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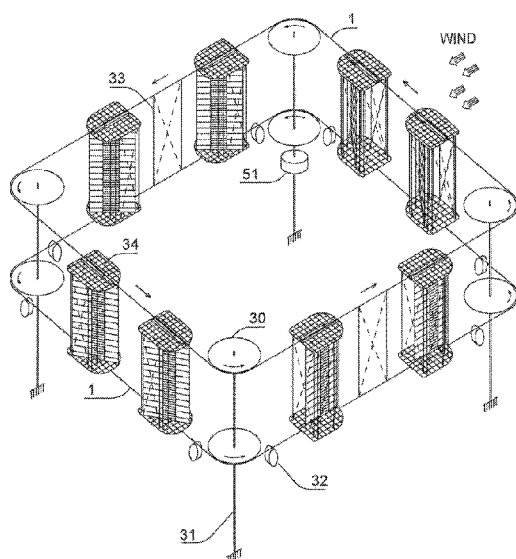
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FIG. 1 (for annotation)



(57) Abstract: The wind cable car converts the sliding movement of the air into a sliding cyclical movement of the carriages (34) along the suspended way and, by means of ropes (1) and rotary pulleys (30), converts it into a twisting movement of the generator (51). The present invention is based on the ability of a set of connected carriages (34) moving on a horizontal closed cable way in a form of a closed loop to perform a forward movement caused by the wind force. The movement of all the interconnected carriages (34) and the operation of the entire wind energy recovery system are made possible by turning the movable parts of the vertical plates of the wind carriages (34) which resist the moving air. The wind cable car is firmly mounted in the terrain and has a stationary or movable suspended way and its operation is independent of the wind direction. The basic application of the invention is in obtaining electrical and mechanical energy from the kinetic energy of the wind.

DESCRIPTION OF THE INVENTION

Wind cable car

Field of technology

The present invention refers to a wind cable car and its use is in the field of wind turbines and drive units using wind power to drive machines and to produce electric energy. The invention belongs to the field of physics, the mechanics part.

Background of the invention

Almost 95% of the industrial wind turbines are two or three-bladed propeller turbines with a horizontal axis of rotation known as HAWT. The design constraint for these types of turbines is given by the speed of the free end of the turbine blade because at high tip speeds turbulent problems occur that adversely affect the energy yield of the equipment. In the past, multi-blade wind turbines, or other wind turbines referred to as VAWT, type H - a rotor with vertical blades and a vertical axis of rotation, or the Darrieus turbines - were also used. The oldest types are carousel turbines with various swinging slats, effective in one half of the rotor rotation. A lot of ideas for linear drive devices with sheets or blades mounted at the two ends on two cables, chains or ropes arranged in a closed loop have emerged, but all are designed to utilize the

linear movement of the rope in a perpendicular or oblique direction to the horizon, and, between two cables, a rotating sheet or wing causing the movement of the cables is directly placed, and the cables are attached to a frame located on a rotary table that rotates according to the wind direction. There are also patents where the perpendicular sheets move horizontally along a fixed path but are designed in a different manner. This invention of the wind cable car describes and utilizes the linear movement of carriages arranged and connected one after the other predominantly in the horizontal direction by means of movable ropes, and it describes several mechanical methods of obtaining wind energy to drive machines.

In the description of the invention below, the differences in the different structural types of the cable car will be explained; they differ from each other by the spatial arrangement of the guiding way, the manner of attaching the carriage to the rope, and the separately explained structural differences of the used wind carriages,

Summary of the intervention

The invention of the wind cable car is based on the ability of a set of connected carriages of a new structure moving on a horizontal closed cable way in a form of a closed loop to perform a cyclic repetitive forward movement along the determined way by the wind force. The wind cable car consists of carriages, a cable way, pulleys and a supporting structure. The movement of the carriage set is independent of the wind direction. This is due to the automatic turning of the vertical plates of the carriages. The automatic turning of the vertical plates of the carriages is made possible by positioning the vertical axis of plates rotation in a point which is forward of the resultant of the forces acting from the wind to the plate in the direction of the carriage movement. The rotation range of the plates is defined so that the effect of wind force on the plate causes the carriage to move in the required direction. The wind carriages move at the same speed on a line horizontal way. They are driven by the wind force, which is transmitted through the tilting vertical pushed sheets formed by the plates that are part of each carriage. The carriages either move on a fixed way on their own wheels, or are firmly attached to the movable way made of a pair of parallel closed ropes. This movement of the pair of ropes is transmitted by means of rotary pulleys at the end of the way to the torque effect of the generator or the mechanical machine. If the carriages move on their own wheels, the energy from the movement of the carriages is transmitted through the auxiliary tow rope, or each carriage has its own rotary generator, or another electromagnetic induction method is used for energy take-off. To utilize the wind carriages to get energy from the wind, all of the carriages must interact and be connected to each other and arranged one after another in a closed way. The wind leans up to the carriages and if it acts on the carriage in any of the three horizontal directions, except for the front opposite acting of the wind, it causes the carriages together with the ropes to move. It is analogous to the movement of a sailing boat or wind-powered surfing float. The principle for the operation of the present invention is the common feature of the wind carriages that they do not resist the opposite wind or only minimal, they resist the rear wind as much as possible, and towards both directions of the side wind, they automatically rotate turn their effective surface obliquely so that the result of the applied wind force allows the carriages to move forward. The carriages from the opposite action of the wind are pulled by the carriages that are pushed by the wind from the windward side or rear side, because the wind acts on the carriages with a much greater force. The movement of all interconnected carriages, and thus the operation of the entire wind energy recovery system, is made possible and caused by turning the movable parts of the resistance plates of the wind carriages. Each individual carriage moves in the particular phases of its orbital

movement either against the wind, down the wind or obliquely to the wind in a horizontal direction, and the change in the direction of travel of the carriage is caused by the change in the direction of the carriage way. Each individual carriage is able to perform partial work at a certain time due to the wind. If the wind blows from the rear to the way, then all the carriages moving from the rear to the front provide the force for the movement of the rope because the wind rotates the rotary resistance plates so that their resistance sheets will create a resistive force of the air flow and the carriages of the same structure moving from the front to the back against the wind will only have minimal front resistance, because the wind turns the resistance sheets to such a position where all the resistance sheets will be turned parallel to the direction of the moving air. This is achieved by positioning the axis of rotation of the main resistance sheet which is located in front of the main resistance sheet and limiting its vertical rotation at a defined angle. By analogy, this principle can be compared to the movement of a sailing boat to the rear wind and to the movement of a sailing boat to the front wind with sails lowered. If the wind blows from the side to the way, the main resistance sheets of the carriages on both opposing moving ropes move to such a position that they are turned oblique to the wind and each to the opposite side and apply such force to the carriage that it moves forward. In this position of the carriages and the main resistance plates on the wind, all the side-wind carriages move the pairs of ropes. By analogy, this principle can be compared to the movement of a sailing boat with the side wind. The safety of the entire wind power system by wind-driven carriages circulating on the closed ways is ensured by the insertion of overload protection mechanisms which, in extremely strong winds, turn all wind carriages in the direction against the wind where they have minimal resistance. In this description, the structure and shape of the four types of ways distinguished by their arrangement and the way of attaching the carriage to the way and the structure of several types of wind carriages will be explained in detail. The attachment of the carriage to the stationary way so that the wind does not throw it off is made through a set of spatially arranged wheels on the way. The attachment of the carriage to the moving way so that the wind does not throw it off is ensured by a fixed connection to the moving way. In the fixed connection to the movable way, the carriage rotation is resolved by the sliding connection mechanism when the length is changed between the two points of the fixed connection on the straight section and the rotary section on the way at the moment of rotation, and in the wheel connection to the stationary way, the carriage rotation is resolved by the rotary mechanism of the wheel connection when the length is changed between the two points of the connection on the straight section and the rotary section to the way at the moment of rotation. The way of the wind cable car for the carriages is a fixed anchored line part of the structure that is geometrically

continuously enclosed in a loop. It is mounted in the surrounding environment and consists of at least two supporting or orbital line guides. The way can be movable or stationary and is predominantly in the horizontal direction. The moving way can have an arrangement of two ropes either side by side or under one another. The stationary way can also have an arrangement of elements of the line way either side by side or under one another. The connected carriages move on a fixed line way made of ropes, cables, rods or tubes using their own wheels, or on a movable way made of a movable rope where the carriages move together with the rope that rotates round the pulleys at both ends. The movement of the ropes at the same speed is ensured by the cross-linking of both ropes or by other known methods on the chain principle on the moving way. In the ground plan, the way which has the arrangement of the line guides under one another can have a different shape of a closed polygon, and the change in the direction of the carriages movement takes place round the vertical axis. This shape adapts to the nature of the surrounding terrain. The way having a side-by-side arrangement of line guides has a predominant line character with a slight swell of the way in the vertical direction, and the change in the direction of the carriage movement takes place round the horizontal axis. The way made of the line elements can have a relatively large length between the directional turns depending on the strength of the construction materials. On this way length, several interconnected carriages can be fixed in a modular manner, each of which will provide a partial force to move the tow rope due to the wind. The line part of the way always has its supporting structure which is located at the ends of the way and it stabilizes the rotary parts of the way. The advantages of the invention of the wind cable car are the simplicity of the structure, where the individual parts of the carriage structure are not subjected to high force load moments, since the structural parts of the carriage are attached at least in two points, and the centrifugal force does not act on the structural parts of the carriage as in wind installations with the vertical and horizontal axis of rotation. Another advantage is the possible modular arrangement of the entire system and a large number of wind carriages on the ropes. An advantage is also the use of the transfer of force from the wind to the rope, which is made of a high-strength material of high strength and is only subjected to tension. An advantage is the environmentally friendly design that does not burden the environment by killing living creatures, by noise and vibrations from high-speed parts of the equipment. An advantage is the possibility of making a massive structure and the accumulation of the energy obtained from a large number of partial forces of the wind carriages by means of transfer using the orbital ropes to the rotating pulleys and further to one electric energy generator. An advantage is the possibility of placing the invention on existing buildings and existing structures closer to the energy consumer. An advantage is the use of readily available

construction materials. An advantage is in an economically favourable result regarding the size of the investment in the structure and the amount of energy obtained. An advantage is the location of the invention in places with other economical land use, for example above agricultural lands and in places above water bodies. An advantage is the use of a very strong wind and wind blasts as well as a very low air flow. An advantage is the simplicity of the construction without the use of large cranes and construction mechanisms. An advantage is also the easier maintenance compared to the existing propeller turbines and not degrading the landscape architecture while getting energy from the wind. An advantage is that the wind cable car is started automatically without an auxiliary starting device.

Overview of the pictures in the drawings

In the axonometry, in Fig. 1, there is a schematic diagram of the line horizontal way of the wind cable car in the form of a closed loop with orbital ropes located under one another and wind carriages firmly fixed by a sliding mechanism on both ropes.

In the axonometry, in Fig. 2, there is a schematic diagram of the line horizontal way of the wind cable car in the form of a closed loop with orbital ropes located side by side and wind carriages firmly fixed by a sliding mechanism on both ropes in the position with up-wind.

In the axonometry, in Fig. 3, there is a schematic diagram of the line horizontal way of the wind cable car in the form of a closed loop with orbital ropes located side by side and wind carriages firmly fixed by a sliding mechanism on both ropes in the position with side wind.

Fig.4 shows the ground plan of the basic-type carriage moving against the wind firmly fixed by a sliding mechanism on both ropes arranged one another.

Fig. 5 shows the ground plan of the basic-type carriage in the position of the carriage at the side wind.

Fig. 6 shows the axonometry of the basic-type carriage in the position of the carriage with side wind.

Fig. 7 shows the ground plan of the basic-type carriage in the position of the carriage at the side wind from the opposite side as in Fig. 5.

Fig. 8 shows the ground plan of the basic-type carriage in the position of the carriage at the rear and rear side wind.

Fig. 9 shows a cross-sectional view of the A-A structure of the basic-type carriage from Fig. 4.

Fig. 10 shows a cross-sectional view of the B-B structure of the basic-type carriage from Fig. 4.

Fig. 11 shows the ground plan of the carriage type with two rotary plates in the position of the carriage moving against the wind firmly attached on the orbital ropes arranged side by side.

Fig. 12 shows the ground plan of the carriage type with two rotary plates in the position of the carriage side to the wind.

Fig. 13 shows the axonometry of the carriage type with two rotary plates in the position of the carriage at the rear and rear side wind.

Fig. 14 shows the ground plan of the carriage type with two rotary plates in the position of the carriage side to the wind from the opposite side as in Fig. 12.

Fig. 15 shows the ground plan of the carriage type with two rotary plates in the position of the carriage at the rear and rear side wind.

Fig. 16 shows the cross-sectional view of the C-C structure of the carriage type with two rotary plates from Fig. 11.

Fig. 17 shows the cross-sectional view of the D-D structure of the carriage type with two rotary plates from Fig. 11.

Fig. 18 shows the ground plan of the slat carriage structure showing the carriage type with a combination of a V-shaped design with a vertical rotary plate mounted on both orbital ropes arranged one another.

Fig. 19 shows the cross-sectional view of the detail of the horizontal salt which is attached t the frame via a wire strand.

Fig. 20 shows the structural axonometry of the slat carriage structure showing the carriage type with a combination of a V-shaped design with a vertical rotary plate with a sliding mechanism mounted on both orbital ropes arranged one another.

Fig. 21 shows the cross-sectional view of the E-E structure of the carriage type from Fig. 18.

Fig. 22 shows the cross-sectional view of the F-F structure of the carriage type from Fig. 18.

Fig. 23 shows the ground plan of the wind cable car way with the ropes arranged under one another and the carriages of the slat carriage type with a combination of a V-shaped design with a vertical rotary plate exposed to the side wind.

Fig. 24 shows the cross-sectional view of the G-G wind cable car way with the ropes arranged under one another and the carriages of the slat carriage type with a combination of a V-shaped design with a vertical rotary plate and a generator located there.

Fig. 25 shows the ground plan of the carriage type with the tilting horizontal plate round the horizontal axis in the position of the carriage moving against the wind firmly attached on the orbital ropes arranged side by side.

Fig. 26 shows the cross-sectional view of the H-H of the carriage type with the tilting horizontal plate from Fig. 25.

Fig. 27 shows the axonometry of the carriage type with the tilting horizontal plate in the position of the carriage moving against the wind firmly attached on the orbital ropes arranged side by side.

The arc arrows in the figure show the rotation of the plates at the side and rear winds.

Fig. 28 shows the cross-sectional view of I-I of the carriage type with the tilting horizontal plate from Fig. 25.

Fig. 29 shows the side view of the carriage type with the tilting horizontal plate in the tilted position to the rear wind on the way with the ropes arranged side by side.

Fig. 30 shows the ground plan of the wind cable car way with the ropes arranged side by side in the cross-sectional view K-K from Fig. 31 with the carriages with the tilting horizontal plate firmly fixed on the orbital ropes in the position of the carriages moving against the wind.

Fig. 31 shows the cross-sectional view J-J of the wind cable car way with the ropes arranged side by side from Fig. 30 with the carriages with the tilting horizontal plate firmly fixed on the orbital ropes in the position of the carriages moving against the wind.

Fig. 32 shows the ground plan of the carriage type of the tilting box structure in the position of the carriage moving against the wind firmly fixed on the orbital ropes arranged under one another.

Fig. 33 shows the ground plan of the carriage type of the tilting box structure in the position of the carriage with side wind firmly fixed on the orbital ropes arranged under one another.

Fig. 34 shows the axonometry of the carriage type of the tilting box structure in the position of the carriage moving against the wind firmly fixed on the orbital ropes arranged under one another.

Fig. 35 shows the cross-sectional view M-M of the carriage type of the tilting box structure in the position of the carriage moving against the wind from Fig. 32.

Fig. 36 shows the cross-sectional view L-L of the carriage type of the tilting box structure in the position of the carriage moving against the wind from Fig. 32.

Fig. 37 shows the side view of the carriage type of the tilting box structure in the position of the carriage to the rear wind.

Fig. 38 shows the ground plan of the carriage type of simple structure in the position of the carriage moving against the wind firmly fixed on both orbital ropes arranged under one another.

