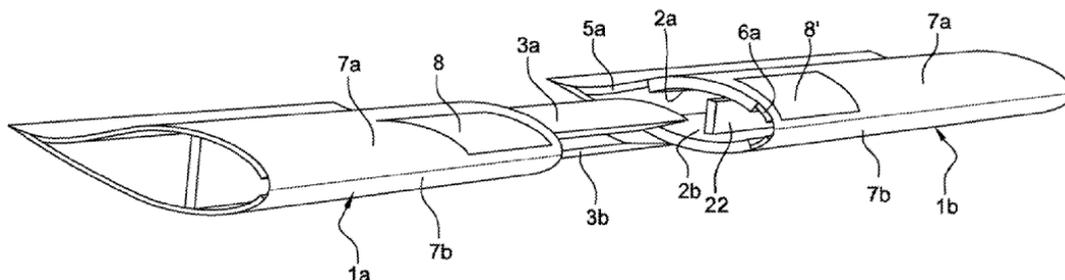
{Longitudinally segmented blades; Connectors therefor}

Definition statement

This place covers:

Blades which are made of two or more elements in its longitudinal direction.

Illustrative example of subject matter classified in this group:



References

Informative references

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

| | |
|---|-----------------------------|
| Separate elements forming the blade tip, attachment thereof | F03D 1/0687 |
|---|-----------------------------|

F03D 1/0679

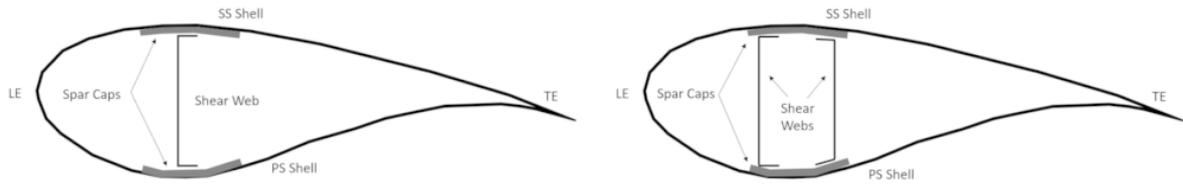
{Load carrying structures, e.g. beams}

Definition statement

This place covers:

Wind turbine blades having an outer structure, e.g. shells, skins, which via its shape defines the aerodynamic property of the blade and an inner structure that carries the structural loads and provides stiffness. The inner structure may include beams, spar caps and shear webs as illustrated below.

Illustrative examples of subject matter classified in this group:



F03D 1/181

{characterised by the connection to the tower, e.g. yaw systems (controlling the orientation in relation to wind direction [F03D 7/0204](#))}

Definition statement

This place covers:

Mechanical aspects and layout of the yaw system, i.e. of the elements allowing rotation of the nacelle with respect to the tower.

Yaw actuator arrangements, e.g. yaw motors or hydraulic cylinders.

Other connecting aspects between the nacelle and the tower.

References

Limiting references

This place does not cover:

| | |
|---|-----------------------------|
| Controlling the orientation in relation to wind direction | F03D 7/0204 |
|---|-----------------------------|

Informative references

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

| | |
|--|-----------------------------|
| Power-supply to auxiliary components, e.g. batteries, electrical circuits, converters or back-up systems | F03D 80/003 |
| Yaw bearings | F03D 80/701 |

F03D 3/00

Wind motors with rotation axis substantially perpendicular to the air flow entering the rotor (controlling thereof [F03D 7/06](#))

Definition statement

This place covers:

Wind motors having their rotation axis substantially perpendicular to the flow of air entering the machine. When the flow has been guided into a direction other than the original wind direction, the final flow into the wind motor should be considered for classification.

References

Limiting references

This place does not cover:

| | |
|----------------------------|---------------------------|
| Controlling of wind motors | F03D 7/06 |
|----------------------------|---------------------------|

F03D 3/04

having stationary wind-guiding means, e.g. with shrouds or channels
([F03D 9/35](#) takes precedence)

Definition statement

This place covers:

A wind-guiding means positioned upstream, downstream or around a wind motor. The wind-guiding means directs wind to the rotor, or blocks wind from reaching a part of the rotor. The wind-guiding means may have a movement which is independent from the rotation of the rotor.

F03D 3/0427

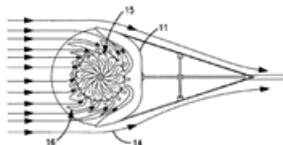
{with converging inlets, i.e. the guiding means intercepting an area greater than the effective rotor area ([F03D 3/0463](#), [F03D 3/049](#) take precedence)}

Definition statement

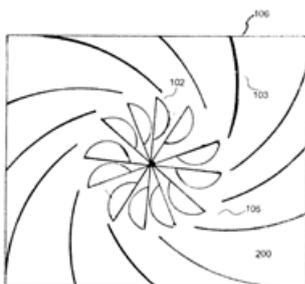
This place covers:

Wind motors characterised by the "effective area" of the rotor which is the cross section area of the rotor which contributes positively, i.e. causes a torque in/ to the desired rotation. The "augmenting" guiding means are those guiding means which intercept an area of flow greater than this "effective rotor area", and direct the flow into the rotor. The guiding means which fulfil this intercepting role are bounded on all sides from inlet to outlet into rotor, and therefore also accelerate or "concentrate" the flow into the rotor.

Illustrative example of subject matter classified in this group:



Illustrative example of subject matter classified in this group:



References

Limiting references

This place does not cover:

| | |
|--|--|
| Guiding means forming also a shield means on one side of the rotor | F03D 3/0463 , F03D 3/049 |
|--|--|

F03D 3/0454

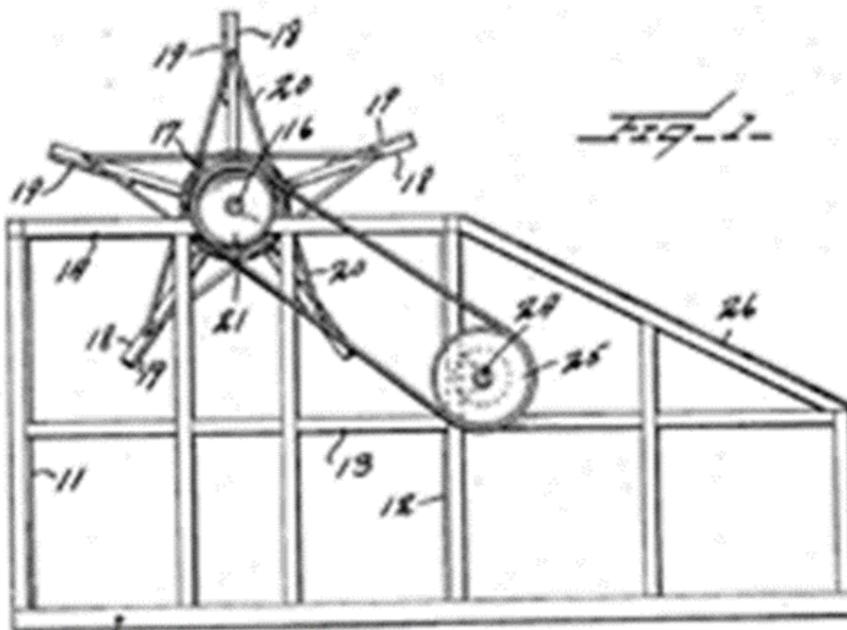
{and only with concentrating action, i.e. only increasing the airflow speed into the rotor, e.g. divergent outlets ([F03D 3/0463](#) takes precedence)}

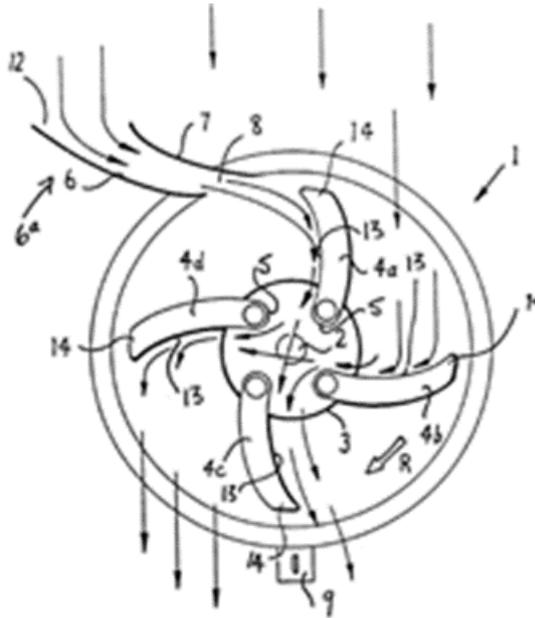
Definition statement

This place covers:

Wind motors with a concentrating means, i.e. the guiding means only increase the flow speed into the rotor without intercepting an area of flow greater than the effective rotor area (see definition of the effective area in [F03D 3/0427](#)).

Illustrative example of subject matter classified in this group:





See channel 12

References

Limiting references

This place does not cover:

| | |
|--|-----------------------------|
| With augmenting action, i.e. the shield means intercepting an area greater than the effective rotor area | F03D 3/0463 |
|--|-----------------------------|

F03D 3/061

{characterised by their aerodynamic shape, e.g. aerofoil profiles}

Definition statement

This place covers:

Rotors characterised by their shape or form which is defining the aerodynamic property of the rotor.

References

Informative references

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

| | |
|---|----------------------------|
| Rotors characterised by their constructional elements | F03D 3/062 |
|---|----------------------------|

F03D 3/062

{characterised by their construction elements}

Definition statement

This place covers:

Constructional aspects of the rotors.

References

Informative references

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

| | |
|--|----------------------------|
| Rotors characterised by their aerodynamic shape, e.g. aerofoil profile | F03D 3/061 |
|--|----------------------------|

F03D 3/066

{the wind engaging parts being movable relative to the rotor}

Definition statement

This place covers:

Wind motors where the wind engaging parts can be moved relative to the rotor, e.g. arrangements allowing pitching the wind engaging parts independently from the mechanical rotation of the rotor.

