SOLAR WINDMILL

TECHNICAL FIELD OF THE INVENTION

This invention is in the domain of mechanics, and is related to propulsion mechanisms, which utilize the energy of the wind and/or sun to generate mechanical energy. According to the International Classification of Patents (**MKP**) an invention can be marked with the classification symbol **F03D3/00**, which includes classified wind propulsion mechanisms with a normal axis of rotation to the wind flow w entering the rotor, or with the somewhat closer symbol **F03D3/04**, in case of a stationary instrumentality for wind direction with channels. Since this is an invention which also utilizes the energy of the Sun in order to generate mechanical energy, it can be marked with the classification symbols **F03G6/00**, or **F24J2/00**.

An invention can also be marked with the classifying symbol **E04D13/18**, which classifies all roof covers with devices that collect energy.

In this manner, invention can also be marked with classifying symbol **F24J2/04**, intended for solar heat collectors, which conduct working fluid through the collector or with the symbol **F24J2/05**, if they are surrounded with a transparent fence.

TECHNICAL PROBLEM

A problem which this invention addresses is as follows: how to handle the construction of the solar windmill which uses solar energy and/or wind energy in order to spin electric generator, in order to generate an electric current, accomplished by using the following parts: collector, chimney (containing wind turbine rotor and a generator), while a special device called a ‘‘cap’’ is placed on top of the chimney.

The second problem solved with this patent is introducing a transportation system for people and goods, for remote areas which don’t have roads, such as mountain tops, islands etc. That can be accomplished thanks to the possibility of removing that cap

from solar windmill, and moving around like an aircraft, powered by energy from batteries, produced by the solar windmill itself. The chimney of solar windmill, can also have multiple purposes, it can be used as pillar for various energy cables, telecommunication cables, transportation cable cars, etc. This is possible due to a fact that the rotor is not outside like as is the case with classic windmills, or the space beneath the cap of the solar windmill is free and can be used for various other purposes. As most of the solar windmill's weight is very low because the rotor-generator is set on the ground level, the height that the solar windmill can achieve is substantial.

BACKGRAUND ART

Permanent windmills actually use only the horizontal component of wind. Wind speed as a particular source of energy affects the windmill in compliance with location and annual average wind speed. Average wind speed is in relation with height above the active flat surface of the ground. Energy of the wind that can be used substantially increases when height surpasses 1000 m from active surface.

For energy conversion, the rotor of the windmill can have horizontal or vertical axes of rotation, with blades which are moving in circular areas.

There is a well known type windmill where the rotor and the generator are placed on top of the pylon and can be aligned with the wind for maximum efficiency.

Those kinds of machines can't use thermal streaming of air, which is formed due to the soil heating up with solar energy.

Devices that can use this kind of air movement are known as solar towers, or as solar chimneys. A project involving a solar chimney was tested in Madrid in Spain, and it was considered a success. Those solar chimneys are widely known as chimneys with up draft or down draft air intake.

So far it is not known if there exists any device that combines the work of the windmill with a solar chimney in such a manner that uses all the air streaming and

winds, unlike solar chimneys or classic windmills, with the position of the propeller and generator on the ground level of the windmills pylon with the lowest as possible centre of weight.

A large number of windmills can be found in all patent files, but in this document we will list only a few of them for demonstration, because they only share the domain with this new invention.

In the patent file with the mark **YU 47541** which bears the name ''Propeller windmill with an object made of reinforced concrete and with a steel tower for routing the air flow'', a solution is offered for the problem to constructing a windmill able to be driven by artificial wind, which is made from Sun's energy, converting the temperature difference in the form of artificial wind to useful mechanical power, where solar heating cells are embedded in the construction.

In the patent file with the mark **YU 47708** a wind turbine is described with several rotors and a telescopic part drawn in to each other, and an impellent wheal is built in the base part of the turbine.

One vertical turbine with a stabilized central air router, which is consists of a larger number of symmetrical wings, where an air router located in centre of the roatary wheel of the turbine, which is spin around its axes for the purpos of detecting air flow direction, is described in the patent file with the mark **RS 52649.**

In the German patent file with the mark **DE A_1 3801671** a wind turbine is described which consists of a vertically placed cylindrical cage rotor, with stable ball-wings, placed around it on base floor in shape of a ring which can be rotated around their vertical axes and where its angle of rotation can be hydraulically preset.

One vertical turbine, described in the American patent file with label **US 4,245,958,** is placed in a skeleton which has four vertical pylons interconnected with plenty of tumblers, connectors and fasteners.