Fig. 39 shows the ground plan of the carriage type of simple structure in the position of the carriage at the side wind.

Fig. 40 shows the axonometry of a carriage of simple structure in an oblique position to the wind and the guiding orbital ropes.

Fig. 41 shows the ground plan of the carriage of simple structure in the position of the carriage at the side wind from the opposite side as in Fig. 39.

Fig. 42 shows the ground plan of the carriage of simple structure in the position of the carriage at the rear wind.

Fig. 43 shows a cross-sectional view of the N-N structure of the carriage of simple structure from Fig. 38.

Fig. 44 shows a cross-sectional view of the O-O structure of the carriage of simple structure from Fig. 38.

Fig. 45 shows the cross-sectional view of the P-P from Fig. 46 which shows the structural connection of the movable connection of the carriages to the cables or ropes of the stationary way.

Fig. 46 shows the cross-sectional view of the R-R of the wheel set from Fig. 45.

Fig. 47 shows the view of a runner set with two wheel axles with the connection to the carriage via a connection rod on a stationary way of the wind cable car with ropes located side by side.

Fig. 48 is a graphical illustration of the effect of a v-size wind on the oblique plate of the carriage at the side wind.

Fig. 49 is a graphical illustration of the effect of a v-size wind on the oblique plate of the carriage at the rear wind.

Fig. 50 is a graphical illustration of the effect of a v-size wind on the oblique plate of the carriage and the plate perpendicular to the way ropes at the rear wind.

Examples of the invention embodiments

The principle of the invention makes it possible to construct wind cable cars of various shapes, sizes and types according to the dimensioning of the individual elements of the structure, the arrangement and location of ropes for the horizontal way, the way of connecting the carriages to the way and the use of different types of carriages.

Example no. 1: The description of the structure of the wind cable car carriages 34 of the basic type with one main rotary plate which is showed in Fig. 1 and Fig. 4 to 10 on the guiding way with orbital ropes in the form of horizontal loops arranged under one another and on the

stationary guiding way made of horizontal loops of immovable cables or ropes arranged under one another.

The wind cable car with the guiding way with orbital ropes arranged under one another consists of four basic structural components, namely: the supporting structure made of masts 31, the horizontally oriented pulleys 30, and the horizontal cable way with orbital ropes 1, and the carriages 34. On at least two masts 31, horizontally mounted pulleys 30 are mounted in a rotary position on which two orbital ropes 1 is put on arranged under one another in the form of a horizontal closed loop. The guide wheels 32 will be used to compensate the deflection from the weight of the orbital ropes 1 and the carriages 34. On the orbital ropes 1 arranged under one another, the carriages 34 are fixed in two points to each orbital cable 1 by a fixed connection 28 via a sliding mechanism 9. The carriage 34 consists of the upper and bottom horizontal structural plates 3 and 4, the vertical shaft 10, the vertical connecting bars 11 of the oblique reinforcement, the main vertical rotary plate 5, the two auxiliary vertical rotary plates 6, the connecting vertical rods 7 of the auxiliary plate, and from oblique reinforcements 8. The basic element of the carriage structure 34 is the stabilization of two fixed horizontal plates 3 and 4 placed above one another, where the shaft 10 of the main vertical rotary plate 5 is fixed. The main rotary plate 5 is fixed to this axis 10 in approximately one third of its length. The structure of the carriage 34 consists of a fixed stationary support part and movable rotary parts that are designed to be rotated by the wind itself. The two fixed horizontal plates arranged above one another 3 and 4 form the carriage bases, which are reinforced in all planes by straight and oblique rod elements 11, so that they form a firm cage that resists all external forces and forms the carriage framework 34. The plates 3, 4 reinforce the structure in a horizontal direction and, at the same time, they provide a horizontal wind screen to the vertical rotary plates 5, 6 while not colliding with the wind when the carriage direction changes. The movable parts of the carriage structure 5, 6 rotate within a defined rotation range round the vertical axis of rotation. The vertical movable parts 5, 6 have an axis of rotation located in front of the centre of gravity of the plate in the direction of carriage movement 34 so that the wind can automatically rotate them from any direction by its action. The rotary plates 5, 6 are sheets with a dual function and are divided according to the efficiency at different wind directions with respect to the carriage 34 and according to the position of the carriage 34 on the main plates 5 and the auxiliary plates 6. The main rotary plate 5 has the function of taking the force from the moving wind from the rear and side directions and passing it via the rod shaft 10 and the side defining elements for the rotation range of the of the main plate 5 to the fixed immovable supporting part of the carriage 34. The auxiliary rotary plate

6 has the function of absorbing the force from the moving wind only from the rear direction, it is connected by a longitudinal joint to the main plate 5 from one side and the other side of the plate 5 at its rotation axis, and it transmits the force via the main plate 5 and connecting rods 7 to a fixed stationary supporting part of the carriage 34. The fixed parts transmit the acting wind force from the movable plates 5 and 6 to the movement of the orbital rope 1 and through the pulleys and the pulley shaft to the generator 51. The sliding mechanism 9 in the fixed connection of the carriage 34 to the movable way through the connection 28 ensures, by its shortening of the connection length, that the rotation of the carriage round the pulleys is smooth and continuous when the length of the two connection points of the carriage on the straight section and the length of the two connection points in the arc while rotating change.

The wind cable car with the stationary guiding way made of horizontal loops of immovable ropes or cables 67 arranged under one another consists of four basic structural parts, namely: the supporting structure made of masts 31, the horizontally oriented pulleys 30 with a rotary rope, the stationary way and the carriages 34. On at least two masts 31, the pulleys 30 are mounted in a rotary position on which two orbital ropes 1 are put on arranged under one another in the form of a horizontal closed loop. The stationary way made of ropes or cables 67 is identical in shape to the orbital ropes 1 in the form of a closed horizontal loop, and all four loops are arranged under one another in the order from the top, where the first loop is the orbital rope 1, the second is the rope or cable way 67, the third is the rope or cable way 67 and the fourth loop is the orbital rope 1 again. The carriages 34 move in a horizontal direction between the two stationary way made of ropes or cables 67. The arrangement of the orbital ropes 1 is symmetrical along the edges of the stationary way made of ropes or cables 67 because of the uniform distribution of the forces applied to the orbital ropes 1 and the carriages 34. The carriages 34 are attached to the rope or cable 67 in a movable manner by means of the runner 36 with a rotary wheel mechanism analogously to Fig. 45 to 47 for the stationary way with ropes or cables 67 arranged side by side. The carriage 34 attaches to the way in four points, thereby stabilizing its vertical and horizontal position. The rotation of the carriage when changing the length between the two connection points on the straight section and the length of the two connection points in the arc to the way at the moment of rotation is solved by the rotary mechanism of the wheel connection 48. The structure, function of the carriage 34 and the transmission of wind energy for this type of invention embodiment are, in the following explanation, identical to the previous part as in the description of the guiding way with orbital ropes 1 arranged under one another. The transmission of the wind energy and the power generation is also offered by the system of the wind cable car with stationary ways but in a different way - by avoiding the use of orbital ropes 1 and pulleys

30, replacing the orbital rope 1 only with the connecting rope between the carriages 34 and the electric energy then will be produced by direct induction or a generator mounted on each carriage 34 that moves along the stationary way. The description of the construction of the carriages 34 in the previous description of the invention is characterized by its simplest basic type. The wind carriages may be constructed from several repetitive rotary parts of the carriage 34, and the design variability is very large. The wind carriages 34 may have multiple main and auxiliary rotary plates 5 or 6 arranged side by side or one after another, thereby reducing the need for large dimensions of the individual rotary parts. In this way, even large-size wind carriages can be constructed with greater wind energy recovery. The function of the carriages consisting of the several repetitive rotary parts of the carriage 34 of the wind cable car is identical to the previous parts of the description.

Example no. 2: The description of the structure of the wind cable car with the basic-type carriages 54 with two main vertical rotary plates, which is showed in Fig. 2 and 3 and Fig. 11 to 17, on the guiding way with orbital ropes in the form of vertical loops arranged side by side and on the stationary guiding way made of vertical loops of immovable cables or ropes arranged side by side, which is showed in Fig. 47.

The wind cable car with the guiding way with orbital ropes 1 arranged side by side consists of four basic structural components, namely: the supporting structure made of masts 31, vertically oriented pulleys 30, and the cable way with orbital ropes 1, and the carriages 54. On at least two masts 31, the pulleys 30 are mounted in a rotary position on which two orbital ropes 1 are put on arranged side by side in the form of a vertical closed loop. The guide wheels 32 will be used to compensate the deflection from the side forces of the wind. On the orbital ropes 1 arranged side by side, the carriages 54 are fixed in two points to each orbital cable 1 by a fixed connection 24 via a sliding mechanism 15. The basic element of the structure is the stabilization of two fixed vertical frames, namely the front frame 16 and the rear frame 19, one behind the other, perpendicular to the direction of the carriage movement 54. These frames are connected in all four corners by a cross connector 2 of these frames and are reinforced in both vertical and horizontal planes to form a firm cage. The bottom and upper horizontal parts of the front frame 16 are connected to the main vertical rotary plates 20 via the shafts 17 at approximately 1/3 of the length of the plate 20, and to the auxiliary vertical side rotary plates 23 are connected to the main rotary plates 20 by a connection joint on both outer sides. In the front, the main rotary plates 20 are connected also to the auxiliary front rotary plates 25 by a connection joint on both

inner sides, and, in the front, the main rotary plates 20 are connected upwards and downwards with two front connection slats 18. The main rotary plates 20 have stoppers 22 attached to the plates to define the rotation range of the main plates. The function and position of all plates in different wind directions is explained in Fig. 11 to 17. If the wind blows from the front of the way, all the main plates 20 and the auxiliary plates 25 and 23 are parallel to the orbital ropes 1 of the way and create only minimal wind resistance. If the wind blows from the side to the way, the main resistance sheets of the carriages on both opposing moving orbital ropes 1 move to such a position that they are turned oblique to the wind and each to the opposite side and apply such force to the carriage that it moves forward, while the auxiliary plates 25 and 23 are put parallel to the main plates 20. If the wind blows from the rear of the way, the main resistance plates 20 of the carriages 54 are turned obliquely to the way direction, and the auxiliary plates 25 and 23 are turned perpendicular to the way direction and they create maximum wind resistance thereby moving the carriage 54 forward. The wind cable car with the stationary guiding way made of vertical loops of immovable ropes or cables 67 arranged side by side consists of four basic structural parts, namely: the supporting structure made of masts 31, the vertically oriented pulleys 30 with a rotary rope, the stationary way and the carriages 54. On at least two masts 31, the pulleys 30 are mounted in a rotary position on which two orbital ropes 1 are put on arranged side by side in the form of a vertical closed loop. The stationary way made of ropes or cables 67 is identical in shape to the orbital ropes 1 in the form of a closed vertical loop, and all four loops are arranged side by side in the order from the either side, where the first loop is the orbital rope 1, the second is the rope or cable way 67, the third is the rope or cable way 67 and the fourth loop is the orbital rope 1 again. The carriages 54 move in a horizontal direction between the two stationary way made of ropes or cables 67. The arrangement of the orbital ropes 1 is symmetrical along the edges of the stationary way made of ropes or cables 67 because of the uniform distribution of the forces applied to the orbital ropes 1 and the carriages 54. The carriages 54 are attached to the rope or cable 67 in a movable manner by means of the runner 36 with a rotary wheel mechanism as showed in Fig. 45 to 47. The carriage 54 attaches to the way in four points, thereby stabilizing its vertical and horizontal position. The rotation of the carriage 54 when changing the length between the two connection points on the straight section and the length of the two connection points in the arc to the way at the moment of rotation is solved by the rotary mechanism of the wheel connection 48. The structure, function of the carriage 54 and the transmission of wind energy for this type of invention embodiment are, in the following explanation, identical to the previous part as in the description of the guiding way with orbital ropes 1 arranged side by side. The transmission of the wind energy and the power generation is

also offered by the system of the wind cable car with stationary ways but in a different way - by avoiding the use of orbital ropes 1 and pulleys 30, replacing the orbital rope 1 only with the connecting rope between the carriages 54 and the electric energy then will be produced by direct induction or a generator mounted on each carriage 54 that moves along the stationary way. The description of the construction of the carriages in the previous description of the invention is characterized by its simplest basic type. The wind carriages may be constructed from several repetitive rotary parts of the carriage 54, and the design variability is very large. The wind carriages 54 may have multiple main and auxiliary rotary plates 20 or 23, thereby reducing the need for large dimensions of the individual rotary parts. In this way, even large-size wind carriages can be constructed with greater wind energy recovery. The function of the carriages consisting of the several repetitive rotary parts of the carriage 54 of the wind cable car is identical to the previous parts of the description.

Example no. 3: The description of the structure of the wind cable car with slat carriages 50 with a combination of a V-shaped design and the type with a vertical rotary plate which is showed in Fig. 18 to 24 on the guiding way with orbital ropes in the form of horizontal loops arranged under one another and on the stationary guiding way made of horizontal loops of immovable cables or ropes arranged under one another.

The wind cable car of this type differs from the previous types of wind cable cars with the movable horizontal way with orbital rope 1 arranged under one another from Example No. 1 only by the type of the connected carriage 50, and thus only this change will be described in the following explanation. Each carriage 50 is firmly fixed to the orbital ropes 1 arranged under one another in two points to each orbital rope 1 by a sliding mechanism 9 and fixed connection 28. The sliding mechanism 9 is mounted on the upper and bottom horizontal plates 39 and 40, between which the vertical slat walls 38 and 41 are formed of horizontal tilting slats 80 mounted on the supporting structure 43 and the side structural frames 46. These slat walls have a V-shaped ground plan with a sharp V-angle facing backwards. The slat walls 38 are mounted at both ends of the V shape perpendicular to the way. In the front of the carriage, the vertical rotary plate 37 is mounted on the horizontal plates 39 and 40. The supporting structure of the slat frames 43 and the structural frame of the side slat sheet 46 are reinforced by the oblique reinforcement 44, 45 and 47 of these slat frames. In this method, the resistance sheets are made of the slat walls 38 and 41 formed from the slats 80, where the slats 80 are able to pass the wind from the front direction and prevent air flow from the rear side. The slats 80 are constructed in a

horizontal direction and open upwards. The V-shaped walls cause the carriage 50 to move forwards in both side wind directions to the carriage way 50. The improved design variant of the wind carriages 50 is a combination of the structural elements of the V-shape slat systems with the main vertical rotary plate 37 where plate moves the entire carriage forward at the side wind. If the wind blows from the rear of the way, all the slats are closed and the wind force is transmitted to move the runner 1 through all the fixed structural elements of the carriage 50. The wind cable car with the connected carriage 50 on the stationary guiding way made of loops of immovable ropes or cables 67 arranged under one another differs from the previous examples of the invention embodiments on this way only by the type of the connected carriage 50. The carriages 50 are attached to the rope or cable 67 in a movable manner by means of the runner 36 with a rotary wheel mechanism analogously those showed in Fig. 45 to 47. The carriage 50 attaches to the way in four points, thereby stabilizing its vertical and horizontal position. The rotation of the carriage when changing the length between the two connection points on the straight section and the length of the two connection points in the arc to the way at the moment of rotation is solved by the rotary mechanism of the wheel connection 48. The structure, function of the carriage 50 and the transmission of wind energy for this type of invention embodiment are, in the following explanation, identical to the previous part as in the description of the wind cable car with slat carriages with a combination of a V-shaped design and the type with a vertical rotary plate which 50 of the guiding way with orbital ropes 1 arranged under one another.

Example no. 4: The description of the structure of the wind cable car with the carriage 69 with the tilting horizontal plate round the horizontal axis, which is showed in Fig. 25 to 31 on the guiding way with orbital ropes in the form of vertical loops arranged side by side with a fixed connection of the carriage to the orbital rope.