F03D 3/067

{Cyclic movements}

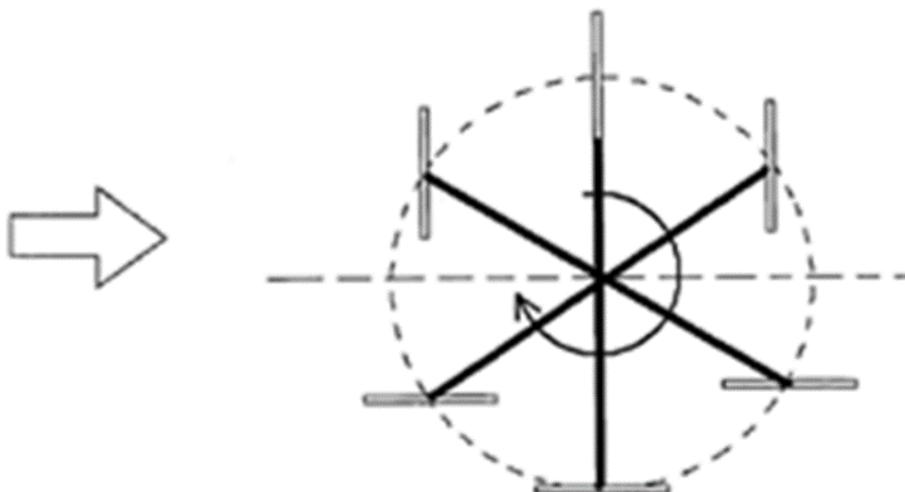
Definition statement

This place covers:

Wind motors wherein the wind engaging parts, i.e. the blades, vanes, paddles or cups, undergo a change of orientation within each cycle of rotation of the wind rotor, coming back to their original position after each revolution. This change of orientation happens of itself, passively, the direct result of the wind acting on the wind engaging parts as the relative wind direction changes with the rotation.

Example:

Illustrative example of subject matter classified in this group:

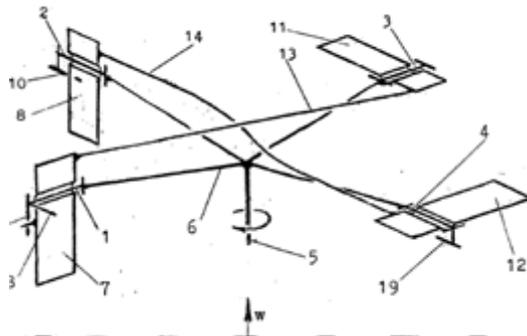
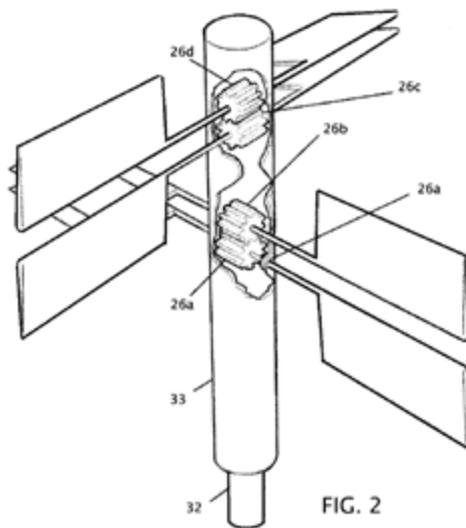


F03D 3/068**{mechanically controlled by the rotor structure}****Definition statement***This place covers:*

Wind motors whereby the cyclic movement of the wind engaging parts during each revolution of the rotor is mechanically related to the rotor rotation, and optionally the wind force or direction.

Examples:

Illustrative example of subject matter classified in this group:

**F03D 5/00****Other wind motors (controlling thereof [F03D 7/00](#))****References****Limiting references***This place does not cover:*

| | |
|----------------------------|---------------------------|
| Controlling of wind motors | F03D 7/00 |
|----------------------------|---------------------------|

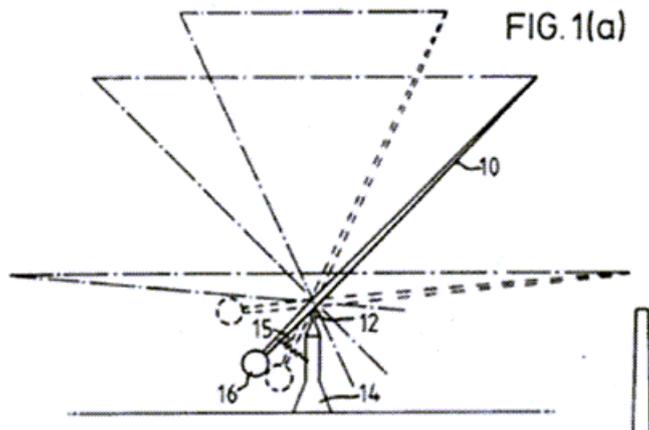
F03D 5/005

{Wind motors having a single vane which axis generate a conus or like surface}

Definition statement

This place covers:

Illustrative example of subject matter classified in this group:

**F03D 5/015**

{of the tethered aircraft type, e.g. kites, with traction and retraction of the tether (controlling thereof [F03D 7/051](#))}

Definition statement

This place covers:

Tethered aircraft, e.g. kite or wings, having a particular flying pattern and getting energy from traction and retraction movement of the tether.

Illustrative example of subject matter classified in this group:

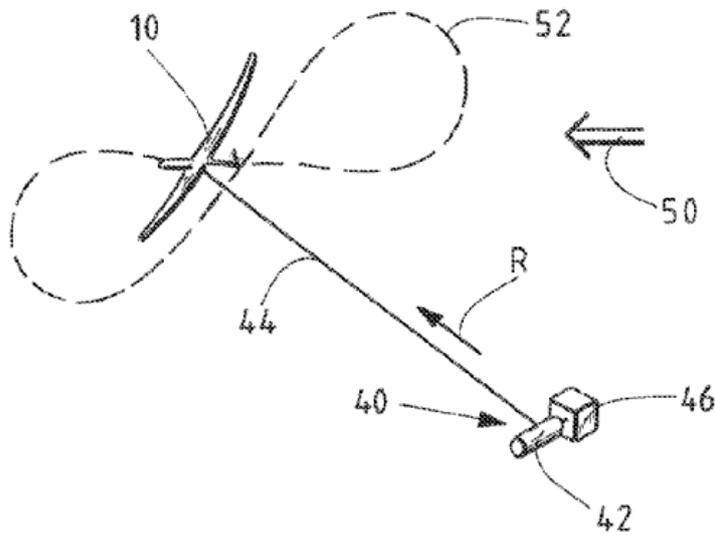


Fig. 2a

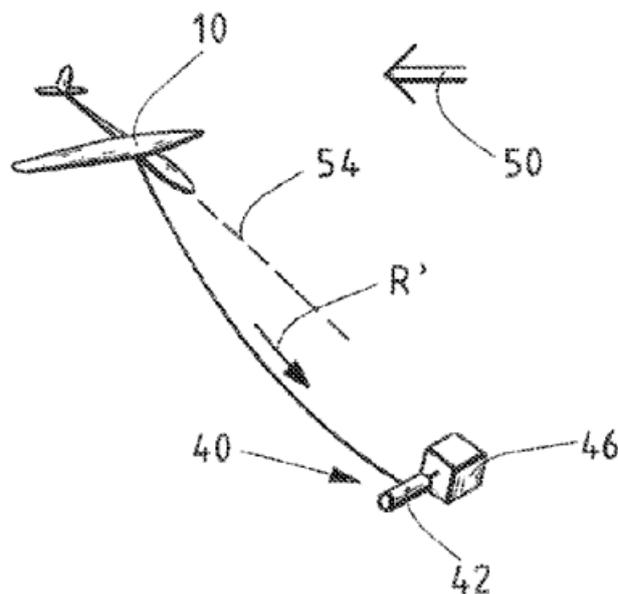


Fig. 2b

References

Limiting references

This place does not cover:

| | |
|---------------------|----------------------------|
| Controlling thereof | F03D 7/051 |
|---------------------|----------------------------|

Informative references

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

| | |
|--|----------------------------|
| Wind motors being supported in air by airborne structures, e.g. by kites | F03D 9/322 |
|--|----------------------------|

| |
|---|
| Aircraft intended to be sustained without power plant |
|---|

| |
|----------------------------|
| B64C 31/00 |
|----------------------------|

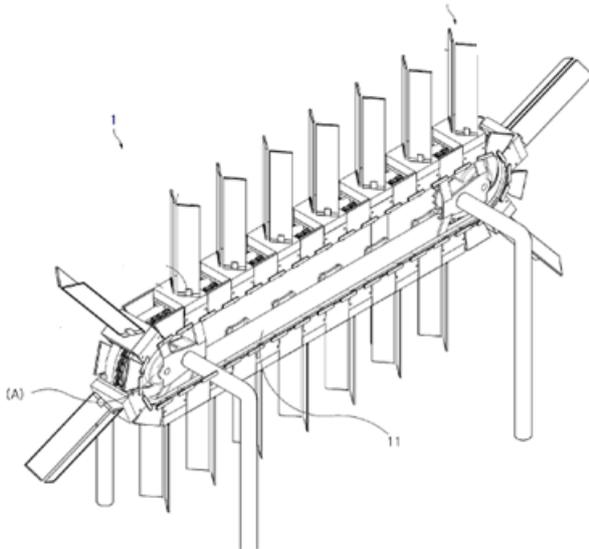
F03D 5/02

the wind-engaging parts being attached to endless chains or the like

Definition statement

This place covers:

Illustrative example of subject matter classified in this group:



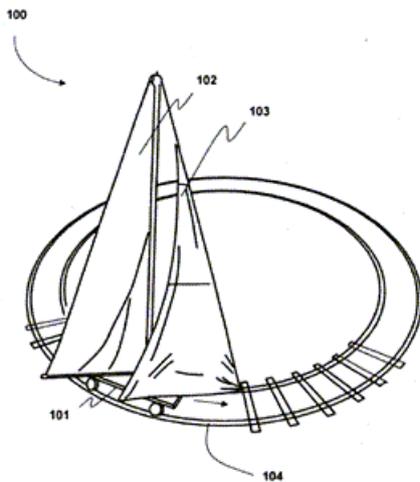
F03D 5/04

the wind-engaging parts being attached to carriages running on tracks or the like

Definition statement

This place covers:

Illustrative example of subject matter classified in this group:

**F03D 5/06**

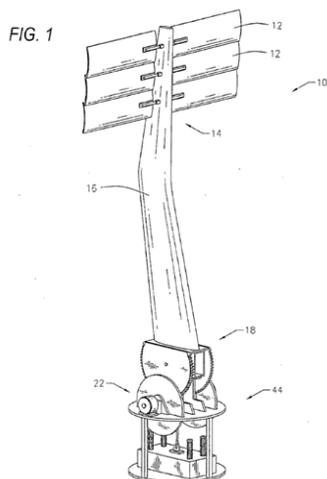
the wind-engaging parts swinging to-and-fro and not rotating

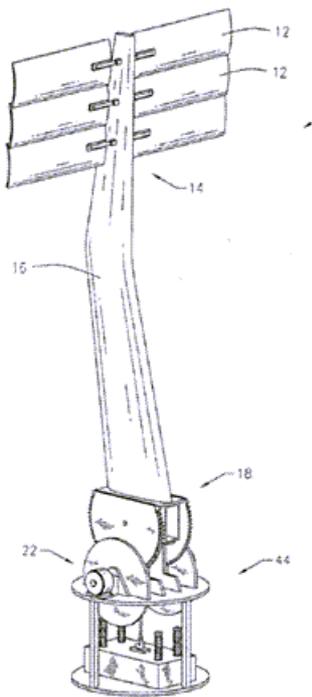
Definition statement

This place covers:

Illustrative example of subject matter classified in this group:

Patent Application Publication Sep. 10, 2009 Sheet 1 of 15 US 2009/0224553 A1





F03D 7/00

Controlling wind motors (supplying or distributing electrical power [H02J](#), e.g. arrangements for adjusting, eliminating or compensating reactive power in networks [H02J 3/18](#); controlling electric generators [H02P](#), e.g. arrangements for controlling electric generators for the purpose of obtaining a desired output [H02P 9/00](#))

Definition statement

This place covers:

Control of wind motors and related control arrangements.

[F03D 7/02](#) and [F03D 7/06](#) covers essentially the two main types of wind motors according to groups [F03D 1/00](#) and [F03D 3/00](#). [F03D 7/051](#) covers the control of wind motors according to groups [F03D 5/015](#) and [F03D 9/322](#). The head group [F03D 7/00](#) covers all other types of wind motors.

Subgroups [F03D 7/0204](#) - [F03D 7/0296](#) cover the purpose of the control or the type of control actuators. Subgroups under [F03D 7/04](#) cover the type of controllers and/or the control methods.

References

Limiting references

This place does not cover:

| | |
|--|----------------------|
| Supplying or distributing electric power | H02J |
| Controlling electric generators | H02P |

Informative references

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

| | |
|--------------------|-----------------------------|
| Pitch arrangements | F03D 1/0667 |
|--------------------|-----------------------------|

| | |
|---|-----------------------------|
| Actuation arrangements for elements attached to or incorporated with the blade, e.g. flaps or slats | F03D 1/0685 |
| Yaw arrangements, rudders | F03D 1/181 |

Special rules of classification

Documents should be classified in [F03D 7/02](#) for purpose of control or the type of controller and in addition according to the control method or type of controller in group [F03D 7/04](#). For example, a model-based controller acting on the pitch system to reduce rotor noise should be classified in groups [F03D 7/045](#), [F03D 7/0224](#) and [F03D 7/0296](#).

Subgroups of [F05B 2270/00](#), in particular control parameters under [F05B 2270/30](#), should be used systematically in combination with classification in [F03D 7/00](#) or its subgroups.

When monitoring aspects are relevant for the control, classification in [F03D 17/00](#) should be considered as well.

F03D 7/0202

{controlling floating wind motors}

Definition statement

This place covers:

Controlling wind motors, e.g. pitch, yaw, power output, while taking under consideration the behaviour of the floating support structure, e.g. ensuring wind motor stability or taking into account wave induced movements of the supporting platform.

References

Informative references

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

| | |
|---|----------------------------|
| Control of the floating platform as such to decrease unwanted movement, e.g. controlling ballast or anchoring | B63B 39/00 |
|---|----------------------------|

F03D 7/024

{of individual blades}

Definition statement

This place covers:

Controlling each blade individually or independently, e.g. modulating the pitch angle based on the rotational angle of the blade to compensate for gravity or vertical wind shear.

Special rules of classification

This group is mainly used in combination with other groups of [F03D 7/022](#) and its subgroups. For instance, individual control of a flap should be classified in [F03D 7/0232](#) and [F03D 7/024](#).

F03D 7/0264

{for stopping; controlling in emergency situations (orientating out of wind [F03D 7/0208](#))}

Relationships with other classification places

[F03D 7/0208](#) covers the yawing movement of the rotor in a downwind position and the means to carry it. If the intention of the disclosed subject-matter is stopping or protecting the rotor, classifying in both groups, i.e. [F03D 7/0208](#) and [F03D 7/0264](#) should be considered.

References

Limiting references

This place does not cover:

| | |
|-------------------------|-----------------------------|
| Orientating out of wind | F03D 7/0208 |
|-------------------------|-----------------------------|

F03D 7/0272

{by measures acting on the electrical generator}

Definition statement

This place covers:

Control of the generator to control the rotor, e.g. for regulating the rotor output torque or its speed. This can be done in various ways, e.g. control of the converter or of the generator speed.

Relationships with other classification places

The control of the generator or other electrical elements per se is covered by corresponding groups under [H02P](#) or [H02M](#). Under [F03D 7/0272](#), the generator is only seen as an abstract input-output black box element or actuator.

F03D 7/028

{controlling wind motor output power}

Definition statement

This place covers:

Controlling the output power of the wind rotor when acting on the rotor itself, i.e. by actuating some rotor or generator elements.

Relationships with other classification places

The control of the active and reactive power by acting on the electrical elements in the transmission line, e.g. converter or transformer, is covered by corresponding groups under [H02J](#) or [H02P](#).

F03D 7/0284

{in relation to the state of the electric grid}

Definition statement

This place covers:

Control of the wind motor based on grid demand.

F03D 7/0296**{to prevent, counteract or reduce noise emissions}****Definition statement***This place covers:*

Controlling wind motors to prevent, counteract or reduce noise, e.g. modifying the control strategy and reducing rotor speed during night time.

References**Informative references**

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

| | |
|---|-----------------------------|
| Arrangements for reducing noise pollution | F03D 80/005 |
|---|-----------------------------|

F03D 7/043**{characterised by the type of control logic}****Definition statement***This place covers:*

Control methods specially adapted to wind motors.

F03D 7/047**{characterised by the controller architecture, e.g. multiple processors or data communications}****Definition statement***This place covers:*

Control hardware or remote computing specially adapted to wind motors, e.g. redundant controllers, multi-processors architecture, decentralized cloud computing.

Data communication between SCADA system, turbine controllers or actuators.

F03D 7/048**{controlling wind farms}****Definition statement***This place covers:*

Conjoint control of two or more wind motors located in relatively close proximity.

Relationships with other classification places

Control of wind motors with several rotor units mounted on the same structure is not considered to refer to controlling of wind farms in the sense of this group. This aspect is classified by allocating classification in both [F03D 7/02](#) and [F03D 1/02](#).

F03D 7/051

{the wind motors being supported in air by airborne structures; of the tethered aircraft type}

Definition statement

This place covers:

Control of airborne wind motors or tethered systems, in particular of their flying pattern.

References

Informative references

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

| | |
|---|----------------------------|
| Wind motors of the tethered aircraft type, e.g. kites, with traction and retraction of the tether | F03D 5/015 |
| Wind being motors supported in air by airborne structures, e.g. by kites | F03D 9/322 |

F03D 7/06

the wind motors having rotation axis substantially perpendicular to the air flow entering the rotor

References

Informative references

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

| | |
|---|----------------------------|
| Arrangements for moving the wind engaging parts relative to the rotor | F03D 3/062 |
|---|----------------------------|

F03D 9/00

Adaptations of wind motors for special use; Combinations of wind motors with apparatus driven thereby; Wind motors specially adapted for installation in particular locations (hybrid wind-photovoltaic energy systems for the generation of electric power [H02S 10/12](#))

Definition statement

This place covers:

Adaptations of wind motors for special use;

Combinations of wind motors with means for converting solar radiation into useful energy;

Combinations of wind motors with water energy converters, e.g. water turbines;

Combinations of wind motors with an apparatus storing energy;

Wind motors being characterised by the driven apparatus, e.g. heat pump, hydraulic pump, compressor, or electric generator;

Wind motors specially adapted for installation in particular locations, e.g. moving objects, stationary objects, infrastructure, or using landscape.

References

Limiting references

This place does not cover:

| | |
|--|----------------------------|
| Hybrid wind-photovoltaic energy systems for the generation of electric power | H02S 10/12 |
|--|----------------------------|

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

| | |
|---|----------------------------|
| Pumps characterised by combination with wind motors | F04B 17/02 |
|---|----------------------------|

F03D 9/007

{the wind motor being combined with means for converting solar radiation into useful energy}

Definition statement

This place covers:

Solar panels built in or on the blades or tower.

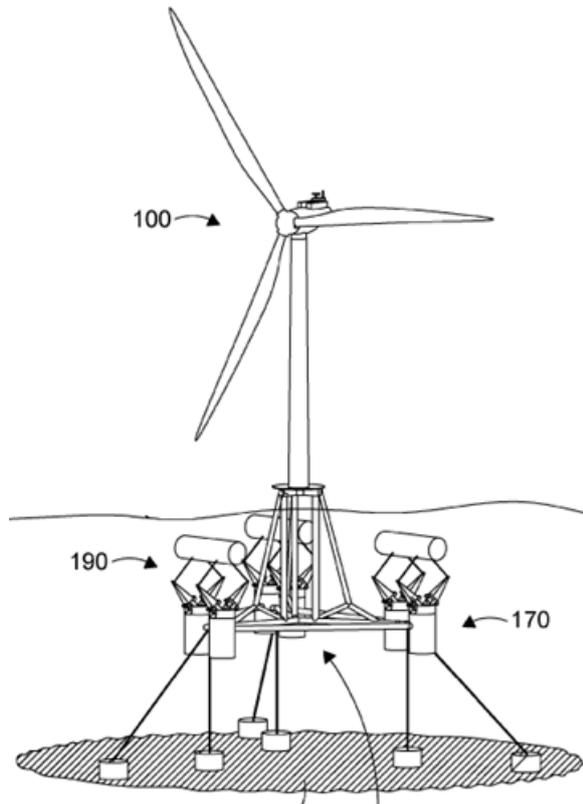
F03D 9/008

{the wind motor being combined with water energy converters, e.g. a water turbine}

Definition statement

This place covers:

Illustrative example of subject matter classified in this group:

**References****Informative references**

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

| | |
|---------------------------------|----------------------|
| Machines or engines for liquids | F03B |
|---------------------------------|----------------------|

F03D 9/11

storing electrical energy

References**Informative references**

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

| | |
|--|------------------------------|
| Storage of energy relating to wind, spring, weight, inertia or like motors | F05B 2260/42 |
|--|------------------------------|

Special rules of classification

The mere disclosure of a trivial battery does not justify classification in this group.