Examination of all other patent documentation with a coresponding classyfuing symbol did not provide a solution for the solar windmill, which might correlate with the solution represented by the invention described in patent application.

DISCLOSURE OF THE INVENTION

The basic idea for the construction of the solar windmill according to this invention is to use energy of the wind and/or solar energy for the production of electrical energy.

Construction of the solar the windmill consists of: collector, chimney (together with the rotor of the windmill and the electric generator) and cap.

The collector consists of an upper central glass part, and a lower peripheral transparent plastic part.

The upper part of the collector consists of sectors, with all of them grouped together forming a cylinder, with an upper end that forms a shell in the shape of a truncated cup. The inner cylindrical opening, with a diameter equal to the outside diameter of the chimney, is formed in the centre of the upper part and passes through the entire height of the upper part. The lower peripheral part of the collector is also made of plastic sectors, whereby in construction the number of segments (sectors) of upper and lower parts is equal. Sectors of the lower part, when aligned, all together form a cylinder, which ends in the shape of a parted shell of truncated square pyramid. The inner cylindrical hole of the cylinder has a diameter equal to the outside diameter of the upper glass part, and it is situated in the centre, and surpasses the height of the lower part.

The rotor and the blades of this wind turbine are made of at least six or more cylindrical parts, which are placed on curved segmental tracks, where each cylindrical part from below has a circular toothed arched lath, which transmits the rotational movement of the rotor to upper pair of conical gears, positioned below the rotor. From the upper pair of conical gears through the vertical shaft, rotation is transmitted to the

lower pair of conical gears, which then move the horizontal shaft of generator which in that case produces electric energy. The generator is placed in the space below the rotor.

The narrow part of the chimney can be made of one single pipe, or, like a telescope, with several extensions. The lower cylindrical part of the chimney transitions to the middle conical part, and after that, to upper cylindrical part. Within the lower cylindrical part of the chimney, the rotor is partly placed.

The cap has an outer and an inner layer, or, it is double – layered. The outer layer is transparent with an impressed pattern with, or without, tiny holes, and the inner layer of the cap is made with thermo accumulating properties. The aerodynamic shape of the cap, which has openings placed downwind, in correlation with the outer layer which has tiny holes, creates zones of low air pressure, and that is how the cap increases suction capacity (draft) of the chimney. Between the outer and the inner layer of the cap, spacers keep distance of the space between those layers, and sensors of air pressure are also added. The cap is made with additional openings for air release from the space between inner and outer layers, and with air wings which hold the direction of cap in accordance with wind flow direction. In the cap body, under the thermo accumulating layer, there are helium balloons inflated on the atmospheric, or very small pressure, and in the cabin there is an electric motor which drives the compressor, and batteries to give power to the motor, and high pressure helium tanks. Helium balloons are filled and emptied with helium from high pressure helium tanks by the compressor. The cap is placed on the chimney on a particular axial ring bearing, and it can rotate around the chimney axis in order to take the direction of the blowing of the wind. When the direction of the cap is downwind, and air is streaming along the cap body, and create certain zones of low air pressure, which are channelled to the chimney exit point, and this increases chimney suction power (draft). If we increase chimney suction power, we can increase the power of the wind generator installed in the chimney, and, correspondingly the power of the electric generator as well.

The solar windmill according to this invention has four working stages, or working regimes, and those are: with wind as the energy source, with Sun as the energy source, simultaneous use of wind and Sun energy, and the pump working regime (or subsidiary working regime).

The solar windmill most often operates in the combined mode (regime of work), using both types of energies (wind and Solar), while sensors for air flow and pressure regulate the opening level of electromagnetic butterfly valves (doors) in the collector, while also, the roof planes can be adjusted according to direction of wind flow.

When we talk about solar windmills with telescopic extensions, it is possible to accomplish a work mode (regime of work) similar to a pump, otherwise, if there are no extensions then this mode is impossible.

When the solar windmill is working in the pumping regime, it is necessary to accomplish movement of the cap, which stands on the chimney telescopic extension, between the lowest cap position and the highest cap position. The raising of cap is accomplished due to helium balloons in the cap, so when they are inflated, they tend to carry telescopic extensions along with the cap, all the way to the highest cap position. While the cap is moving up to the higher position, air flows up the chimney, and also moves the rotor to make useful work, and after that the air passes through the chimney and the cap and then is released outside. While the cap is moving down to a lower position, compressor compress the helium from helium balloons back to the high pressure tanks, and due to the increase of the weight of the cap, it tends to go down while compressing the air in the chimney which in the lower part of the chimney tends to flow in the opposite direction, or toward the ground. That air flow in the lower part is redirected to angled tubes, and going to the rotor intake, and in such a peculiar way, when the butterfly valves are closed in that time frame, so the air must flow through the rotor and do the useful work, and after that through underground pipes to the lower peripheral part of collector. In that part the air is heated once more due to latent heat

from walls and thermo accumulator slopes, and in the underground pipes, and then is moving up, while the cycle of the cap movement is repeated between the lower and the upper position, until latent stored heat exists in the collector.