The wind cable car of this type consists of four basic structural components, namely: the supporting structure made of masts 70, vertically oriented pulleys 30, and the cable way with orbital ropes 1, and the carriages 69. On at least two masts 70, the pulleys 30 are mounted in a rotary position on which two orbital ropes 1 are put on arranged side by side in the form of a vertical closed loop. On the orbital ropes 1, the carriages 69 are fixed at one point to each orbital rope 1 via the shaft 59 which is mounted in a horizontal direction perpendicular to the direction of the carriage way 69 at approximately 1/3 of the length of the supporting rotary plate 58. The supporting rotary plate 58 has a cut-out 60 in the shape of two concentric arches to restrict the movement of the vertical rotary plate 57. In the supporting rotary plate 58, the bearing 62 is

mounted in the front part of the plate 58 through which a vertical rotary plate 57 with a rectangular cut-out in the middle of the plate is attached perpendicularly, where both plates fit one into another in the perpendicular position. The supporting rotary plate 58 is attached to two stoppers 56 and the wire strand 61 fixed by the other end to the connecting rod of the reinforcement 33, which, together with the stoppers 56, define the range of the rotational movement of the carriage 69. The function and position of all plates in different wind directions is explained in Fig. 25 to 29. The basic feature of the structure is the movable connection of two rotary plates 57 and 58 perpendicular to each other, provided with cut-outs, so that they fit together and the main vertical rotary plate 57 can turn sideways on the supporting plate 58. This is made possible by the bearings 62 built into both plates. The rotary position of the supporting plate 58 is defined in the upper position by the wire strand 61 and in the bottom position by the stopper 56. The rotary position of the main vertical plate 57 is defined by the cut-out in the supporting plate 58. The main vertical plate 58 has a cut-out in the middle of the plate. At the rear wind, the carriage 69 functions by tilting the supporting plate 58 due the wind to the vertical position together with the main plate 57, and the wind pushes the carriage forward. At the side wind, the main vertical plate 57 is turned into an oblique position on the wind and pushes the carriage forward. At the front wind, both plates 57 and 58 are directed longitudinally in the direction of the wind, creating with only minimal frontal resistance. The carriage 69 connects to the way with the line elements arranged side by side in two points, thereby stabilizing its horizontal position. The vertical position is stabilized by the stoppers 56 supported by the orbital ropes 1 of the moving way and by the wire strand 61 defining the movement of the supporting plate 58.

Example no. 5: The description of the structure of the wind cable car with the tilting carriage type 12 of the box structure, which is showed in Fig. 32 to 37 on the guiding way with orbital ropes in the form of horizontal loops arranged under one another with a fixed connection of the carriage to the orbital rope.

The wind cable car of this type consists of four basic structural components, namely: the supporting structure made of masts 31, horizontally oriented pulleys 30, and the cable way with orbital ropes 1, and the carriages 12. On at least two masts 31, the pulleys 30 are mounted in a rotary position on which two orbital ropes 1 are put on arranged under one another in the form of a horizontal closed loop. On the ropes 1, the carriages 12 are attached in one point to each orbital rope 1 by a fixed, but in a horizontal plane by a rotary, connection 79. The box structure of the

carriage 12 is connected to the orbital ropes 1 via a vertical frame 73 mounted in the perpendicular direction to the movement of the orbital ropes 1. The connection 79 is formed on both orbital ropes 1 above one another in one axis of rotation. The tilting box structure, which has the form of an H in the cross-sectional view, is attached to the frame 73 via the horizontal shaft 77 in the middle of the vertical part of the frame 73. The central plate 71 is firmly connected to the vertical walls 78 between two vertical walls 78 of the box structure. The horizontal shaft 77 round which the entire box is rotated in the vertical direction is firmly attached to the middle plate 71, with the ends of the vertical walls 78 attached to the bottom and top flange 72, which increases the rigidity of the structure. The sheets of this flange 72 are parallel to the middle plate 71, while the flange 72 rotates round the box structure and joins the vertical walls 78 at the top and bottom parts. Two pairs of stoppers 76 and 74 are attached to the box at the side which defines the permissible rotation movement of the entire box in the vertical direction. The cable 75 defining the movement range in a horizontal plane is attached on the frame 73 in all four corners; the other end is connected to the orbital ropes 1. The box construction has no rotary sheets. At the rear wind, the carriage 12 operates by tilting the box to the vertical position due the wind, the middle plate 71 ensure the necessary wind resistance and the wind pushes the carriage 12 forward. At the side wind, the entire box is rotated horizontally at an angle to the wind by rotating the entire frame 73 at the point of attachment of the frame 73 to the orbital rope 1, and the two vertical walls 78 ensure the wind resistance and push the carriage 12 forward. The rotation is corrected by the wire strands 75 in the upper and bottom parts of the frame 73, which connect the frame 73 and the orbital ropes 1. At the front wind, the vertical plates 78 and the middle plate 71 are automatically directed longitudinally in the direction of the wind, creating with only minimal frontal resistance. This is ensured by moving the horizontal axis 77 to the front part of the carriage 12. The uniform rotation in the vertical direction is ensured by the increased weight of the front part of the carriage 12.

Example no. 6: The description of the structure of the wind cable car with the carriage 13 of the simple structure, which is showed in Fig. 38 to 44 on the guiding way with orbital ropes in the form of horizontal loops arranged under one another with a fixed connection of the carriage to the orbital rope.

The wind cable car of this type consists of four basic structural components, namely: the supporting structure made of masts 31, horizontally oriented pulleys 30, and the cable way with orbital ropes 1, and the carriages 13. On at least two masts 31, the pulleys 30 are mounted in a

rotary position on which two orbital ropes 1 are put on arranged under one another in the form of a horizontal closed loop. On the ropes 1, the carriages 13 are attached in one point to each orbital rope 1 by a fixed connection of the shaft 10 of the main plate rotation and the orbital rope 1. The main vertical rotary plate 84 rotates round the shaft 10 which is firmly connected to the upper and bottom horizontal structural plates 83 and 85, and the definition of the rotation range of the carriage 13 in the horizontal direction is ensured by ropes 75 connected between the carriage 13 and both orbital ropes 1. Two auxiliary vertical rotary plates 6 are connected to the vertical plate 84 by a joint connection in the shaft 10, and the definition of the rotation range of the plates 6 is given by the connection rods of the auxiliary plate 7 located on both ends of the carriage 13 between the upper and bottom structural plates 83 and 85. This carriage type 13 is similar to the basic type of the carriage 34 with one main rotary plate, but it has a simplified structure with the main rotary plate 84 firmly attached to the upper and bottom structural plates 83 and 85. When the carriage 13 is rotated at the rear and side winds, the upper and bottom plates 83 and 85 also rotate. The second simplification is that the rotary connection to each orbital rope 1 is in only one point, at the axis of rotation, while the rotation range of the carriage 13 is ensured by the wire strands 75 between the wind carriage 13 and the orbital ropes 1. By the firm connection of the perpendicular plates, a firm structure is created without the need for additional reinforcement elements. At the rear wind, the main rotary plate 84 and the auxiliary plate 6 transmit the wind force to the orbital rope 1 the shaft 10 and the wire strand 75. At the side wind, the wind force is transmitted to the orbital rope 1 by the main rotary plate 84.

Referential marks:

- 1 - circular rope of the horizontal route
- 2 - cross connection of the frames
- 3 - upper horizontal structural plate
- 4 - bottom horizontal structural plate
- 5 - main vertical rotary plate
- 6 - auxiliary vertical rotary plate
- 7 - connecting rod of the auxiliary plate
- 8 - oblique reinforcement
- 9 - sliding mechanism
- 10 - shaft of rotation for the main vertical plate
- 11 - connection rod of the oblique reinforcement
- 12 - wind carriage of a box structure type
- 13 - wind carriage of a simple structure type
- 14 - side oblique reinforcement
- 15 - connecting horizontal slat of the vertical supporting structure with a sliding mechanism
- 16 - front supporting vertical frame
- 17 - shaft of rotation for the main vertical plate
- 18 - front connecting horizontal slat of the main plates
- 19 - back supporting vertical frame
- 20 - main vertical rotary plate of the carriage with several vertical rotary plates
- 21 - horizontal oblique reinforcement
- 22 - stopper limiting the movement of the main vertical plate
- 23 - side auxiliary vertical rotary plate
- 24 - connection of the carriage to the way
- 25 - front auxiliary vertical rotary plate
- 26 - wire strand limiting the movement of the front vertical sheet
- 27 - wheel of the sliding runner structure
- 28 - fixed connection of the sliding mechanism with the rope
- 29 - plate rotated in a perpendicular position to the movement direction
- 30 - pulley of the movable rope
- 31 - mast of the wind cable car
- 32 - guide wheel of the horizontal movable rope to the pulley

- 33 - reinforcement of the uniform movement of a pair of ropes
- 34 - basic-type wind carriage with one main rotary plate
- 35 - plate rotated in an inclined position to the movement direction
- 36 - runner consisting of a wheel set with a frame
- 37 - vertical rotary plate of a V-type carriage with a main rotary plate
- 38 - side transverse slat wall
- 39 - upper horizontal structural plate of a V-type carriage with a main rotary plate
- 40 - bottom horizontal structural plate of a V-type carriage with a main rotary plate
- 41 - back oblique slat wall
- 42 - horizontal axes of the slat rotation
- 43 - supporting structure of the slat sheets
- 44 - oblique reinforcement of the slat sheets
- 45 - transverse reinforcement of the carriage structure
- 46 - structural frame of the side slat wall
- 47 - oblique reinforcement of the side slat wall
- 48 - rotary connection between the runner frame and the connecting slat
- 49 - shaft of the vertical rotary sheet
- 50 - V-type wind carriage with a rotary main plate
- 51 - electric energy generator
- 52 - vertical mast or existing building
- 53 - horizontal supporting mast structure
- 54 - basic-type wind carriage with two and more main vertical rotary plates
- 55 - rotation axis of the pulleys
- 56 - stopper of the rotary movement of the carriage supporting plate
- 57 - vertical rotary plate
- 58 - supporting rotary plate
- 59 - shaft of rotation for the supporting plate
- 60 - cut-out in the supporting plate allowing the rotation of the vertical plate within a limited range
- 61 - wire strand defining the movement range of the supporting plate to a vertical position
- 62 - bearing in which the axis of the vertical plate rotates round the supporting plate
- 63 - shaft of the vertical rotary plate of the carriage with a tilting horizontal plate round the horizontal axis
- 64 - profile of the supporting plate in a tilted position at the rear wind

- 65 - profile of the vertical rotary plate in a tilted position at the rear and side winds
- 66 - wheel shaft
- 67 - rope or cable of a stationary way
- 68 - horizontal axis of the movable way pulleys
- 69 - wind carriage with a tilting horizontal plate round the horizontal axis
- 70 - clamping structure of the wind cable car pulleys
- 71 - central plate of the box structure
- 72 - structure flange
- 73 - frame
- 74 - stopper of the carriage tilting into the vertical position
- 75 - wire strand defining the movement range in the horizontal plane
- 76 - stopper of the carriage tilting into the horizontal position
- 77 - horizontal shaft round which the carriage tilts in the vertical direction
- 78 - vertical wall connected to the central plate and upper and bottom structure flange
- 79 - rotary connection of the frame to the ropes
- 80 - slat
- 81 - connecting horizontal slat of the vertical supporting structure
- 82 - frame of the sliding runner structure
- 83 - upper horizontal structural rotary plate of the simple-structure carriage
- 84 - vertical structural rotary plate of the simple-structure carriage
- 85 - bottom horizontal structural rotary plate of the simple-structure carriage
- v - wind direction and speed
- p - direction and speed of the headwind caused by the movement of the carriage, where $p=1/3v$
- w - actual wind speed and direction acting on the plate
- a - width of the oblique plate exposed to the side wind
- b - width of the oblique plate exposed to the side rear wind
- c - width of the vertical plate exposed to the rear wind
- d - width of the oblique plate exposed to the rear wind
- e - width of the vertical plate exposed to the rear wind returned from the oblique sheet
- w1 - returned wind direction and speed
- O - direction and magnitude of the wind force from the actual acting wind
- Ok - component of the force O acting perpendicular to the plate
- Or - component of the force O acting parallel to the plate
- F - component of the force Ok acting in the direction of the carriage movement

F_d - component of the force O_k acting perpendicular to the direction of the carriage movement

F_1 - component of the force O_k acting in the direction of the carriage movement to the oblique plate

F_2 - force acting to the vertical plate

F_3 - component of the force O_1 acting in the direction of the carriage movement from the returned wind

O_1 - direction and magnitude of the force acting on the vertical plate from the returned wind

O_{1r} - component of the force O_1 acting perpendicular in the direction of the carriage movement from the returned wind

F_c - sum of forces $F_1+F_2+F_3$

Industrial application

The invention of the wind cable car can be used to convert the kinetic energy of the wind into mechanical energy, for example, as a driving force for wind power plants, pumps, etc. The industrial application consists mainly in building the energy industry from renewable energy sources. The advantage of increasing the output of the wind power plant is the possibility to build wind cable cars from a large number of wind carriages. The variability of the elements is very high. For example, a wind cable car with a movable way with ropes arranged under one another and basic-type wind carriages with vertical rotary plates, where the ropes rotate on pulleys in the four corners of the rectangle, can also be installed on a tall city building with a flat roof. One of the rotating shafts of the pulleys is connected to an electric energy generator that will supply the building with electric energy. The present invention is also of great use in supplying cheap electric energy to an increasing number of electric charging stations for electric mobility.

PATENT CLAIMS

1. The wind cable way is made of at least two masts (31) and a horizontal way consisting of horizontally laid pulleys (30) and two horizontal orbital ropes (1) arranged below each other in the form of a closed horizontal loop with firmly fixed carriages (34) of the basic type on both orbital ropes (1), or the horizontal way is made of stationary horizontal ropes or cables (67) arranged below each other in the form of a closed horizontal loop with movably mounted carriages (34) of the basic type on the cables (67), or the horizontal way is made of vertically mounted pulleys (30) and two horizontal orbital ropes (1) arranged side by side in the form of a vertical closed loop with carriages of the basic type (54) firmly attached to both ropes (1) with two main vertical rotary plates,, or the horizontal way is made of stationary horizontal ropes or cables (67) arranged side by side in the form of a closed horizontal loop with movably mounted carriages (54) of the basic type with two main vertical rotary plates on the cables (67), but each carriage (34) of the basic type is firmly connected to the orbital ropes (1) arranged under one another at two points on each rope (1) via the sliding mechanism (9) and the upper horizontal structural plate (3) of the carriage and the bottom horizontal structural plate (4) of the carriage are connected by a shaft (10) and connecting rods (11) of the oblique reinforcement, where the vertical rotary plate (5) is mounted on the shaft (10) at approximately 1/3 of its length from the front end, and two auxiliary vertical rotary plates (6) are connected to the vertical plate (5) at the shaft point (10) via the longitudinal joint, where the definition of the rotation of the plates (5) and (6) is determined by the connecting rods (7) of the auxiliary plate and the oblique reinforcement (8), or that each carriage (34) of the basic type is connected movably to the stationary ropes or cables (67) arranged under one another by a runner (36) with a rotary wheel mechanism and, at the same time, it is fixed at one point to the orbital ropes (1) which are connected via the rotary pulleys and the shaft with an electric energy generator, or the generator is attached directly to each carriage (34) of the basic type, or that each carriage (54) of the basic type with two main vertical rotary plates is firmly connected to the orbital ropes (1) arranged side by side at two points on each rope (1) via a slat and a sliding mechanism (15), and a front supporting vertical frame (16) and a rear supporting vertical frame (19) are attached to the sliding mechanism (15), and these frames are connected in all four corners by a cross connector (2) of these frames and are reinforced in the vertical and horizontal planes to form a firm cage, and two shafts (17) are attached to the bottom and upper horizontal parts of the front frame (16) with the main vertical rotary

tables (20) approximately in 1/3 of the length of the table (20), and the side auxiliary vertical rotary plates (23) are connected by a longitudinal joint to the main rotary tables (20) on both outer sides, and also the auxiliary front rotary plates (25) are to the main rotary tables (20) in the front by the longitudinal joint on both inner sides, and the main rotary tables (20) are connected upwards and downwards by two the front connecting slats (18), and the main rotary tables (20) have stoppers (22) attached to the plates to define the rotation range of the main plates, or that each carriage (54) of the basic type with two main vertical rotary plates is connected movably to the stationary ropes or cables (67) arranged side by side by a connecting horizontal slat (81) of the vertical supporting structure and by a runner (36) with a rotary wheel mechanism and, at the same time, is firmly fixed in one point to the orbital ropes (1) which are connected via rotary pulleys, and the shaft with the electric energy generator, or the generator is attached directly to each carriage (54) of the basic type with two main vertical rotary plates.