F03D 9/20

Wind motors characterised by the driven apparatus ([F03D 9/10](#) takes precedence)

References

Limiting references

This place does not cover:

| | |
|---|---------------------------|
| Combinations of wind motors with apparatus storing energy | F03D 9/10 |
|---|---------------------------|

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

| | |
|---|----------------------------|
| Arrangements of propulsion units in vehicles in connection with power supply derived from wind power | B60K 16/00 |
| Electric propulsion of vehicles using wind power | B60L 8/00 |
| Propulsion of ships or other waterborne vessels by wind motors driving water-engaging propulsive elements | B63H 13/00 |
| Driving auxiliaries on ships or other waterborne vessels using wind power | B63J 3/04 |

F03D 9/25

the apparatus being an electrical generator ([F03D 9/22](#) takes precedence)

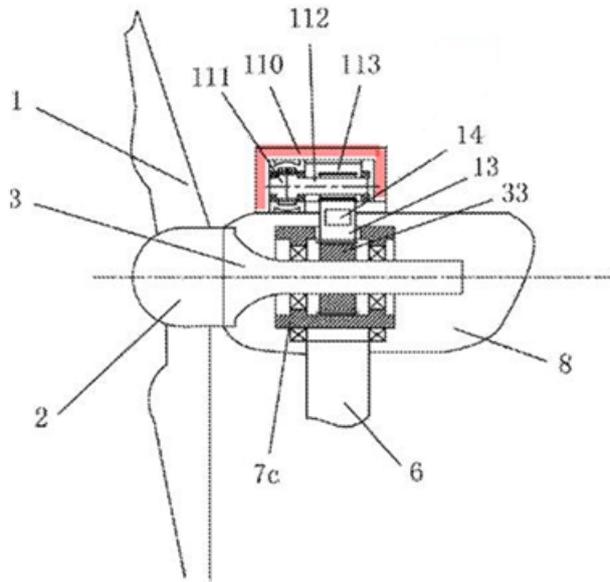
Definition statement

This place covers:

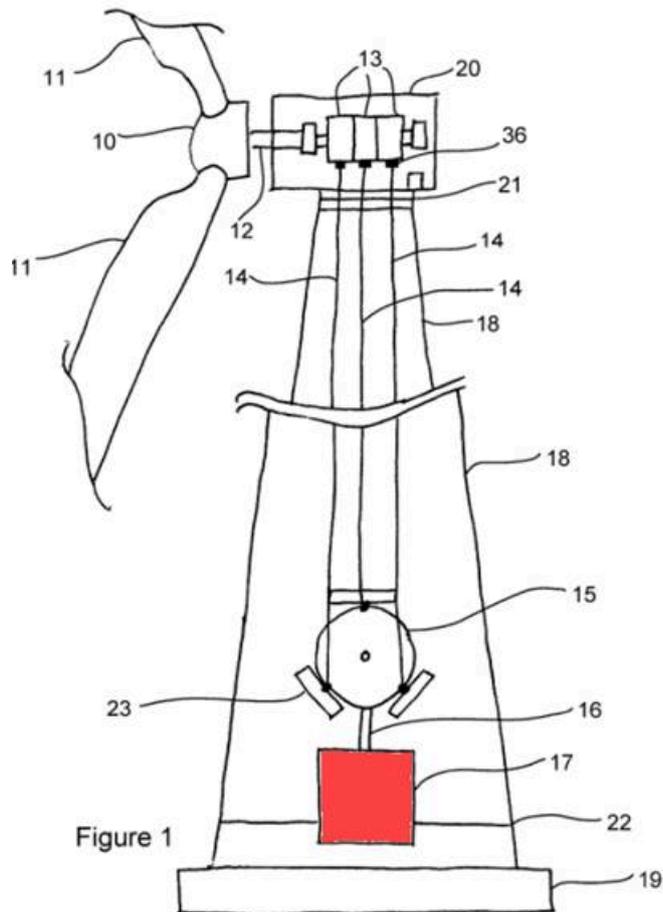
Wind motors combined with the driven apparatus being an electric generator (not a routine electrical generator).

Illustrative example of subject matter classified in this group:

Generator mounted on top of the nacelle:



Generator 17 is activated by a special swash plate 15 and cams 13 on rotating shaft 12:



Relationships with other classification places

Classification in this group [F03D 9/25](#) only applies when the combination of the electrical generator to the wind motor is disclosed. Structural features of the wind generator associated with a wind

Relationships with other classification places

motor is classified in [H02K 7/18](#). The mere disclosure of a state-of-the-art generator does not justify classification in this group. This generator type can be classified in [F05B 2220/706](#).

References

Limiting references

This place does not cover:

| | |
|---|---------------------------|
| Wind motors combined with the driven apparatus producing heat | F03D 9/22 |
|---|---------------------------|

F03D 9/255

{connected to electrical distribution networks; Arrangements therefor}

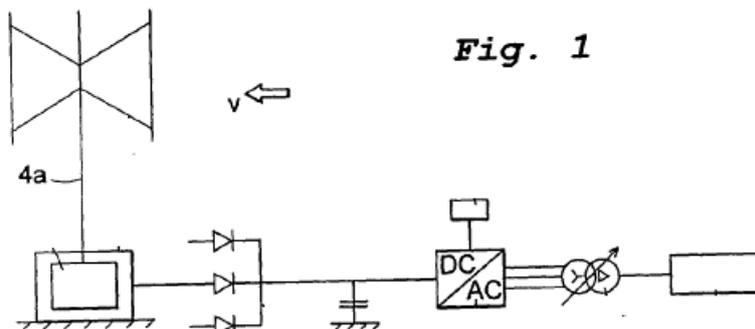
Definition statement

This place covers:

The connection or relative placement between the generator and the transformer to the electricity grid, e.g. by way of connecting elements, power cables, or the location of the transformer to the generator.

General electrical conduction between black-box elements, e.g. generator or transformer.

Illustrative example of subject matter classified in this group:



References

Informative references

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

| | |
|---|----------------------------|
| Arrangement of electrical components within nacelles or tower | F03D 80/82 |
|---|----------------------------|

F03D 9/257

{the wind motor being part of a wind farm}

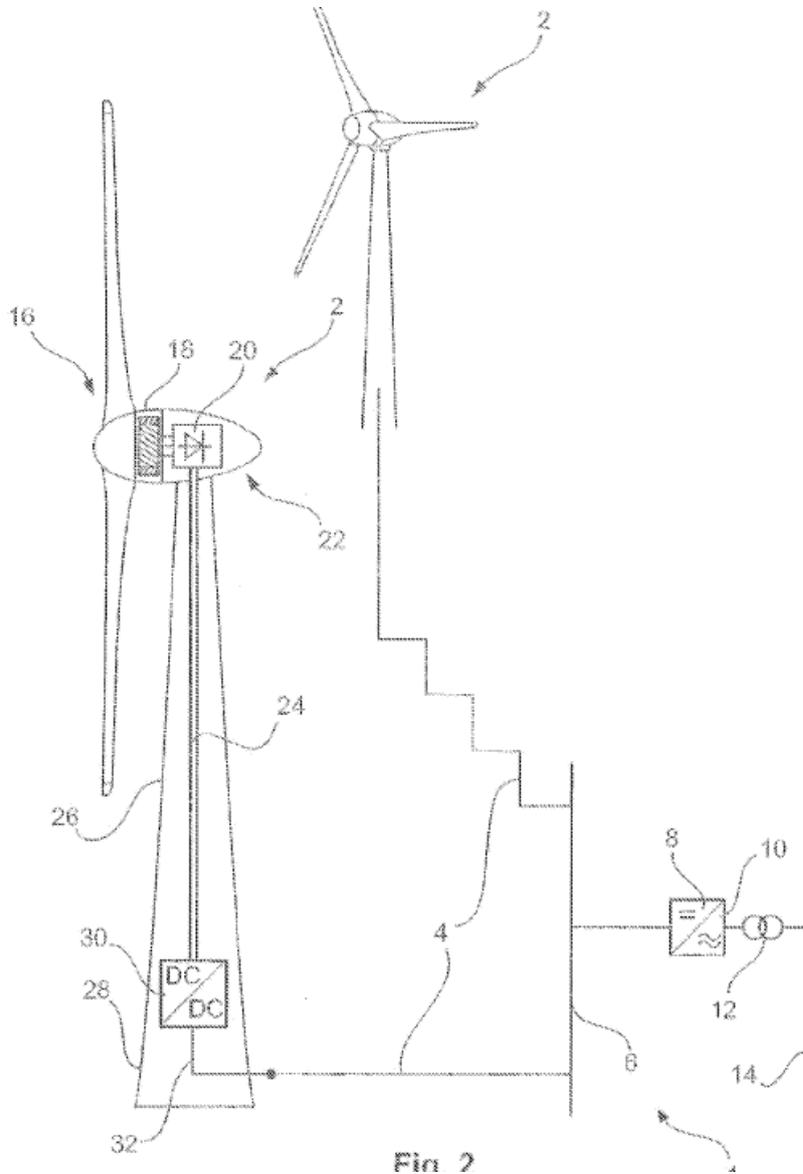
Definition statement

This place covers:

Electrical connection between wind motors, e.g. in an array or in series, other than a trivial disclosure of a wind turbine used in a wind park or a wind farm.

Multiple wind motors connected to a single transformer, different wind rated wind turbines placed in a pattern.