If on any height which the cap can reach with telescopic extensions, there is enough air or/and solar energy, then the solar windmill will work in that regime with the existing energy, and the subsidiary regime of work as a pump ends.

BRIEF DESCRIPTION OF THE DRAWINGS

Invention is explained in detail on the examples shown in the following pictures of drawings:

Figure: FIG 1 – represents a view of the solar windmill (with eight sectors and cap – air craft) on a vertical surface, angle of looking is the same as wind direction.

Figure: FIG 2 – represents an overhead view from the figure 1 (projection on a horizontal surface).

Figure: FIG 3 – represents side view, from figure 1 (projection on profile plane).

Figure: FIG 4 – represents section Y-Y from figure 3 (solar windmill with 8 sectors).

Figure: FIG 5 – represents the partial section X-X from the figure 2.

Figure: FIG 6 – represents an axonometric view of collector 1, with eight sectors 19, together with a partial cross-section of the lower part of the chimney.

Figure: FIG 7 – represents an axonometric view of collector 1, and lower part of the chimney 2, of the solar windmill, disassembled in parts along the chimney axis.

Figure: FIG 8 – represents a side view from figure 1 (projection on profile plane) of a solar windmill with maximally extended telescope chimney extensions, and some sectors with partially rotated roof planes around the edge axis of rotation (μ, η, ξ).

Figure: FIG 9 – represents the enlarged part of the second outher layer 39 – pattern without holes together with the characteristic cross section ∑-∑.

Figure: FIG 10 – represents an enlarged part of the first outher layer 38 – pattern with holes 45, together with the characteristic cross section Ø- Ø.

DETAIL DESCRIPTION OF THE INVENTION

Solar wind turbine consists of a collector **1**, a chimney **2** (in which the wind turbine rotor **27** and the electric generator **32** are located), and a cap **3**.

Collector **1** is consisted of upper central glass part **4** and a lower peripheral transparent plastic part **5**.

The lower part **5** of the collector **1** consists of at least four plastic sectors **19**, with the same number of sectors **19** of the upper **4** and lower part **5** of the construction. Sectors **19** of the lower part **5** put together form a cylinder (not numbered in the blueprint drawings) which ends in the form of partial shell of a truncated square pyramid (not numbered in the blueprint drawings). Every sector **19** of the lower part **5** has a transparent plastic roof planes **20** made of PVC, Lexane, or Graphene, with the reinforcement along the edges, while the roof planes **20** can be partially rotated around **μ**, **η**, **ξ** axes, and can be lifted with the cable system **23**. Roof planes **20** are supported with partition walls **21**, which have their own fundament **22**, and with thermo accumulation slopes **7**, form sectors **19** which, all together aligned in circle, form a collector lower part **5**. Sectors **19** in the drawings are denoted by the cardinal points, namely, by the initials of the cardinal and intermediate directions in the collectors with eight sectors: **19N**, **19NI**, **19I**, **19SI**, **19S**, **19SW**, **19W**, **19NW**. Walls **21** and slopes **7** accumulate the sun's heat, and then emit it at night or at a sudden drop in temperature.

Electric generator **32** is located in the space **10** which is under the rotor **27**. Underneath the lower part of the chimney **2**, the cyllindrical area **9** continues, in which

the elevator (not numbered in the blueprint drawings) is optionally placed. Valve **8** is also located in the area **9**, and it can take two positions, first (**I**) in the upper, and second (**II**) in the lower part of the area **9**. Area **9** is connected to every segment of sector **19** of the lower part **5** of the collector **1** by underground pipes **6.**

In the centre of the lower part **5**, the inner cilindrical openning is located (not numbered in the drawings), that goes all the way through the collectors lower part **5**, which contains the glass part **4**, with spiral walls **18**, as the extensions of sectors **19**. The upper part **4** of the collector **1** consists of at least four or more sectors (not numbered in the drawings) in continuation from the sector **19**, that are all together aligned to form the cylinder (not numbered in the drawings) . The upper side of the cylinder forms a shell shaped as truncated cone (not numbered in the drawings), with inner cylindrical opening (not numbered in the drawings), in the centre of the upper part **4**, of the collector **1**, and passes through entire height of the upper part, with same diameter as wider part **26**, of the chimney **2**.