2. The wind cable car according to claim 1 is defined by the fact that on the orbital ropes (1) arranged under one another in the form of a closed horizontal loop the carriages (50) of the V-type structure with the main vertical rotary plate are firmly attached in two points to each rope (1) via a sliding mechanism (9) attached on the upper and bottom horizontal plates (39) and (40), and the vertical slat walls (38) and (41) are attached between them, made of horizontal tilting slats (80), where these slat walls have a V-shaped ground plan with extended sheets at both ends of the V shape, and vertical rotary plate (37) and the supporting structure of the slat frames (43) are attached on the front of the carriage (50) on the horizontal plates (39) and (40), and structural frame (46) of the side slat sheet is reinforced by oblique reinforcement (44) (45) (47) of the slat frames, or that each carriage (50) of the V-shape structure with the main vertical rotary plate is movably connected to the stationary ropes or cables (67) arranged under one another by a runner (36) with a rotary wheel mechanism and, at the same time, is firmly attached in one point to the orbital ropes (1) which are connected via the rotary pulleys and the shaft with the electric energy generator, or the generator is directly attached to each carriage (50) of the V-shape structure with the main vertical rotary plate.
3. The wind cable car according to claim 1 is defined by the fact that on the orbital ropes (1) arranged side by side in the form of a closed vertical loop the carriages (69) with the tilting horizontal plate round the horizontal axis are attached in one point to each rope (1) via the

shaft (59) which is mounted in the horizontal direction on the supporting rotary plate (58) perpendicular to the direction of the carriages (69) with a tilting horizontal plate approximately in 1/3 of the length of the supporting rotary plate (58), and there is a cut-out (60) in the form of two concentric arches to restrict the movement of the vertical rotary plate (57), and the bearing (62) is mounted in the supporting rotary plate (58) through which the vertical rotary plate (57) with a rectangular cut-out in the middle of the plate is attached perpendicularly, where both plates fit one into another in the perpendicular position, and two stoppers (56) are attached on the supporting rotary plate (58) and the wire strand (61) is attached between the supporting plate (58) and the ropes (1) to define the movement of the carriage (69) with a tilting horizontal plate round the horizontal axis together with the stoppers (56).

4. The wind cable car according to claim 1 is defined by the fact that on the orbital ropes (1) arranged under one another in the form of a closed horizontal loop the carriages (12) of the box structure are firmly but in a rotary position attached above one another in one point on one rope (1) via the connection (79) to the frame (73) which is perpendicular to the direction of the carriage movement (12) of the box structure, and the tilting box structure is attached to the frame (73) via the horizontal axis (77) in the middle of the vertical part of the frame (73), which is of H shape, and the central plate (71) is mounted between the two vertical walls (78) in a firm connection with the vertical walls (78), and the horizontal axis (77) of the rotation of the entire box is firmly connected to the central plate (71), where the upper and bottom flange parallel to the central plate (71) is attached to the ends of the vertical walls (78), which connects the vertical walls (78) in the upper and bottom parts, and two pairs of stoppers (76) and (74) are attached to the side of the box to define the movement of the entire box in the vertical plane, and a wire strand (75) is attached to all four corners to define the movement in the horizontal plane, whose other end is connected to the orbital ropes (1).
5. The wind cable car according to claim 1 is defined by the fact that on the orbital ropes (1) arranged under one another in the form of a closed horizontal loop the carriages (13) of the simple type are firmly but in a rotary position attached above one another in one point to one rope (1) whose main vertical rotary plate (84) is firmly connected with the upper horizontal structural plate (83) and the bottom horizontal structural plate (85), where the definition of the rotation range of the carriage (13) of the simple structure in the horizontal

direction is ensured by two wire strands (75), and two auxiliary vertical rotary plates (6) are attached to the vertical plate (84) by a longitudinal joint in the shaft point (10), where the definition of the plate rotation (6) is defined by the connecting rods (7) of the auxiliary plate located on both ends of the carriage (13) of the simple structure.

6. The wind cable car according to claim 1 is defined by the fact that on each carriage (34) of the basic type and on each carriage (54) of the basic type several rotary plates (5) are mounted of the firm structure of the wind carriage (34) of the basic type, with two main vertical rotary plates,, and several rotary plates (20) are mounted on the firm structure of the wind carriage (54) of the basic type with two main vertical rotary plates , and the sum of the sheet sizes of the individual plates replaces the sheet of one large plate.

FIG. 1 (for annotation)

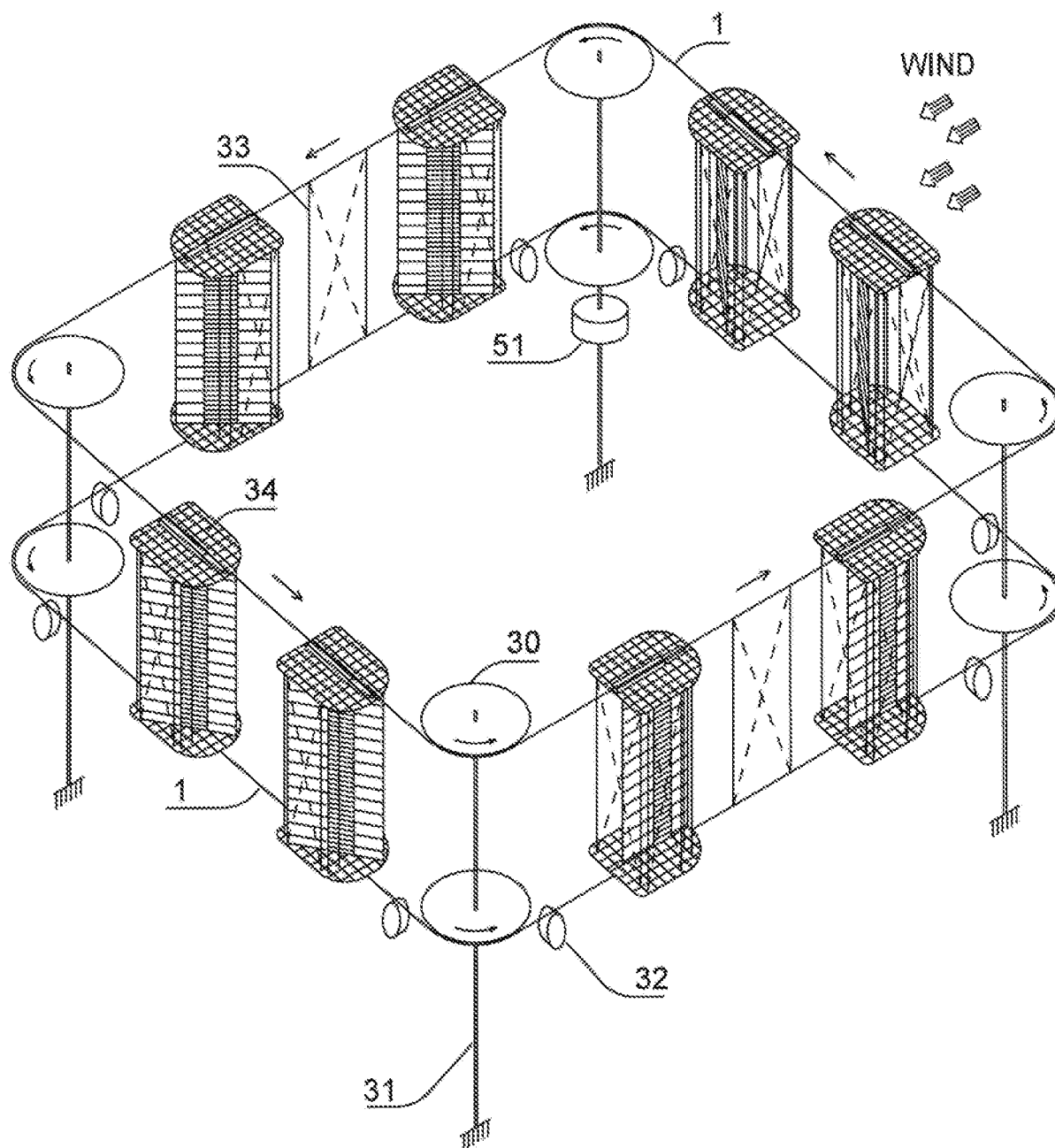


FIG. 2

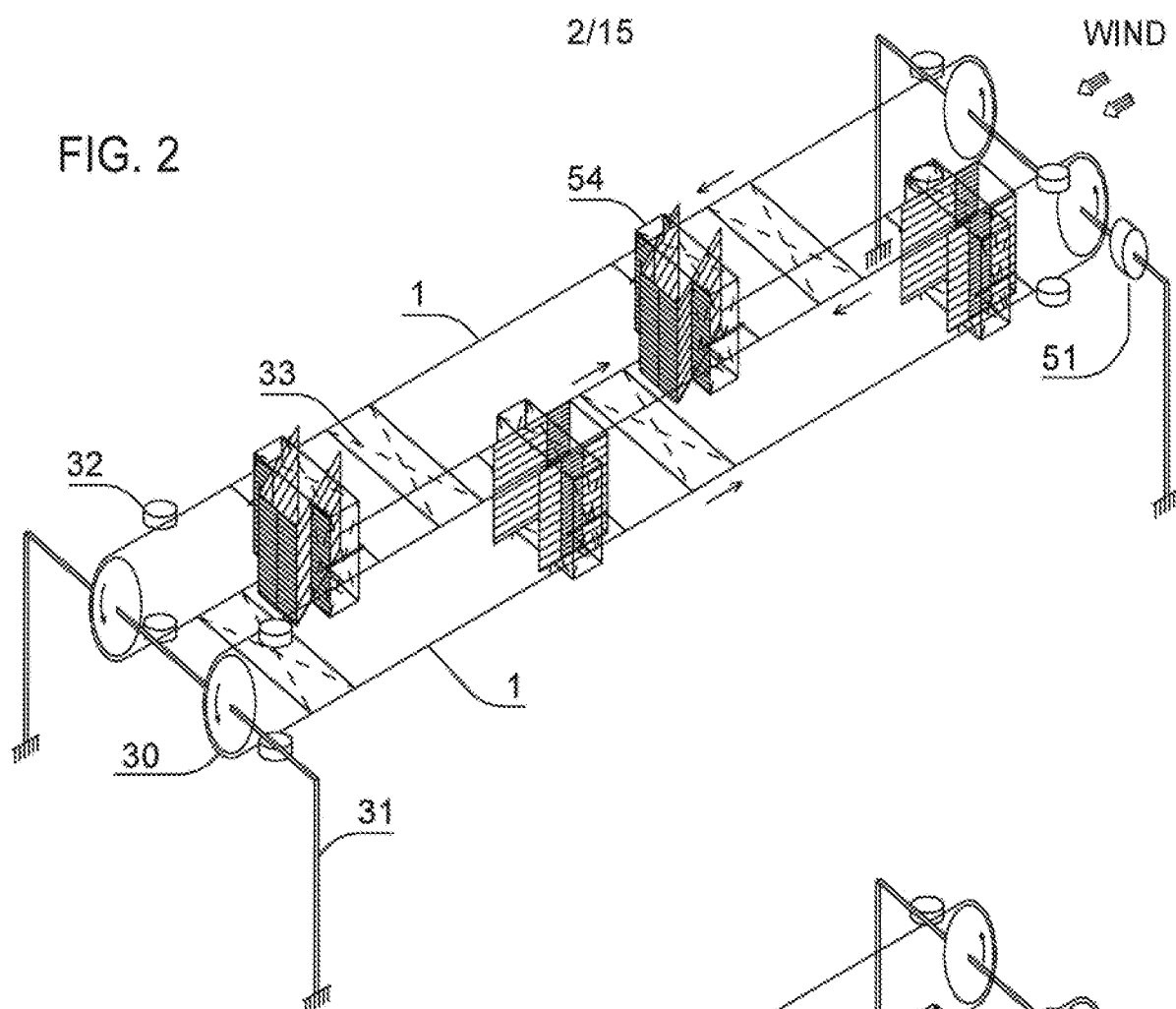
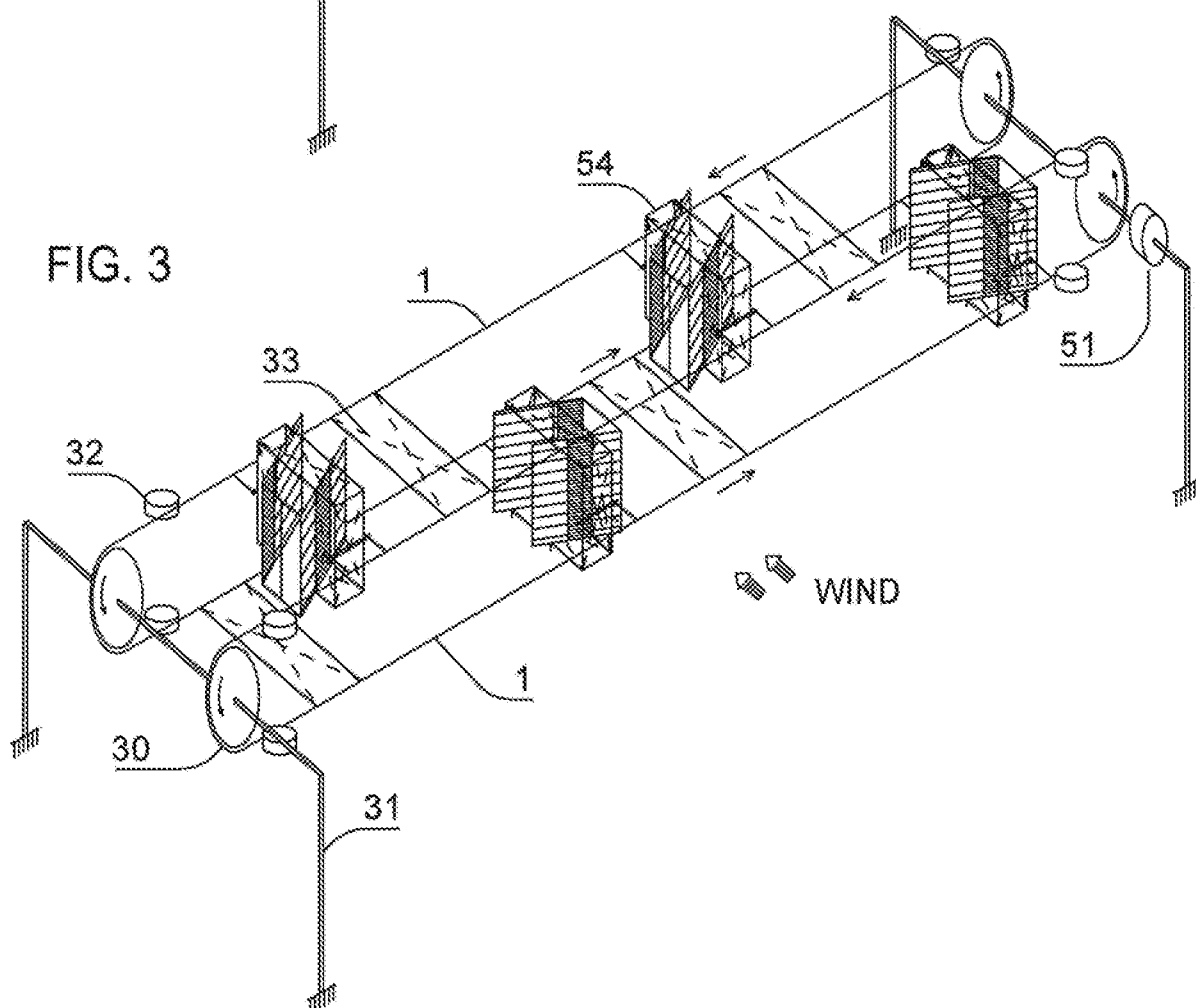