Illustrative example of subject matter classified in this group:



References

Informative references

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

| | |
|---|------------------------------|
| Controlling wind farms | F03D 7/048 |
| Mounting on supporting structures or systems as part of a wind turbine farm | F05B 2240/96 |
| Supplying or distributing electric power; Grid connections | H02J |

Special rules of classification

Structures supporting multiple wind motors are not considered as a wind farm.

F03D 9/28

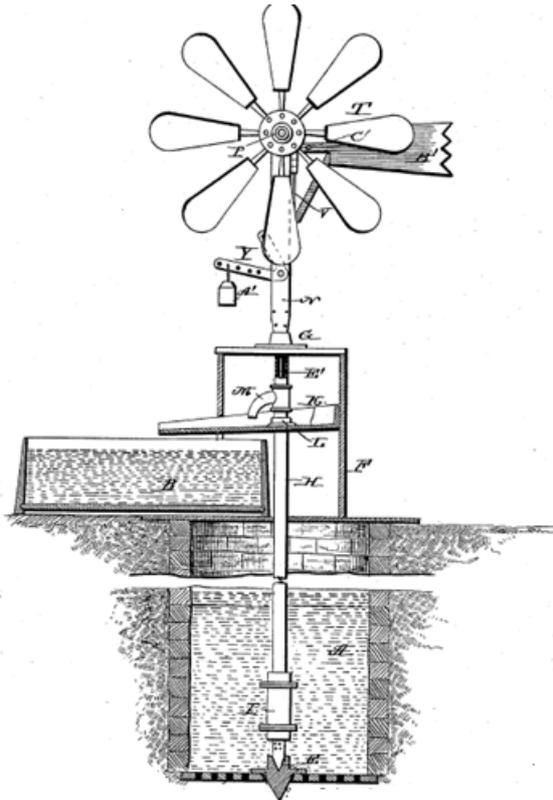
the apparatus being a pump or a compressor

Definition statement

This place covers:

Adaptation of wind motors for driving a pump or a compressor.

Illustrative example of subject matter classified in this group:

**Relationships with other classification places**

Wind motors combined with a heat pump or AC unit are classified in [F03D 9/22](#).

Hydraulic transmissions, i.e. combination of hydraulic pump and motor, are classified in [F03D 15/202](#).

F03D 9/30

Wind motors specially adapted for installation in particular locations (means for mounting or supporting wind motors [F03D 13/20](#))

References**Limiting references**

This place does not cover:

| | |
|---|----------------------------|
| Arrangements for mounting or supporting wind motors | F03D 13/20 |
|---|----------------------------|

Informative references

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

| | |
|--|----------------------------|
| Anchoring arrangements for special vessels | B63B 21/50 |
|--|----------------------------|

Special rules of classification

[F03D 9/30](#) covers the location or place where the wind motors are installed and operated. [F03D 13/20](#) covers the supporting structure of the wind motor or the way it is mounted to this structure.

For example, a wind motor positioned on a building should be classified in [F03D 9/45](#) while the arrangements for attaching or supporting the wind motor on a building is classified by allocating [F03D 13/20](#).

Classification in [F05B 2240/90](#) as well as its subgroups is mandatory in combination with [F03D 9/30](#) and [F03D 13/20](#) to identify the supporting structure or location.

F03D 9/32**on moving objects, e.g. vehicles****Definition statement**

This place covers:

Wind motors specially adapted for installation on moving objects, e.g. vehicles, in which the movement of the object causes air flow through the rotor or places the wind motor in a different, typically increased, air flow.

References**Informative references**

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

| | |
|---|-----------------------------|
| Arrangements for mounting or supporting wind motors on a floating support | F03D 13/256 |
|---|-----------------------------|

F03D 9/322

{the wind motors being supported in air by airborne structures, e.g. by kites (controlling thereof [F03D 7/051](#))}

References**Limiting references**

This place does not cover:

| | |
|---------------------|----------------------------|
| Controlling thereof | F03D 7/051 |
|---------------------|----------------------------|

Informative references

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

| | |
|---|----------------------------|
| Wind motors of the tethered aircraft type, e.g. kites, with traction and retraction of the tether | F03D 5/015 |
| Kite sails for water sports boards | B63H 8/10 |

| | |
|------------------------|----------------------------|
| Kite sails for vessels | B63H 9/069 |
|------------------------|----------------------------|

F03D 13/00

Assembly, mounting or commissioning of wind motors; Arrangements specially adapted for transporting wind motor components

Special rules of classification

Mounting is typically understood as fixing something into position onto something, but in this group it is interpreted in a broader sense also encompassing the concept of supporting. Reference is made to the title of group [F03D 13/20](#).

F03D 13/10

Assembly of wind motors; Arrangements for erecting wind motors

References

Informative references

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

| | |
|-------------------|----------------------|
| Cranes in general | B66C |
|-------------------|----------------------|

F03D 13/122

{of auxiliary arrangements inside tower or nacelle, e.g. generators or transmission}

References

Informative references

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

| | |
|---|----------------------------|
| Arrangement of components within nacelles or towers | F03D 80/80 |
|---|----------------------------|

F03D 13/20

Arrangements for mounting or supporting wind motors; Masts or towers for wind motors

Relationships with other classification places

Foundations specially adapted for wind motors are classified in [E02D 27/425](#).

References

Informative references

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

| | |
|---|--------------------------------|
| Wind motors kept aloft by an airborne structure | F03D 9/322 |
| Floating buildings, stores, drilling platforms or workshops, e.g. carrying water-oil separating devices | B63B 35/44 |
| Offshore structures for wind turbines mounted on piles or like supports | E02B 2017/0091 |

| | |
|---|-----------------------------|
| Foundations for poles, masts or chimneys | E02D 27/42 |
| Foundations specially adapted for wind motors | E02D 27/425 |
| Towers; Masts, poles; Methods of erecting such structures | E04H 12/00 |

F03D 13/2005

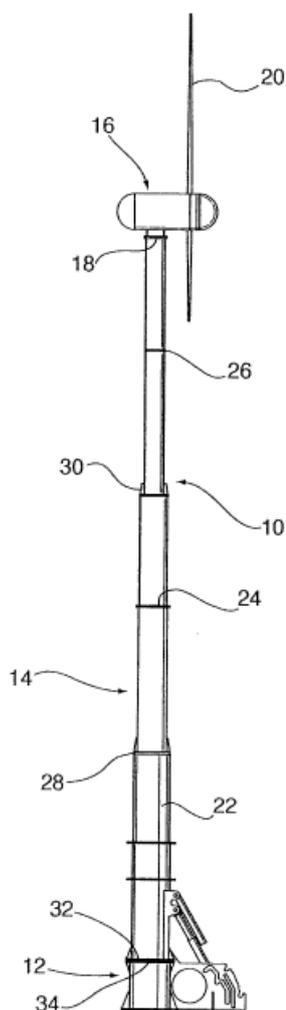
{Masts or poles}

Definition statement

This place covers:

A wind motor supported on a structure which is of a design that has no interior access, similar to a flagpole or a sailboat mast.

Illustrative example of subject matter classified in this group:



F03D 13/201**{Towers}****Definition statement**

This place covers:

Tower-shaped wind motor support which is constructed to support a large nacelle or rotor. The tower may have access doors or be of a framed construction.

References***Informative references***

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

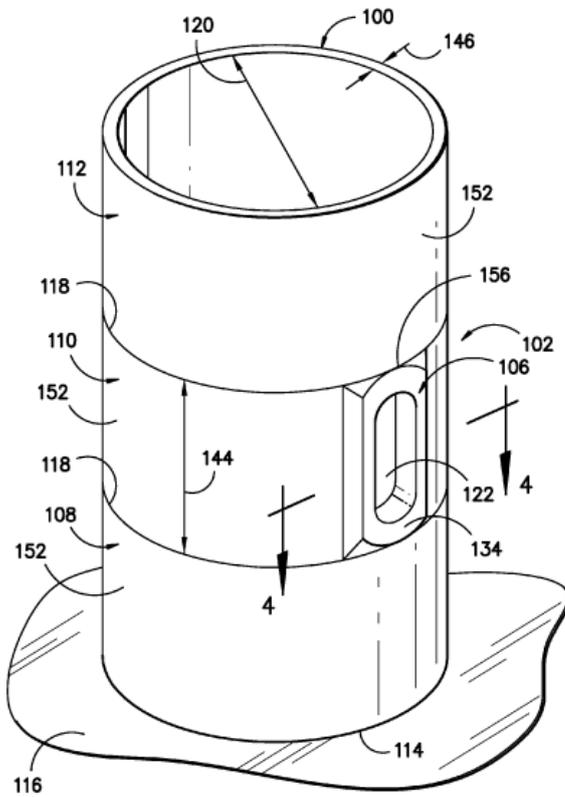
| | |
|---|------------------------------|
| Wind motors supported on masts or poles | F03D 13/2005 |
|---|------------------------------|

F03D 13/202**{Access thereto}****Definition statement**

This place covers:

An opening, hatch, ingress or egress suitable for a person to enter or exit the tower.

Illustrative example of subject matter classified in this group:



F03D 13/204

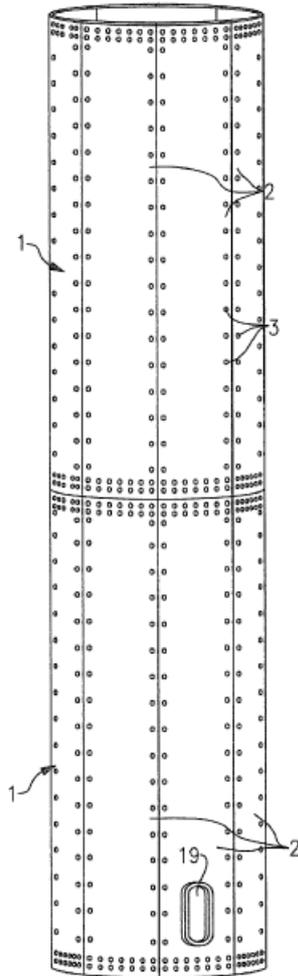
{Circumferentially segmented}

Definition statement

This place covers:

A wind motor tower made from circumferential segments joined together.