FIG. 3



3/15

FIG. 4 ground plan

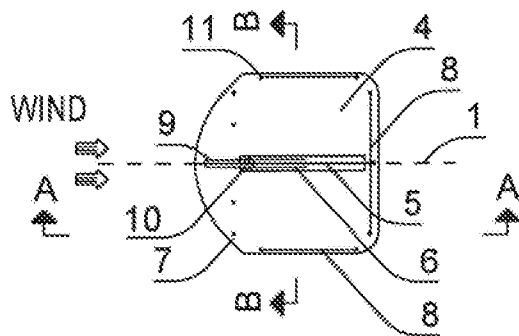


FIG. 5 ground plan

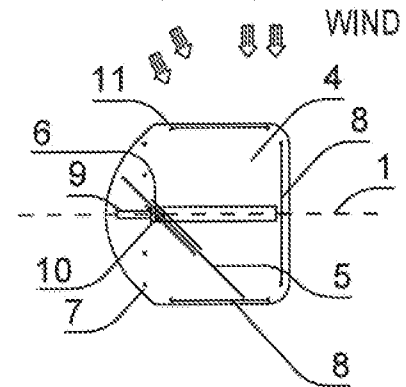


FIG. 6

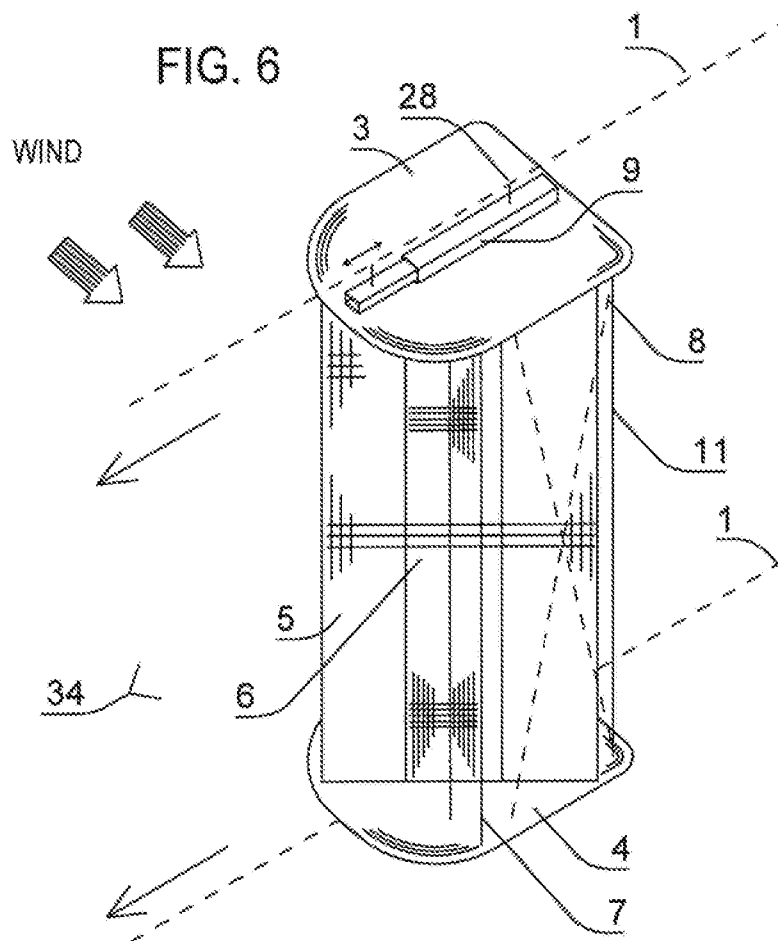


FIG. 7 ground plan

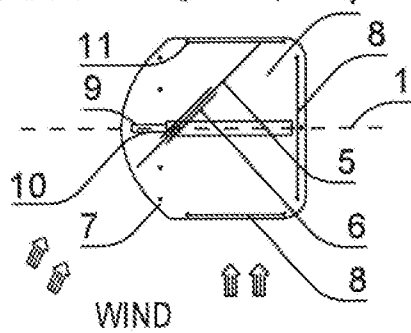
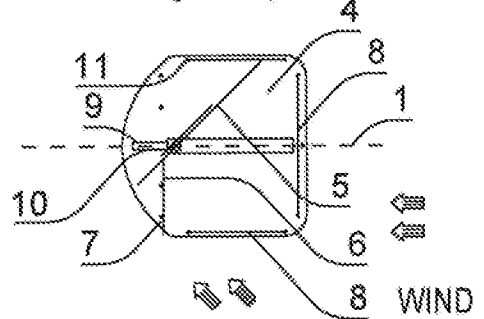


FIG. 8 ground plan



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FIG. 9

cross-sectional A-A

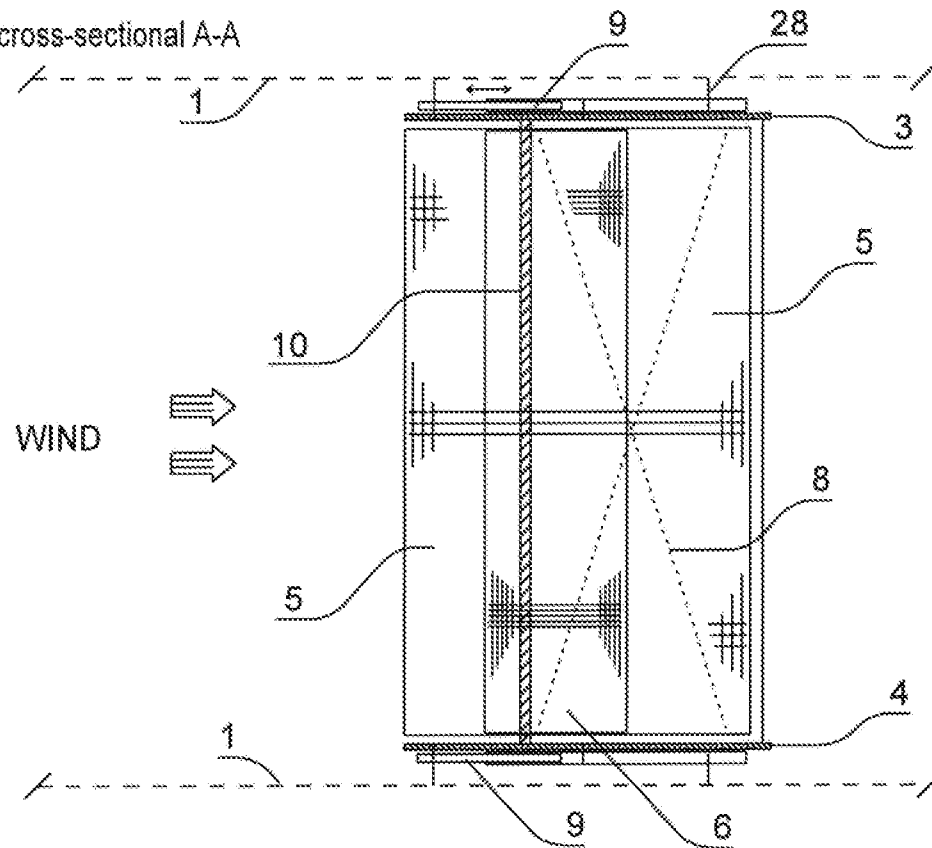
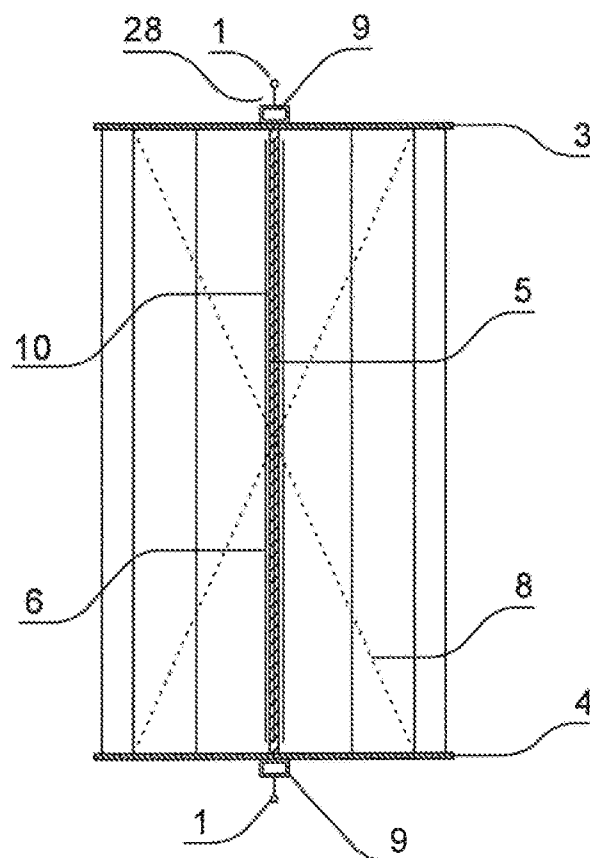


FIG. 10

cross-sectional B-B



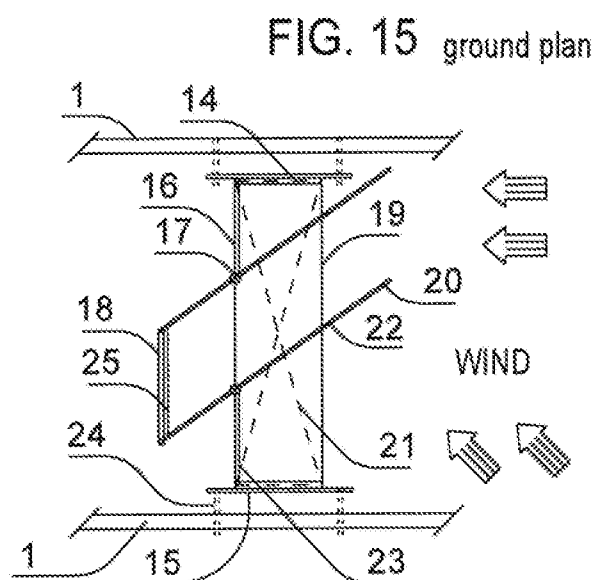
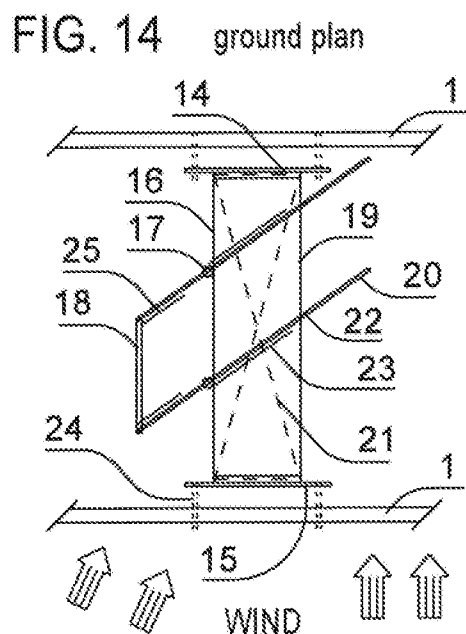
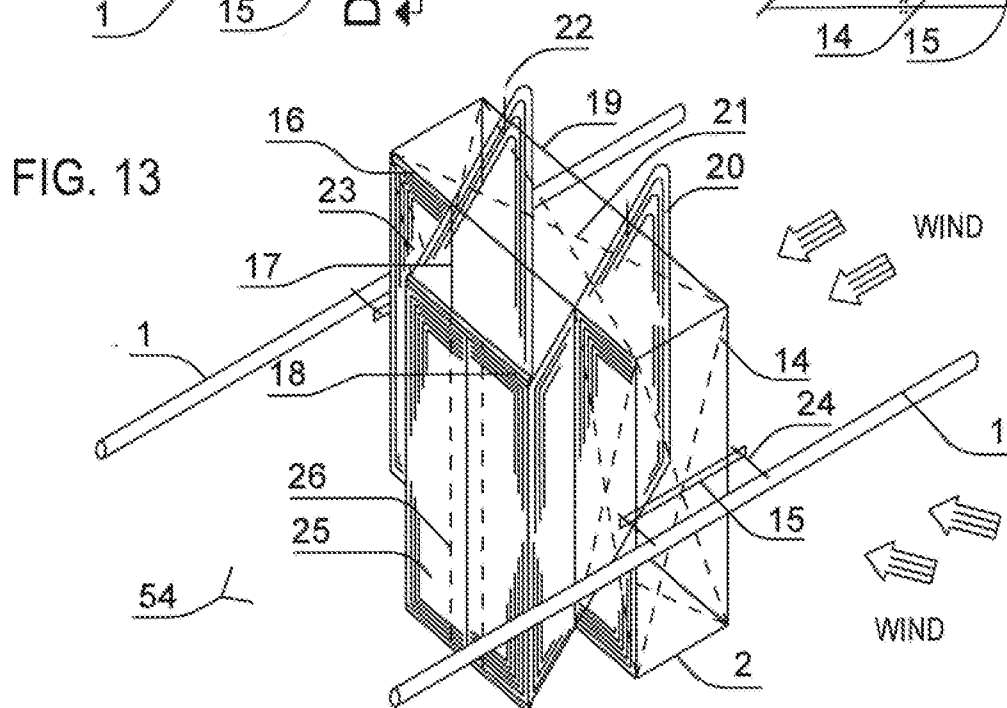
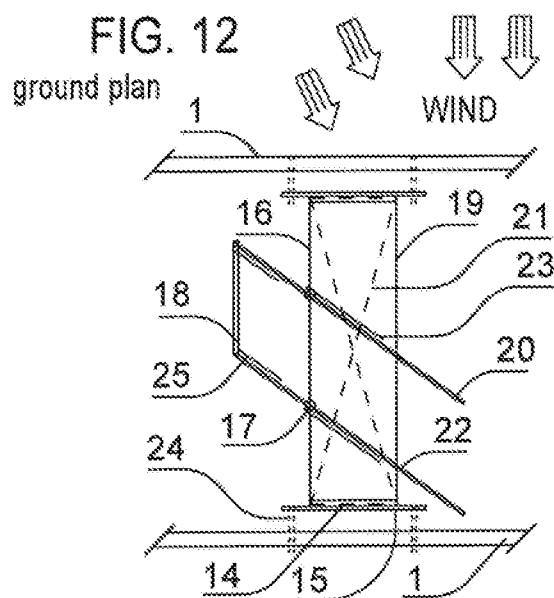
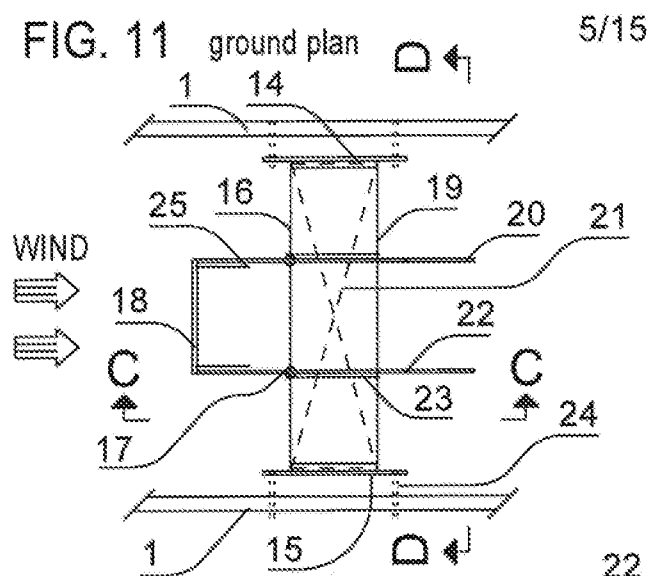


FIG. 16

cross-sectional C-C

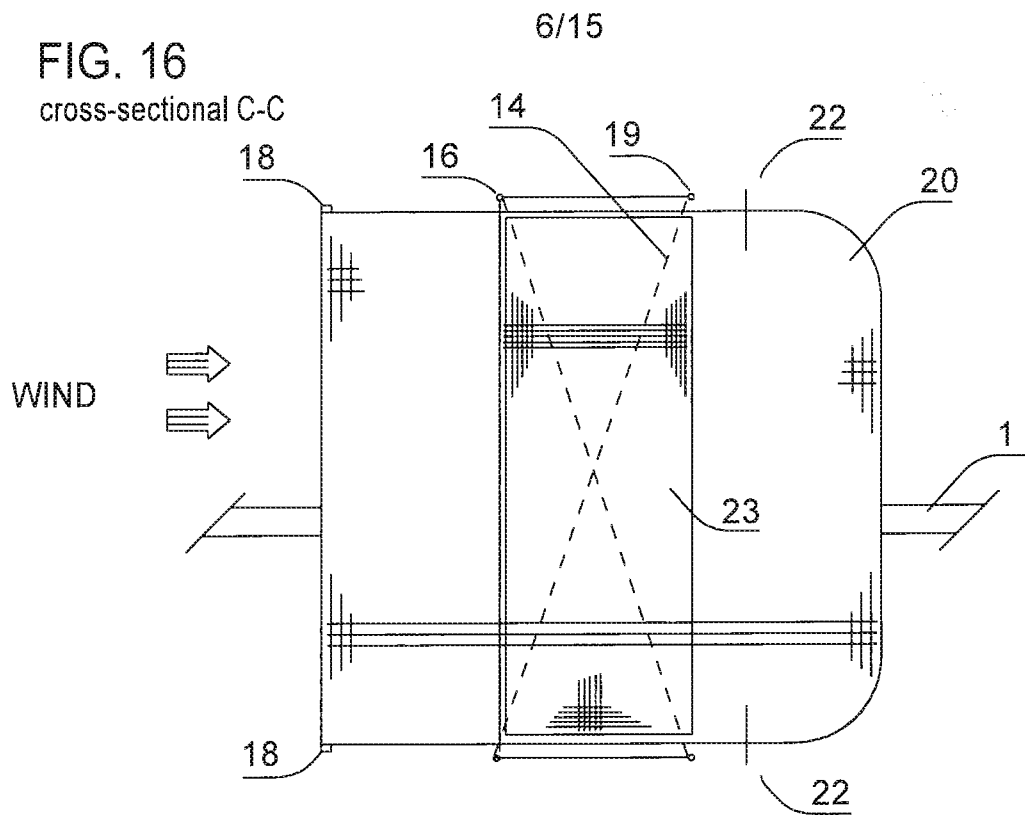


FIG. 17

cross-sectional D-D

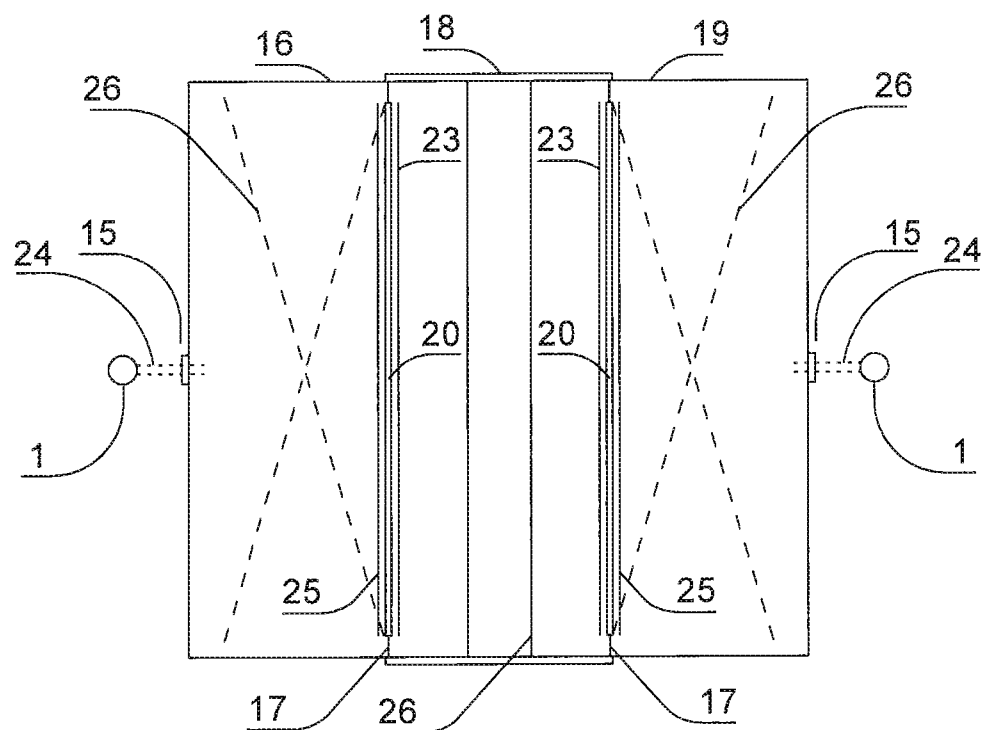


FIG. 18 ground plan

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FIG. 19 detail

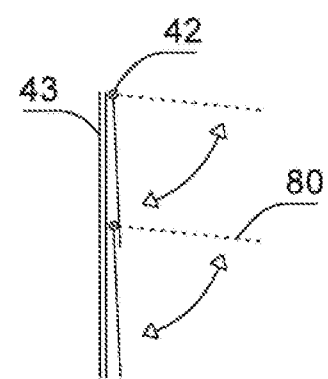
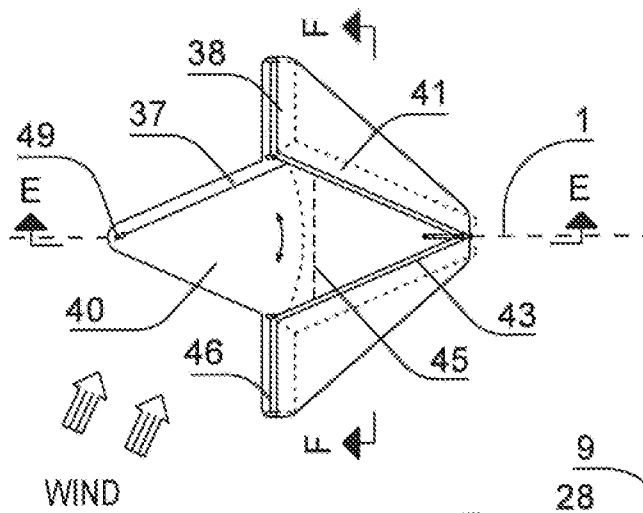


FIG. 20

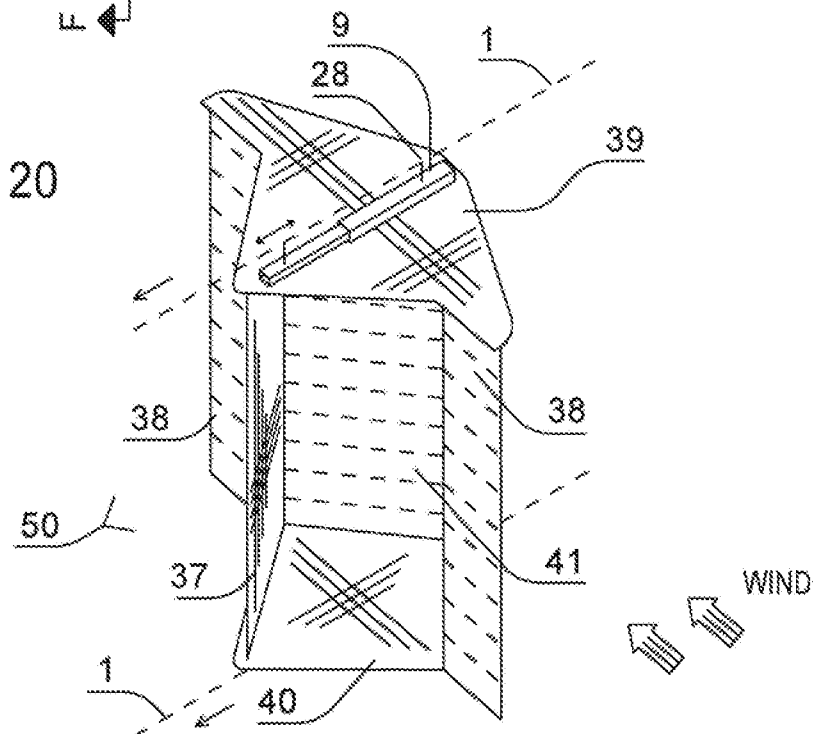


FIG. 21 cross-sectional E-E

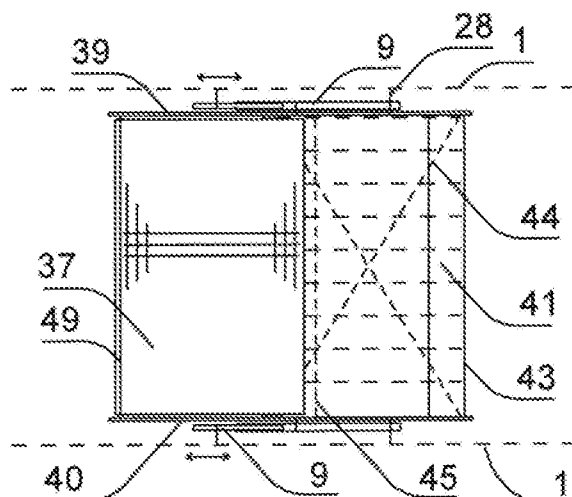
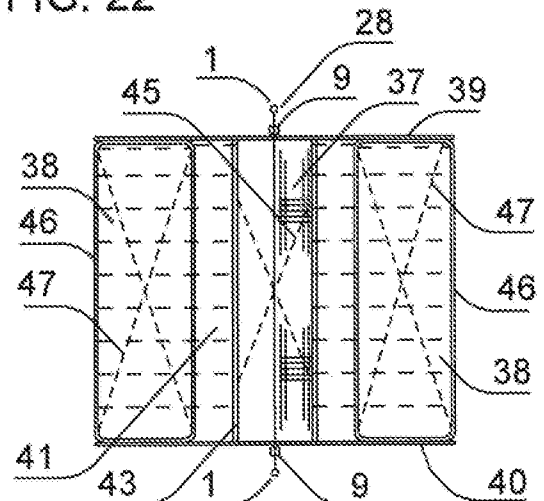


FIG. 22 cross-sectional F-F



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FIG. 23

ground plan

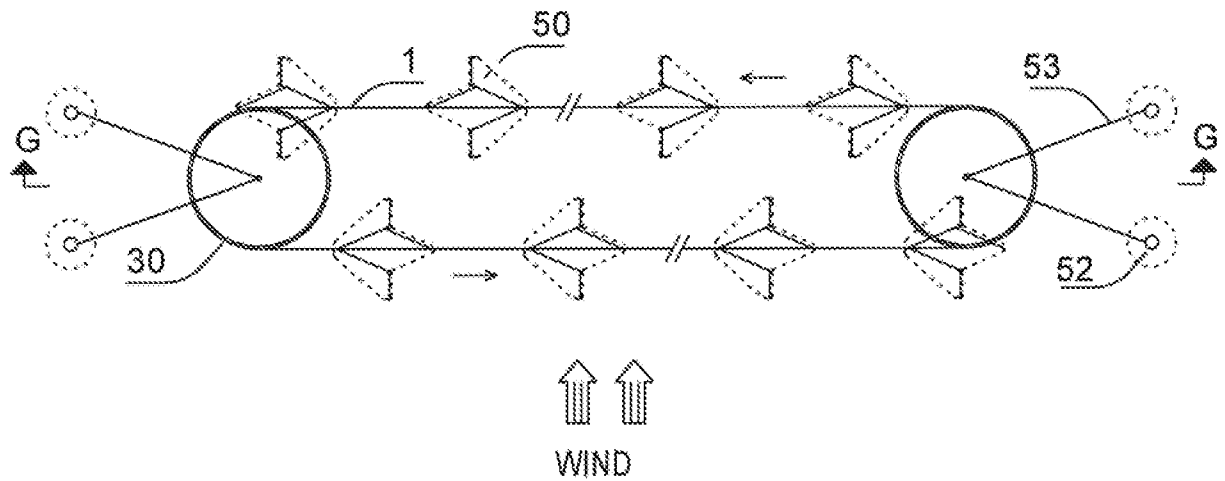
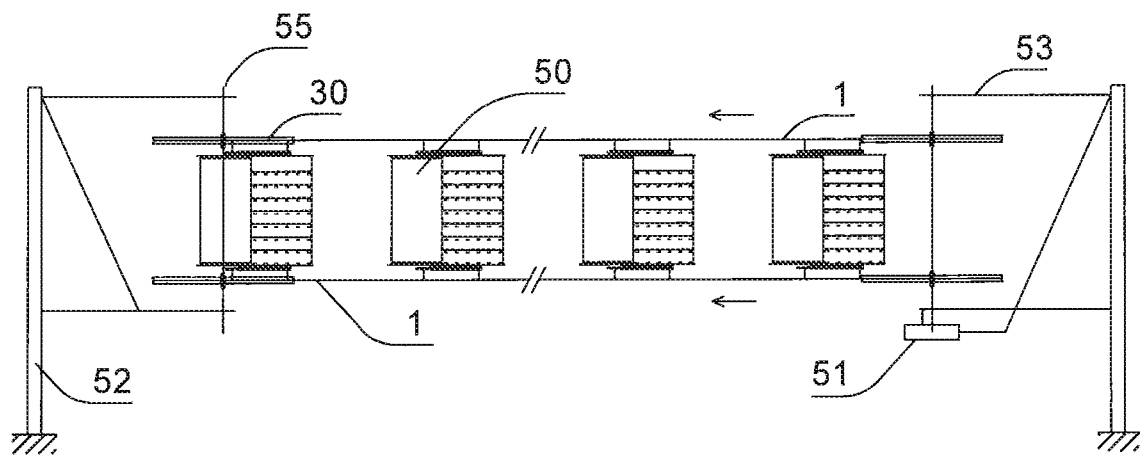