Illustrative example of subject matter classified in this group:



F03D 13/205

{Connection means, e.g. joints between segments}

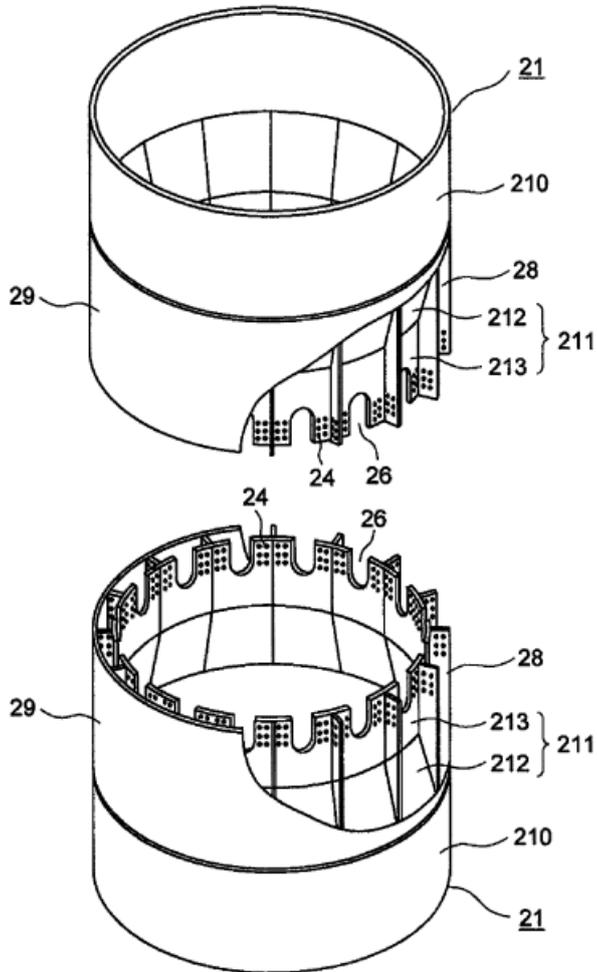
Definition statement

This place covers:

Means for connecting together adjacent segments of a wind motor tower.

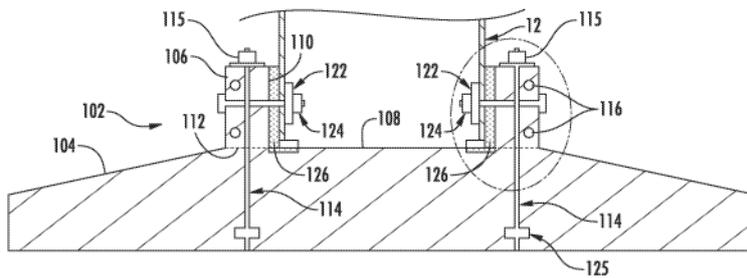
Joints between adjacent segments. The adjacent segments may be either circumferentially or axially arranged.

Illustrative example of subject matter classified in this group:



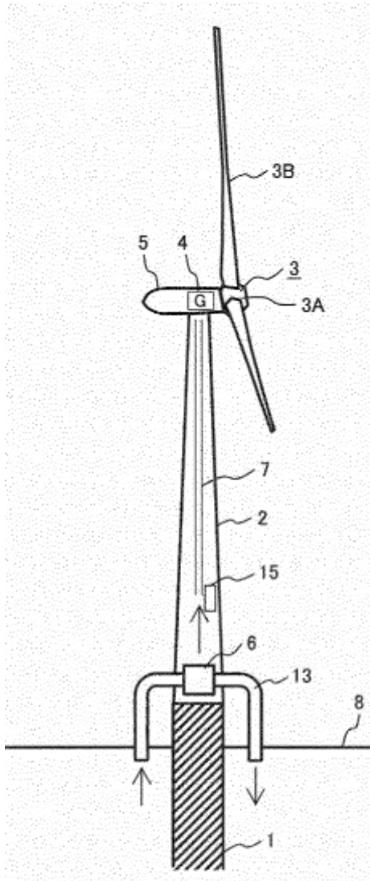
F03D 13/206**{between the tower and the foundation}****Definition statement***This place covers:*

Illustrative example of subject matter classified in this group:

**F03D 13/25****especially adapted for offshore installation****Definition statement***This place covers:*

A wind motor supporting member having features specially adapted for offshore applications.

Illustrative example of subject matter classified in this group:



References

Informative references

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

| | |
|--|----------------------------|
| Anchoring arrangements for special vessels | B63B 21/50 |
| Vessels or like floating structures adapted for special purposes | B63B 35/00 |
| Artificial islands mounted on piles or like supports | E02B 17/00 |

F03D 13/256

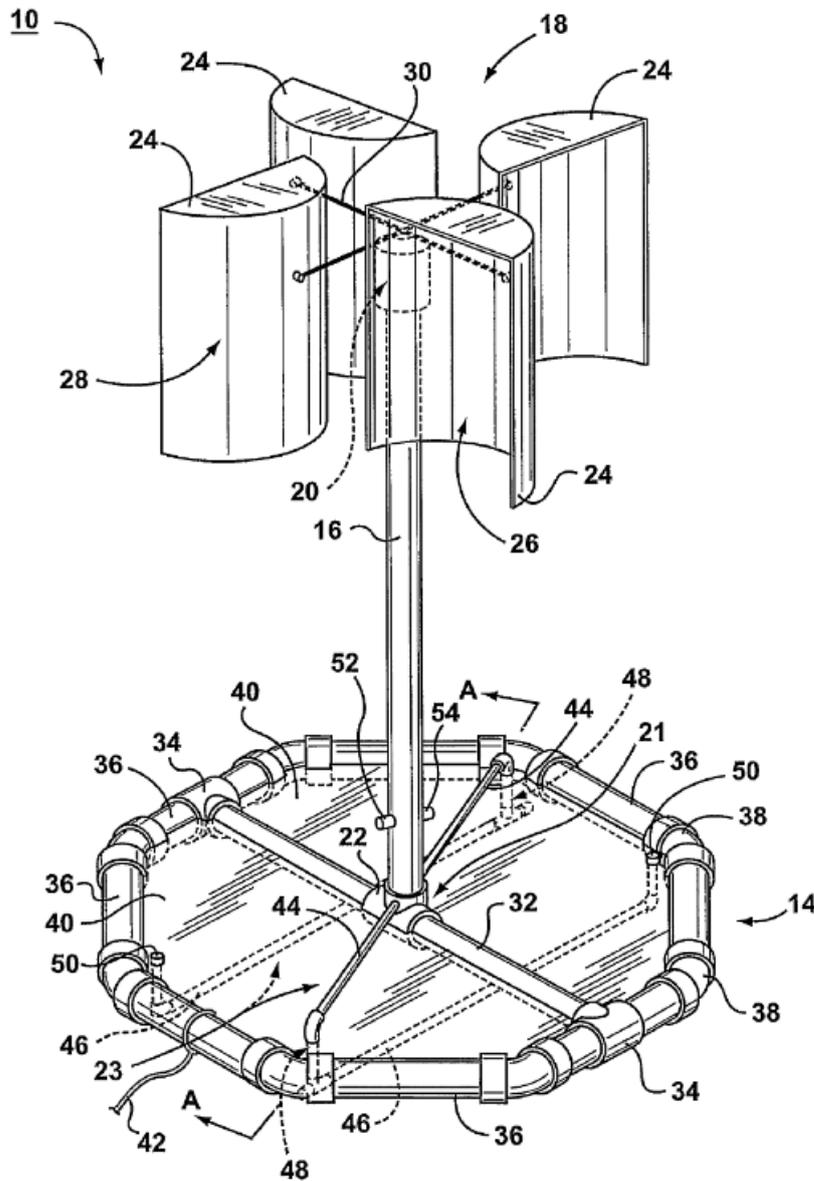
{on a floating support, i.e. floating wind motors}

Definition statement

This place covers:

Offshore wind motors mounted on a floating support.

Illustrative example of subject matter classified in this group:



Relationships with other classification places

The floating structures per se are covered by groups in subclass [B63B](#). [F03D 13/256](#) covers the wind motors or linked elements, e.g. towers or masts, which are installed on or supported by a floating structure.

References

Informative references

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

| | |
|--|-----------------------------|
| Controlling floating wind motors having rotation axis substantially parallel to the air flowing at the rotor | F03D 7/0202 |
| Transporting wind motors to their installation site | F03D 13/40 |

F03D 13/30

Commissioning, e.g. inspection, testing or final adjustment before releasing for production

Definition statement

This place covers:

Inspection, testing or adjustment of the wind motor before operating the wind motor to produce power.

References

Informative references

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

| | |
|--|-----------------------------|
| Inspection or testing of the wind motor or components thereof, after commissioning | F03D 17/001 |
| Micro-siting | F03D 80/002 |

F03D 13/40

Arrangements or methods specially adapted for transporting wind motor components

Definition statement

This place covers:

Transporting or storing of wind motor components.