FIG. 24

cross-sectional G-G



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FIG. 25 ground plan

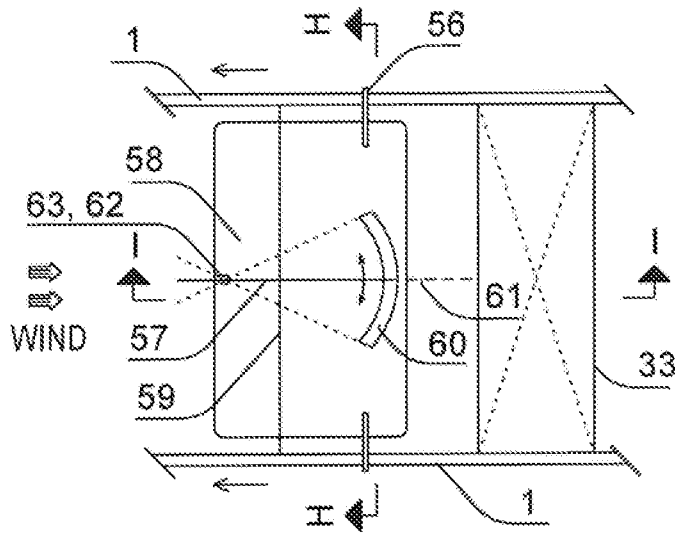


FIG. 26 cross-sectional H-H

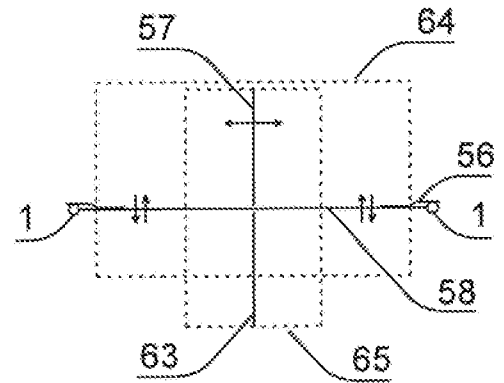


FIG. 27

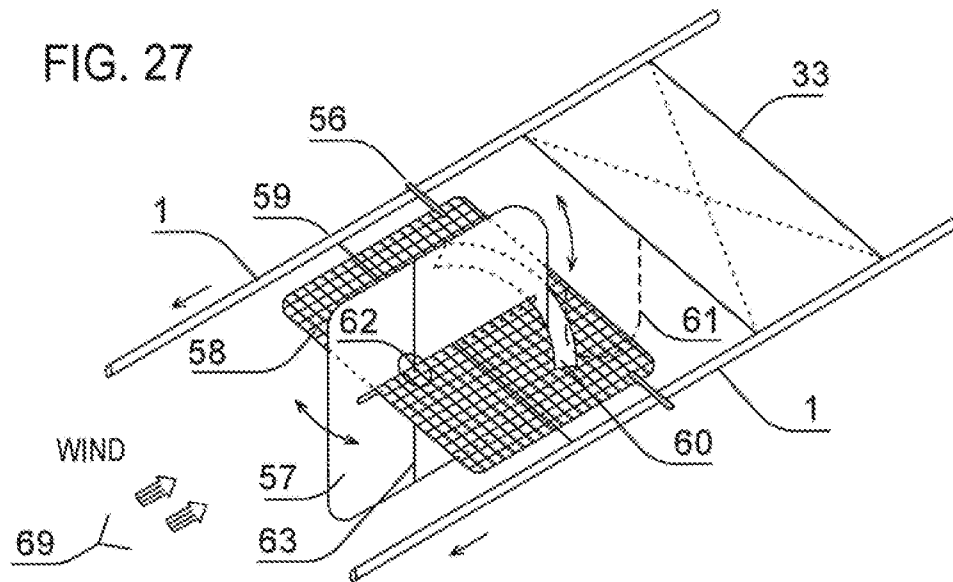


FIG. 28 cross-sectional I-I

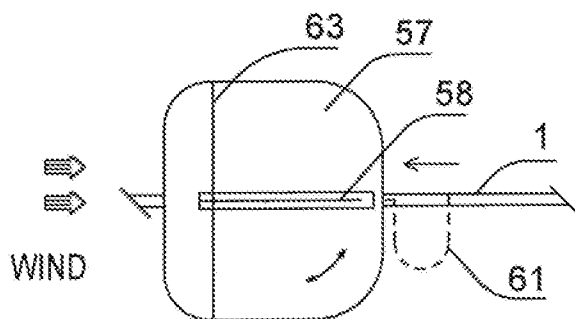


FIG. 29

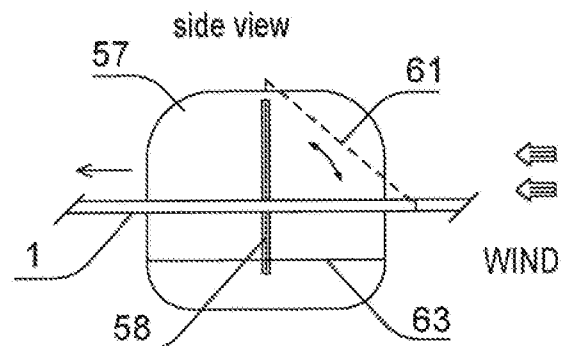


FIG. 30 cross-sectional K-K
ground plan

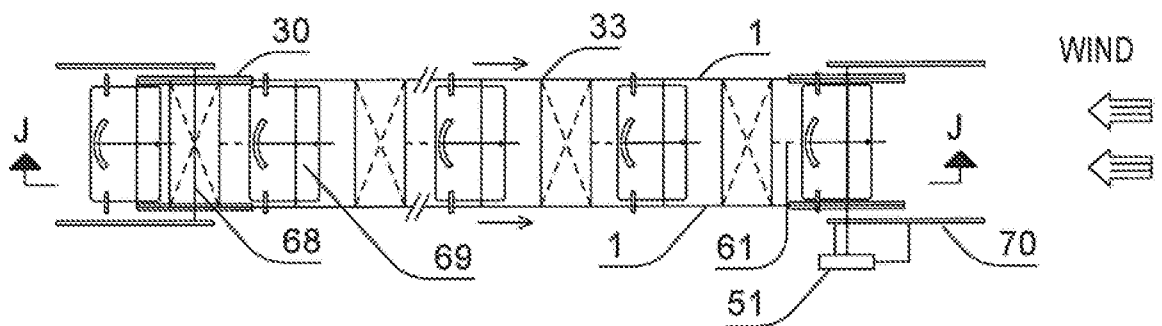
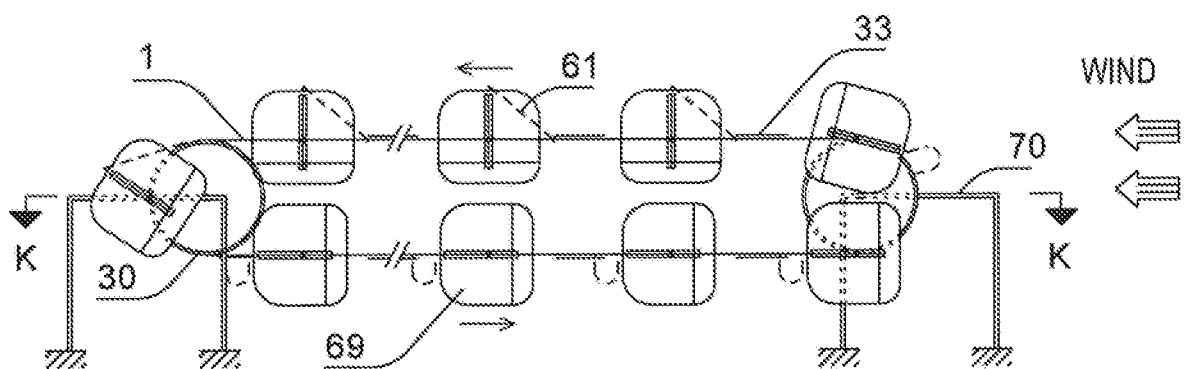


FIG. 31 cross-sectional J-J



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FIG. 33 ground plan

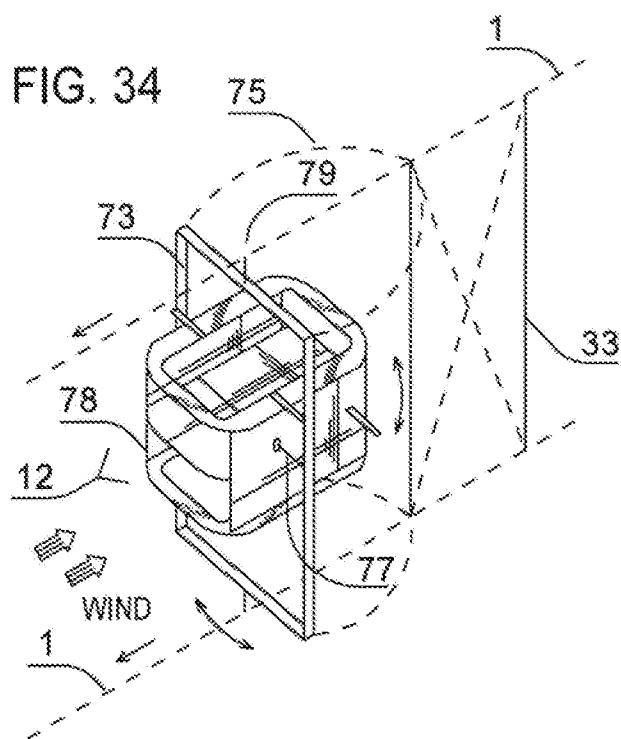


FIG. 34

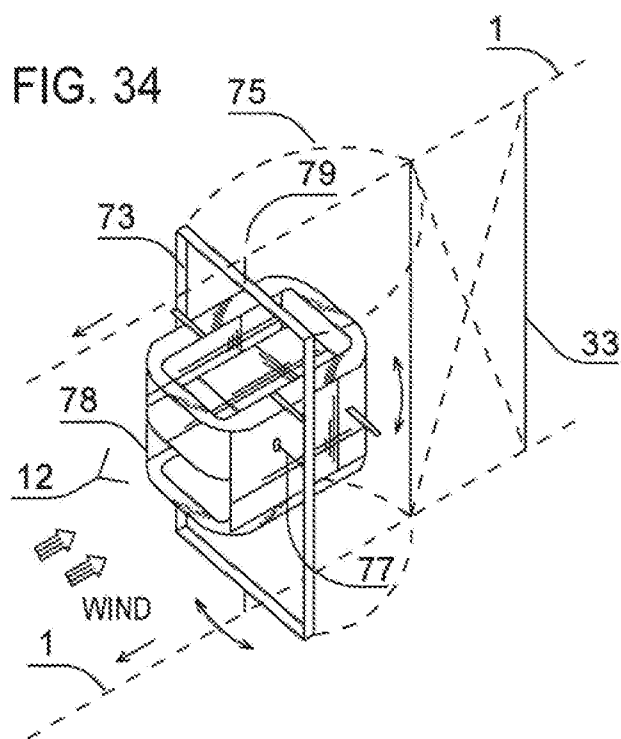


FIG. 35 cross-sectional M-M

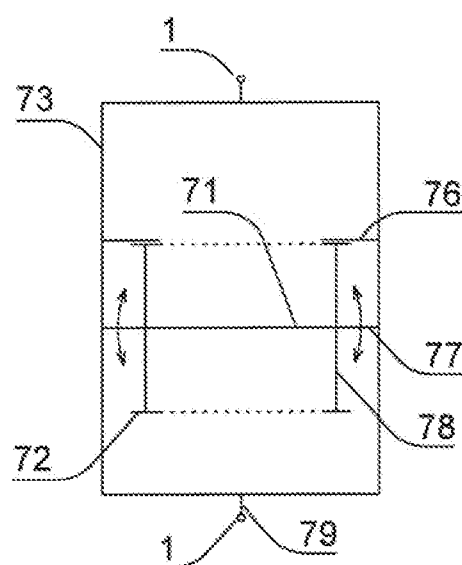


FIG. 36 cross-sectional L-L

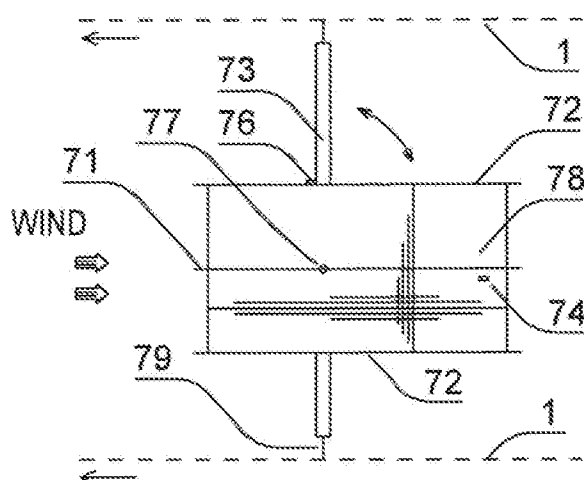
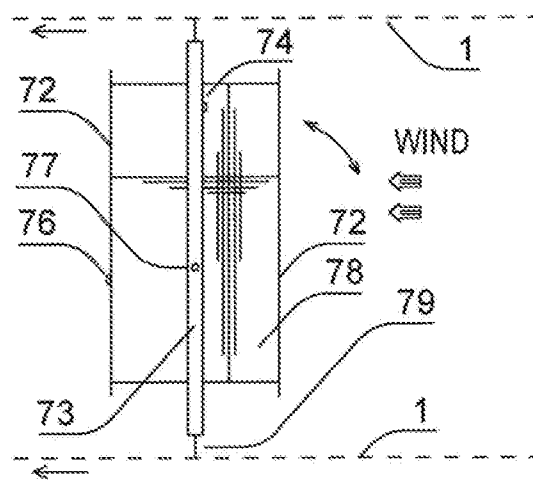


FIG. 37 side view



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FIG. 38 ground plan

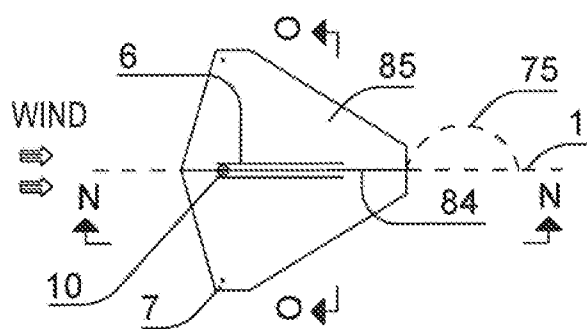


FIG. 39 ground plan

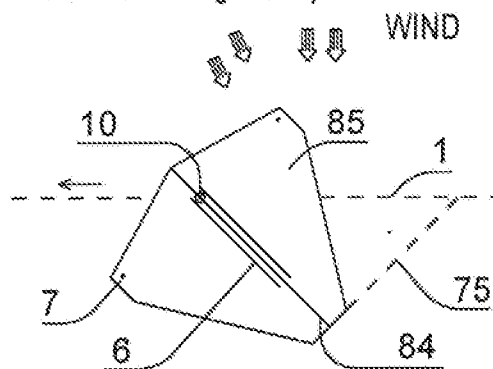


FIG. 40

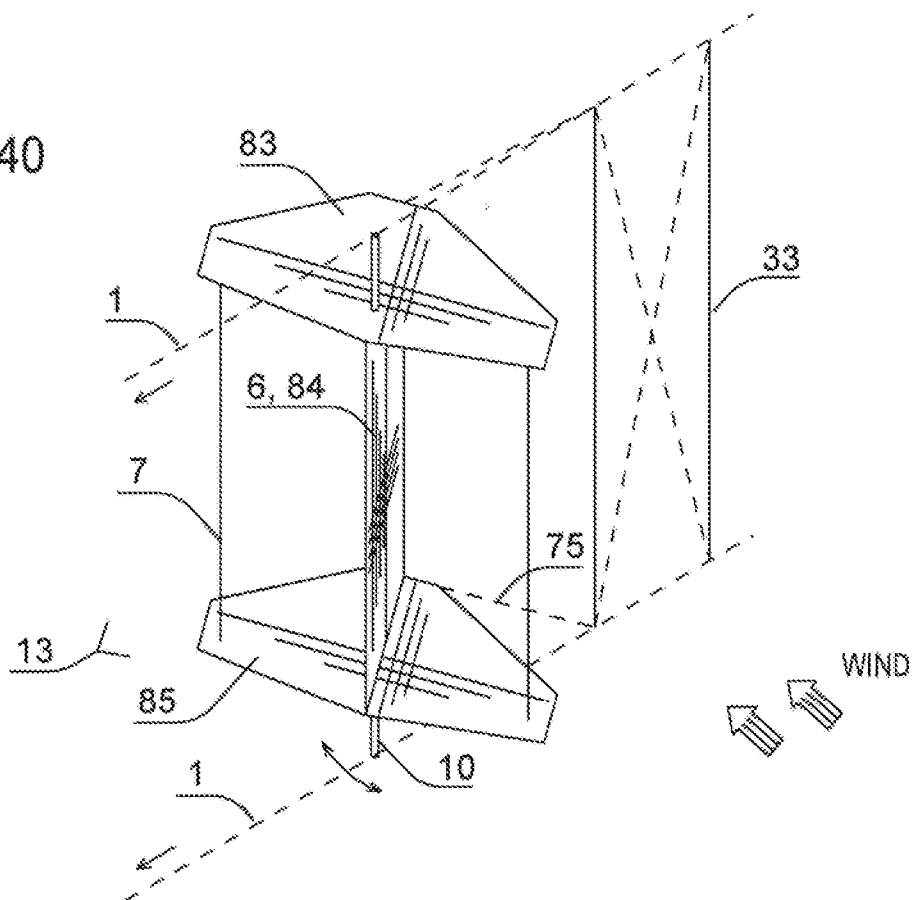


FIG. 41 ground plan

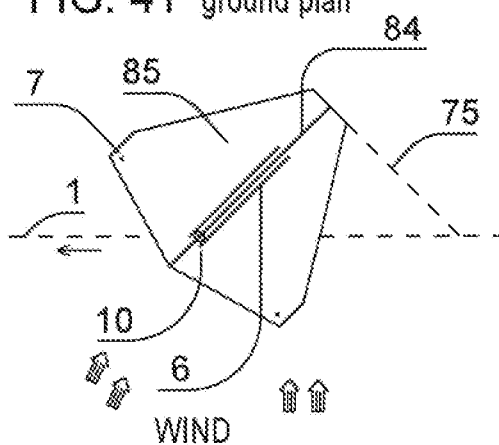


FIG. 42 ground plan

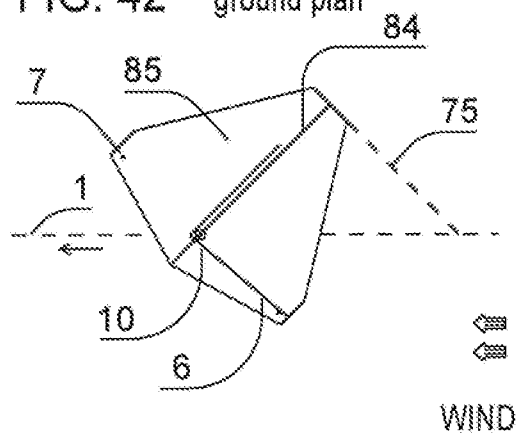


FIG. 43

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cross-sectional N-N

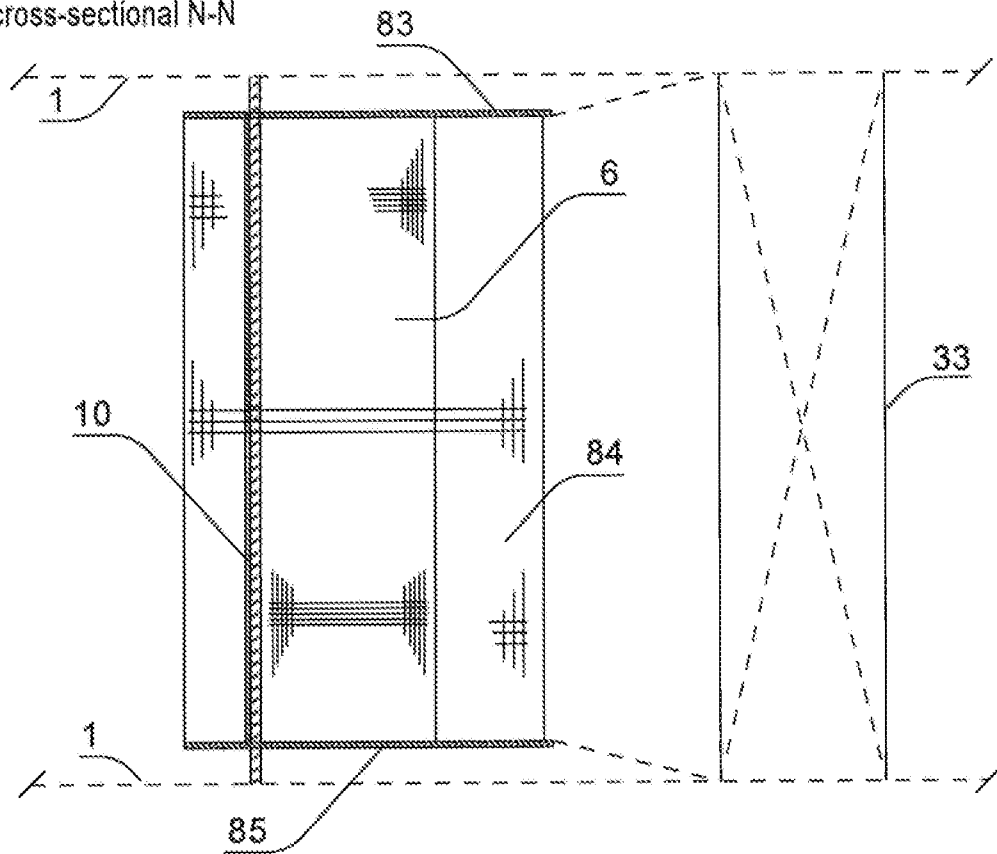
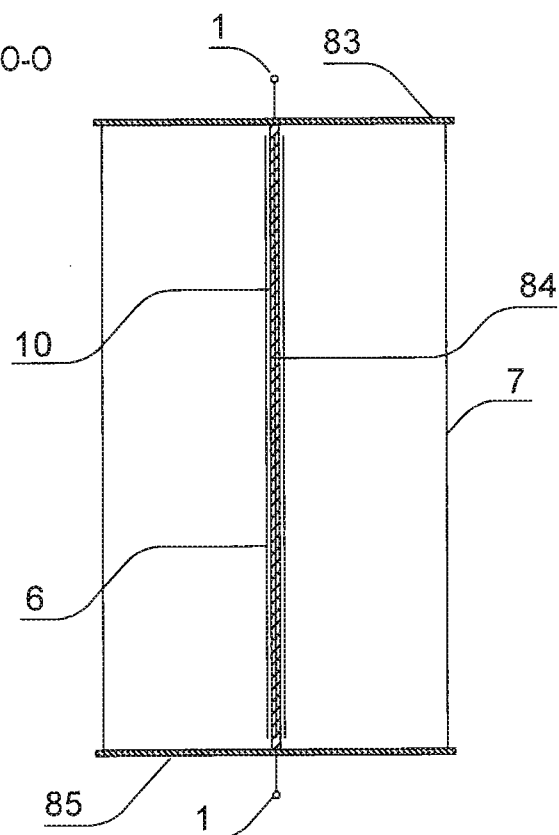


FIG. 44

cross-sectional O-O



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FIG. 45 cross-sectional P-P

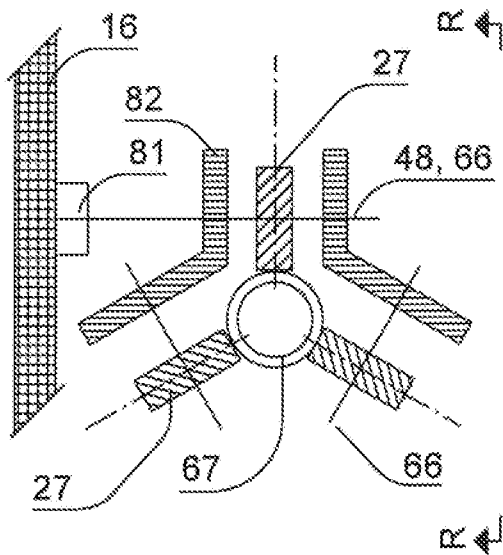


FIG. 46 side view R-R

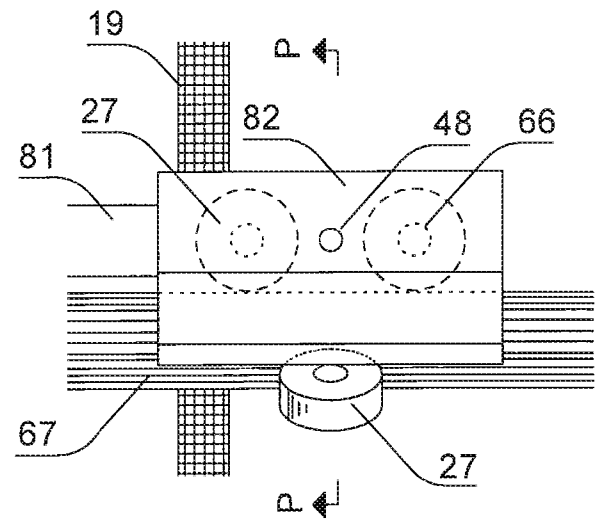


FIG. 47

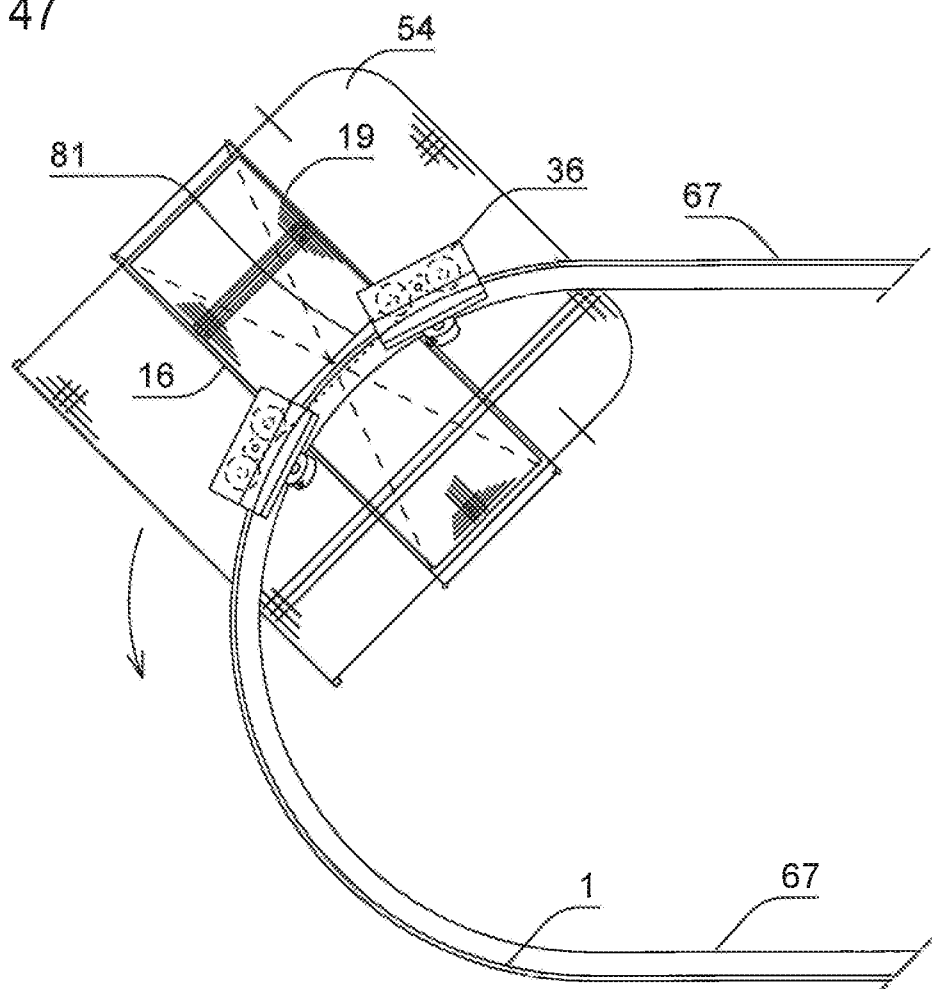


FIG. 48

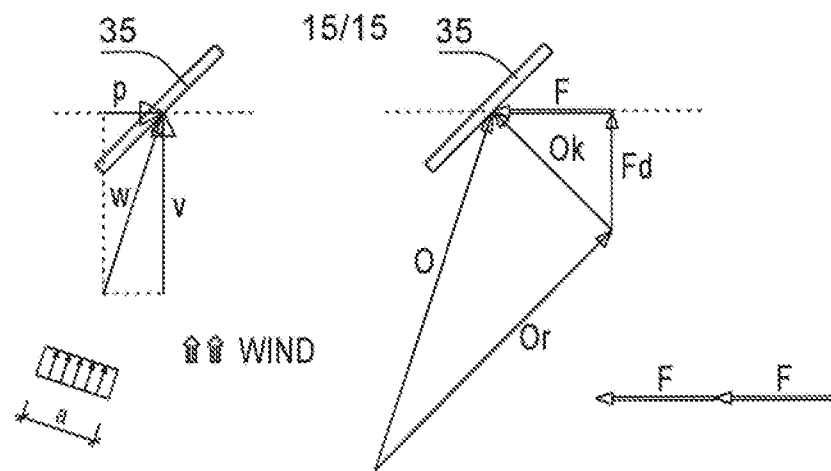


FIG. 49

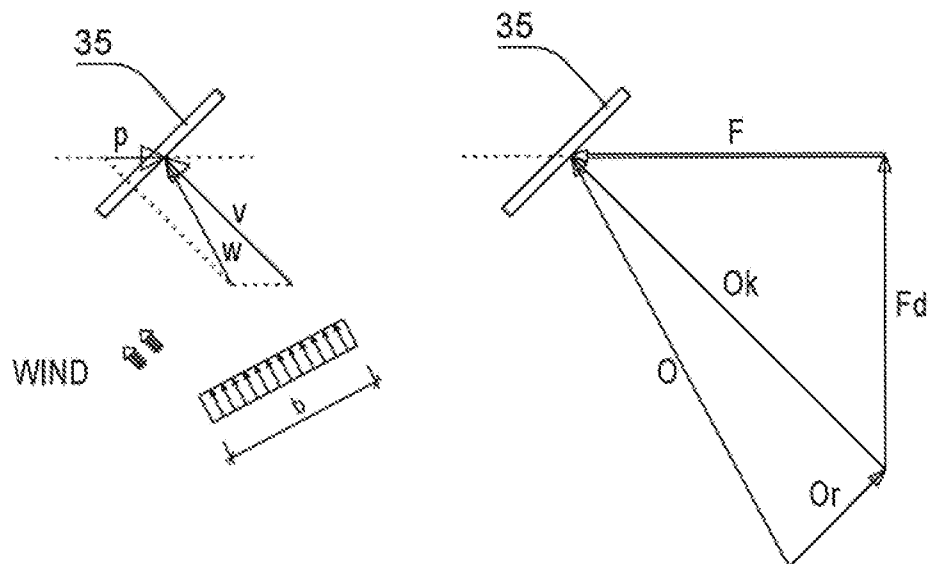
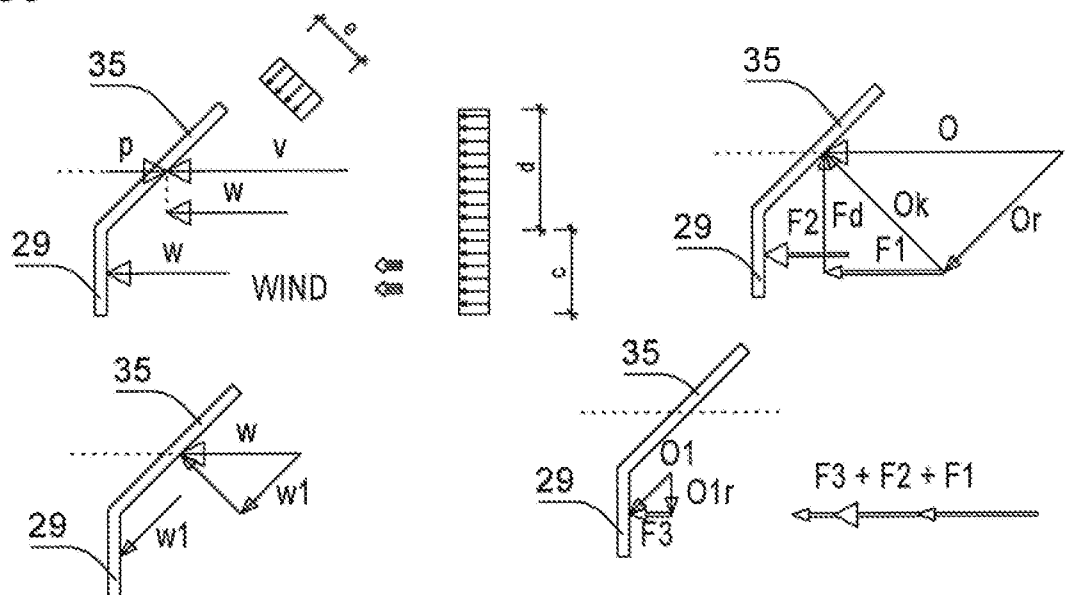


FIG. 50



INTERNATIONAL SEARCH REPORT

International application No.

PCT/SK2020/000002

A. CLASSIFICATION OF SUBJECT MATTER

F03D3/02, F03D5/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: F03D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SK: IPC F03D

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, WPIAP, X-Full - Full-text databases (EN), PATENW, IPO SR internal database

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 8704496 A1 (LABRADOR GAUDENICIO AQUINO) 1987-07-30 page 13 lines 1-28, page 16 lines 7-19, page 19 line 17, page 20 line 20, fig. 1, 2, 5 and 8	1-6
A	CN 102192093 A (MINGMAO WU) 2011-09-21 paragraphs [56-58], fig. 5	1-6
A	WO 2018163527 A1 (EZOE RYOJI, EZOE EIKO) 2018-09-13 paragraph [17], fig. 4	1-6



Further documents are listed in the continuation of Box C.



See patent family annex.

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

18 June 2020 (18.06.2020)

Date of mailing of the international search report

14 July 2020 (14.07.2020)

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Authorized officer

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Telephone No. +421 48 4300 216

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/SK2020/000002

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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CN 102192093 A	2011-09-21	NONE	
WO 2018163527 A1	2018-09-13	CN 110537017 A JP 6249258 B1 JP 2018145930 A	2019-12-03 2017-12-20 2018-09-20