References

Informative references

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

| | |
|---|----------------------------|
| Use of a wind motor mounted to a vehicle to produce power when the vehicle is either moving or stationary | F03D 9/32 |
| Assembling the wind motor at the installation site | F03D 13/10 |
| Vehicles adapted to transport or carry special loads or objects | B60P 3/00 |
| Transporting offshore structures, specially adapted for electric power plants | B63B 77/10 |

F03D 15/00

Transmission of mechanical power

Definition statement

This place covers:

Transmission of mechanical power, i.e. mechanisms by which the wind-derived mechanical power is conveyed to its point of use

References

Informative references

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

| | |
|---------|----------------------|
| Gearing | F16H |
|---------|----------------------|

F03D 15/05

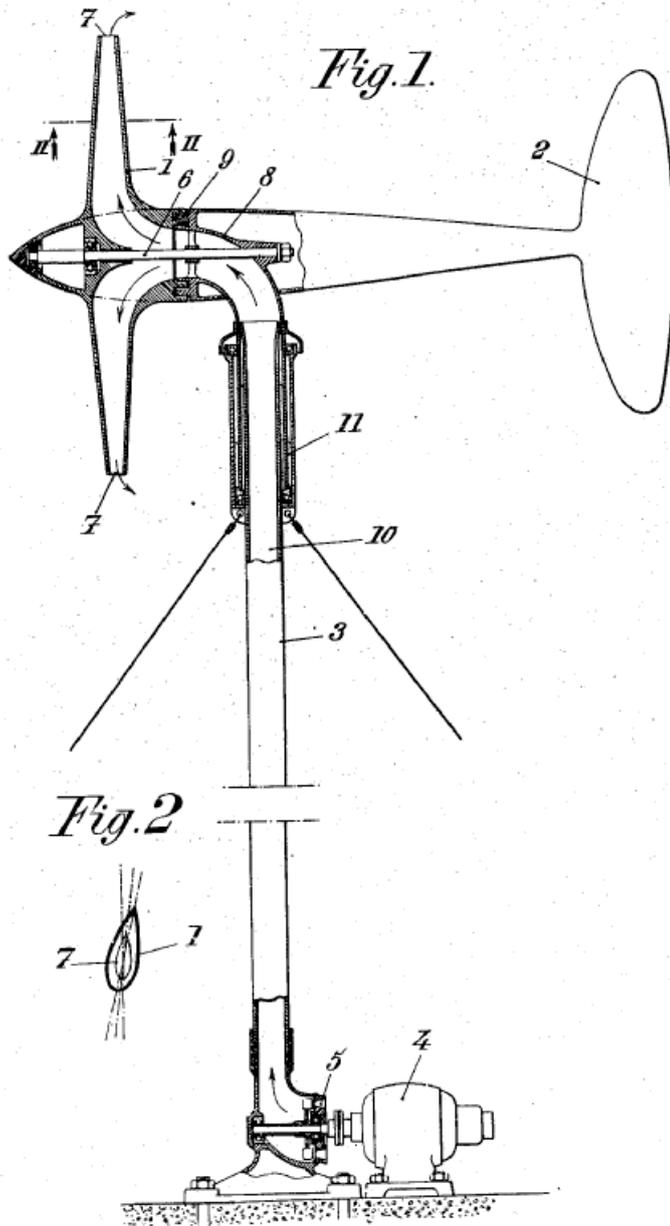
{using hollow exhausting blades}

Definition statement

This place covers:

Air flow through the blades, e.g. windmills creating a flow of air through the blade by their rotation.

Illustrative example of subject matter classified in this group:



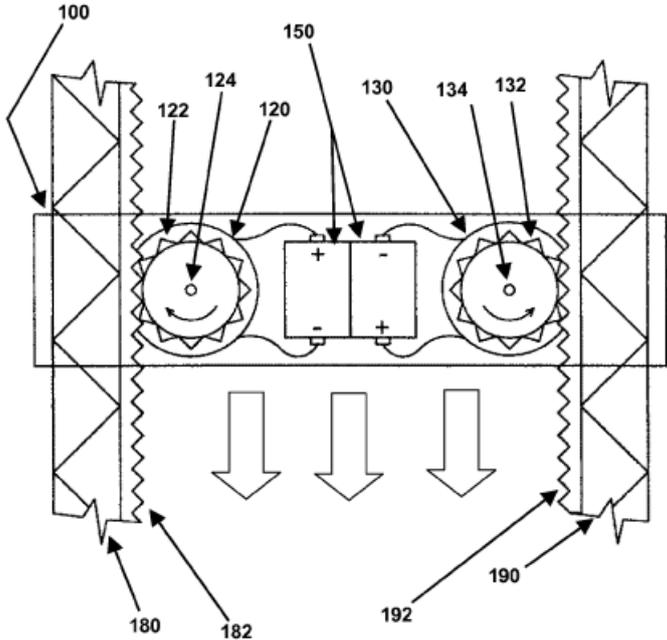
F03D 15/10

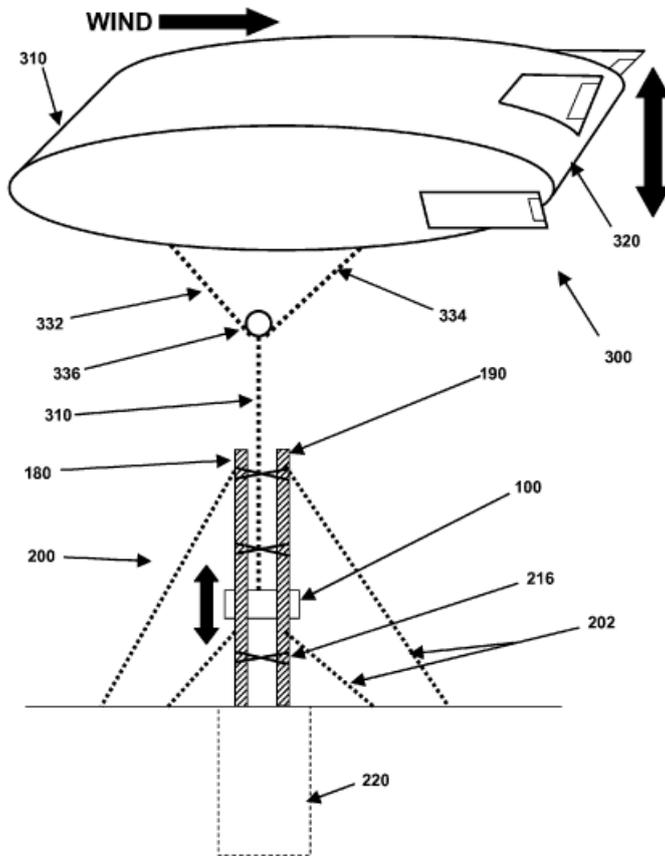
using gearing not limited to rotary motion, e.g. with oscillating or reciprocating members

Definition statement

This place covers:

Wind motors transmitting mechanical power to their power generating device with a gear or gearbox. The gear is of any type, including rotary, as well as a rack and pinion gearing.





References

Informative references

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

| | |
|---|---------------------------|
| Wind motors with the wind-engaging parts swinging to-and-fro and not rotating | F03D 5/06 |
|---|---------------------------|

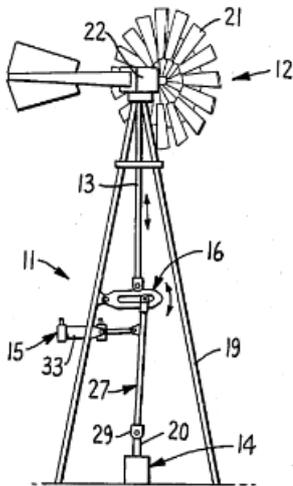
F03D 15/15

{Changing or adjusting stroke}

Definition statement

This place covers:

Wind motors having the stroke length of a pump cylinder adjusted. The length of stroke is typically adjusted relative to the speed of the wind.



F03D 15/20

Gearless transmission, i.e. direct-drive

Definition statement

This place covers:

Gearless transmission arrangements in which the rotor shaft is directly coupled to the generator without intermediate gearing or other drive elements.

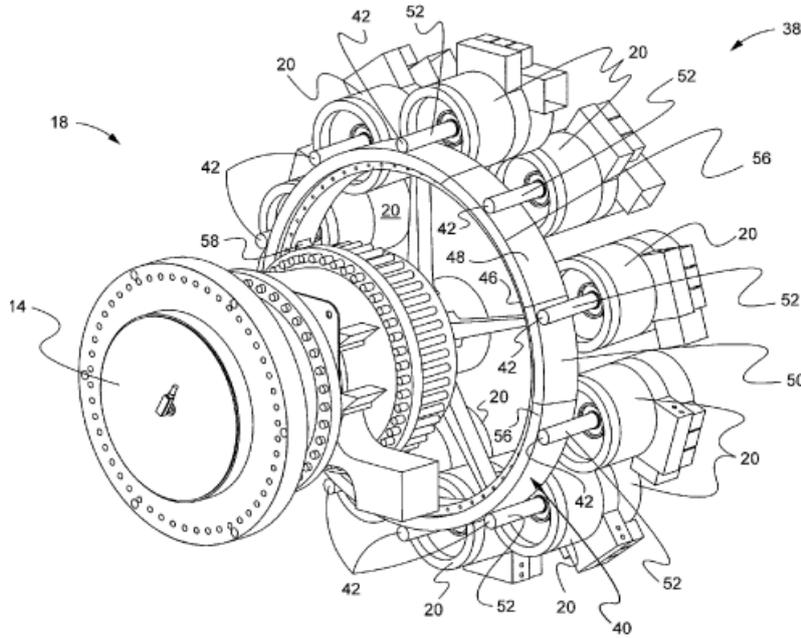
F03D 15/201

{using friction drives, e.g. belts}

Definition statement

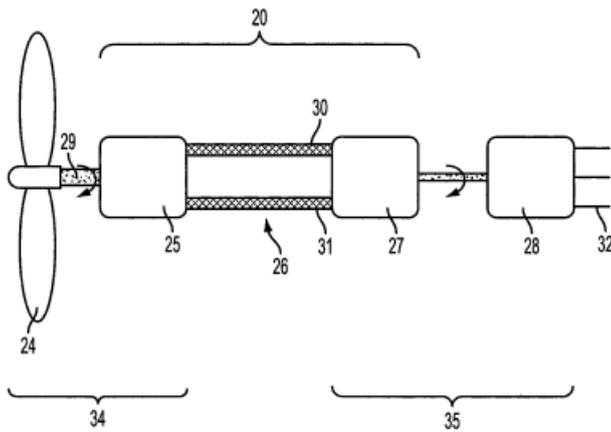
This place covers:

Illustrative example of subject matter classified in this group:



F03D 15/202**{using hydraulic transmission}****Definition statement***This place covers:*

Illustrative example of subject matter classified in this group:

**F03D 15/205****{to the generator located at the tower bottom}****Definition statement***This place covers:*

Transmissions coupling the rotor to a ground-based generator.

F03D 17/00

Monitoring or testing of wind motors, e.g. diagnostics (testing during commissioning of wind motors [F03D 13/30](#))

Definition statement

This place covers:

Monitoring or testing of wind motors, e.g. diagnostics or inspection.

References

Limiting references

This place does not cover:

| | |
|---|----------------------------|
| Testing during commissioning of wind motors | F03D 13/30 |
|---|----------------------------|

Informative references

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

| | |
|---|-----------------------------|
| Ice detection | F03D 80/405 |
| Testing static or dynamic balance of machines or structures; Testing of structures or apparatus, not otherwise provided for | G01M |

Special rules of classification

[F03D 17/00](#) includes subgroups relating to the purpose (cf. [F03D 17/009](#)), and relating to the component being monitored or tested (cf. [F03D 17/027](#)). When appropriate, classification of the document should include the component of the wind motor being monitored or tested, together with the purpose of the monitoring or testing. For example, a wind motor tower being monitored for natural frequency vibrations should be allocated CPC symbols [F03D 17/034](#) for the tower, and [F03D 17/017](#) for monitoring natural frequencies thereof.

When control aspects are relevant, e.g. monitored parameters being used for controlling, classification in [F03D 7/00](#) should be considered as well.

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

| | |
|-----------------------|--|
| Monitoring or testing | Overseeing or analysing the operating conditions of the wind motor mechanism, typically to identify problematic conditions. This may involve reference to wind motor sensor signals indicating, e.g. wind speed and direction, pitch angle, vibration, rotary torque, blade load and strain. |
|-----------------------|--|

F03D 17/001

{Inspection}

Definition statement

This place covers:

Inspection of the wind motor at the installation site. Inspection is performed on-demand or on a scheduled basis rather than a continuous monitoring.

The use of occupied vehicles, e.g. boats, helicopters for personnel to reach wind motor inspection sites.

F03D 17/002

{by testing or performing a safety check}

Definition statement

This place covers:

Inspecting or checking the operation of the wind motor when implemented with a controlled input to verify the wind motor is performing to its specifications.

F03D 17/003

{characterised by using optical devices, e.g. lidar or cameras}

Definition statement

This place covers:

The use of optical devices during the inspection process.

Special rules of classification

The mere mentioning of a camera being used to take a picture during the inspection process does not justify classification in this group.

F03D 17/004

{by using remote inspection vehicles, e.g. robots or drones}

Definition statement

This place covers:

The inspection process being performed or assisted by the use of remote vehicles, e.g. remotely controlled robots or unmanned aerial vehicles.

References

Informative references

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

| | |
|--------------------------|----------------------|
| Manipulators | B25J |
| Unmanned aerial vehicles | B64U |

F03D 17/011

{for monitoring mechanical loads or assessing fatigue; for monitoring structural integrity}

Definition statement

This place covers:

The use of sensors to measure variables such as stress and strain which represent forces exposed on components of the wind motor.

Diagnosing the remaining useful life of a wind motor component.

Monitoring the wind motor with respect to the initiation and propagation of cracks due to cyclic loading.

References

Informative references

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

| | |
|--|-------------------------------|
| Controlling wind motors to increase fatigue life | F03D 7/0292 |
| Strain gauges | F05B 2270/808 |

F03D 17/012

{for monitoring wear or clearance}

Definition statement

This place covers:

Monitoring the wind motor with respect to wear or clearance. Excessive wear can cause for clearances between parts to be outside of acceptable ranges.

References

Informative references

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

| | |
|-----------------------|-----------------------------|
| Monitoring vibrations | F03D 17/015 |
|-----------------------|-----------------------------|

F03D 17/013

{for detecting abnormalities or damage}

Definition statement

This place covers:

Detection of an abnormality or damage in the wind motor. Faults or failures are considered an extreme case of abnormalities and damage, i.e. the wind motor is still operable with the detection of an abnormality or damage, whereas a fault or failure detection indicates the inoperability of the wind motor. Detecting faults or failures are covered by subgroup [F03D 17/014](#).

F03D 17/015

{for monitoring vibrations}

Definition statement

This place covers:

Monitoring wind motors with respect to a measured vibration.

References

Informative references

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

| | |
|-------------------------------|-----------------------------|
| Monitoring wear or clearances | F03D 17/012 |
|-------------------------------|-----------------------------|

F03D 17/016**{indicative of rotor imbalance}****Definition statement***This place covers:*

The vibration value is representative of the rotor imbalance.

Special rules of classificationBalancing rotors during or before commissioning is classified in [F03D 13/35](#).**F03D 17/017****{Natural frequencies or oscillations}****Synonyms and Keywords***In patent documents, the following words/expressions are often used as synonyms:*

- Natural frequency
- Eigenfrequency
- Fundamental frequency
- Resonant frequency

F03D 17/018**{for monitoring temperature}****Definition statement***This place covers:*

Monitoring temperature of wind motor elements.

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

| | |
|-----------------------------------|----------------------------|
| Cooling or heating of wind motors | F03D 80/60 |
|-----------------------------------|----------------------------|

F03D 17/021**{for monitoring power or current}****Relationships with other classification places**

This group covers monitoring power or current associated with the electrical generator of the wind motor. Group [H02P 9/00](#) covers arrangements for controlling electric generators for the purpose of obtaining a desired output.

F03D 17/022**{for monitoring displacement}****Definition statement***This place covers:*

Sensors or methods for determining and monitoring variables such as length or distance between components of the wind motor.

References**Informative references**

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

| | |
|------------------------------|-------------------------------|
| Displacement measuring means | F05B 2270/821 |
|------------------------------|-------------------------------|

F03D 17/024**{for monitoring sound or acoustic signals}****Definition statement***This place covers:*

Sensors or methods for determining and monitoring noises emitted by the wind motor.

References**Informative references**

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

| | |
|---|-------------------------------|
| Controlling the wind motor to reduce noise emissions | F03D 7/0296 |
| Accessory devices for reducing noises emitted by the wind motor | F03D 80/005 |
| Noise or sound levels as control parameters | F05B 2270/333 |
| Microphones | F05B 2270/81 |

F03D 17/025**{for calibrating}****Definition statement***This place covers:*

Monitoring or diagnosing an error or offset of the wind motor, such as the yaw error, and implementing a correction to the measured error.

References**Informative references**

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

| | |
|--|-----------------------------|
| Controlling the wind motor to orient in relation to wind direction | F03D 7/0204 |
|--|-----------------------------|

F03D 17/026**{for assessing power production capabilities}****Definition statement***This place covers:*

Estimating or predicting the power producing capabilities of the wind motor, e.g. based on predicted wind speed or on wind motor operability. Analysis of operating the wind motor above the power curve or above its rated power for a length of time.

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

| | |
|-------------------------|-----------------------------|
| Controlling wind motors | F03D 7/00 |
| Micro-siting | F03D 80/002 |

Synonyms and Keywords*In patent documents, the following abbreviations are often used:*

| | |
|-----|--------------------------|
| AEP | Annual Energy Production |
|-----|--------------------------|

F03D 80/003**{Power-supply to auxiliary components, e.g. to pitch drives or cooling fans}****Definition statement***This place covers:*

The primary or redundant power-supply means for controlling a wind motor auxiliary component. For example, the use of any one of a: hydraulic circuit, battery, slip-ring, switch or controller to actuate a yaw or pitch drive motor.

Method or means for adjusting the power consumption of auxiliary components.

References***References out of a residual place****Examples of places in relation to which this place is residual:*

| | |
|--|-----------------------------|
| Hydraulic actuators or electric actuators for changing the blade pitch of the wind motor | F03D 1/0667 |
|--|-----------------------------|

F03D 80/004

**{for reducing adverse effects on animals, e.g. preventing avian collisions;
Detection of animals}**

Definition statement

This place covers:

Devices or processes for minimizing interaction between the wind motor and animals, e.g. birds or bats.

Detection of animals.

References**Informative references**

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

| | |
|--------------------------------------|----------------------------|
| Arrangements for warning air traffic | F03D 80/10 |
|--------------------------------------|----------------------------|

F03D 80/005

{for reducing noise pollution}

Definition statement

This place covers:

Accessories used on the wind motor or in the vicinity of the wind motor to attenuate noise emissions therefrom.

References**References out of a residual place**

Examples of places in relation to which this place is residual:

| | |
|--|------------------------------|
| Noise reducers provided on blade surfaces | F03D 1/06495 |
| Controlling the wind motor to reduce noise emissions | F03D 7/0296 |

F03D 80/011

{Decommissioning}

Definition statement

This place covers:

Rendering wind motors inoperative. Dismantling wind motors.

References**Informative references**

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

| | |
|------------------------------|----------------------------|
| Assembly of wind motors | F03D 13/10 |
| Commissioning of wind motors | F03D 13/30 |

F03D 80/10

Arrangements for warning air traffic

References

Informative references

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

| | |
|--------------------------------------|---------------------------|
| Traffic control systems for aircraft | G08G 5/00 |
|--------------------------------------|---------------------------|

F03D 80/20

Arrangements for avoiding shadow flicker

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

| | |
|----------------|--|
| Shadow flicker | Periodic flickering effect due to repetitive shadows cast by rotating wind turbine blades. |
|----------------|--|

F03D 80/30

Lightning protection

References

Informative references

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

| | |
|--|----------------------------|
| Installations of lightning conductors; Fastening thereof to supporting structure | H02G 13/00 |
|--|----------------------------|

F03D 80/501

{by using platforms}

Definition statement

This place covers:

Temporary or permanent platforms associated with the wind motor for use during maintenance or repair.

F03D 80/507

{Retrofitting; Repurposing, i.e. reusing of wind motor parts for different purposes; Upgrading, i.e. replacing parts for improving the wind turbine performance}

Definition statement

This place covers:

Furnishing or upgrading the wind motor with a new or modified part.

Repurposing of a wind motor or component thereof into another useful item.

References

Informative references

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

| | |
|----------|----------------------------|
| Cleaning | F03D 80/55 |
|----------|----------------------------|

F03D 80/70

Bearing or lubricating arrangements

Definition statement

This place covers:

Yaw bearings, pitch bearings or shaft bearings used on the wind motors.

Lubrication circuits and devices for supplying lubricant to wind motor components.

References

Informative references

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

| | |
|--|-----------------------------|
| Monitoring or testing the blade pitch drive or yaw drive | F03D 17/029 |
| Monitoring or testing the wind motor bearings | F03D 17/032 |
| Lubricating of machines in general | F01M |
| Bearings | F16C |

F03D 80/701

{Pitch or yaw bearings}

Definition statement

This place covers:

The rolling elements, races and gears making up the bearings providing rotational movement between the blade and hub, or the tower and nacelle.

References

Informative references

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

| | |
|--------------------|-----------------------------|
| Pitch arrangements | F03D 1/0664 |
| Yaw arrangements | F03D 1/181 |

F03D 80/80

Arrangement of components within nacelles or towers

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

| | |
|---------|--|
| Nacelle | The protective outer housing enclosing wind motor components such as the transmission, associated gearing and turbine. |
|---------|--|