Steel construction of the upper part **4**, is formed with at least four steel pylons **11** with their own fundaments **12**, where each spiral intake (not numbered in the blueprint drawings), has one pylon **11**. The spiral walls **18**, start from the pylons **11**, and spread in a form of the spiral all the way to the centre, to the chimney wider part **26**, which has rotor in side, while the space between the spiral walls 18 creates the spiral intake.

Sloped bearings **13** are mounted on pylons **11**, which support the bearing ring **14** and the bearing ring **14** holds the chimney **2**, so in that way pylons **11** bear the chimney **2**.

Special profiles **15** are also mounted on pylons **11**, which bear glass plates (not numbered in the blueprint drawings), to form outer transparent shell, of the collector **1** upper glass part **4**.

Spiral intakes, (not numbered in the drawings), bordered with spiral walls **18** which have thermo accumulating properties, represent spiral channels which are used to swirl

the stream of air on the entrance of the rotor **27** of wind turbine.

In every spiral intake (not numbered in the drawings), a solenoid valve **16** is placed, which may be constructed in form of the butterfly. Alongside of every solenoid valve **16**, in a space between the spiral walls **18**, - or let say in spiral intake, the sensors **17** for air flow and pressure are placed to measure characteristics of air flow by means of which the inclination angle of the solenoid valves **16** is regulated. Collector **1**, collects the wind from direction **w**, and direct air stream towards the rotor **27**, and the chimney **2**, but at the same time allows for sun rays to pass through them to the slopes **7**, when the slopes **7** gets hot, the heat is transmitted to the air by means of convection, and the air than starts its movement to the wind turbine rotor **27** and the chimney **2**.

Wind turbine rotor **27**, is made of arched segments with blades **37**, at least six of them (usually 6, 8, 10 or 12), placed on arched segmented tracks **36**, with bearings, where each of the arched segment 37, from the bottom side has attached a toothed arched lath **35**, which transmit rotational motion of the rotor **27**, to the upper pair of conical gears (not numbered in the blueprint drawings), which are placed beneath the rotor **27**. From the upper pair of conical gears (not numbered in the blueprint drawings), by means of vertical shaft, the motion is transferred to the lower pair of conical gears which transfer motion to the horizontal shaft (not numbered in the blueprint drawings), and that all together in this text has one integral name: Mechanism of rotational transmission **31**, which is connected to the electric generator **32** and thus produces electric energy. Wind turbine rotor **27**, together with electric generator **32**, are consisting parts of the chimney **2**.

The chimney **2** can be produced either as one long pipe, or with telescopic extensions **33** and **34**, which are extended to the upper cylindrical part **24**. Lower cylindrical part **26**, of the chimney **2**, is connected to the upper cylindrical part **24** through conical part **25**. In side of the lower cylindrical part **26**, of the chimney **2** a rotor **27** is partially placed (with vertical axes of rotation), where the inside diameter of the

rotor **27** is almost equal to the outer diameter of the upper cylindrical part **24**, of the chimney **2**, and outer diameter of the rotor **27** is almost equal to the inner diameter of the lower cylindrical part **26**, of the chimney **2**.

Just above conical part **25**, of the chimney **2**, the angled pipes **28**, are installed which connect the chimney **2** with spiral intake (not numbered in the blueprint drawings). On the entrance of every angled pipe **28** from chimney **2** one solenoid valve **30** is installed, and on the bottom side entrance in the upper cylindrical part **24**, of the chimney **2**, one valve **29** is installed. On the exit from top side of the upper cylindrical part **24**, or on one of the extensions 33 and **34**, of the chimney **2**, on the cabin **46**, one valve **42** is installed.

On the top of the upper cylindrical part **24** or on one of the extensions **33** or **34**, of the chimney **2**, the cap **3** is placed, which can rotate on the top of the chimney **2** according to the wind direction **w**. In that way the exit of the chimney **2** gets more suction power, because the cap **3**, create the zone of pressure reduction --------- due to the air streaming around its surface, and this reduction of the pressure is transferred to the top of the chimney **2** and that's how cap increases the power of the chimney, and the power of electric generator **32** as well.

Cap **3** has transparent outer layer **38** or/and **39**, and inner layer **41**, which has thermo accumulating properties. The first outer layer **38** is made of transparent materials with imprinted pattern with tiny holes **45**, while the second outer layer **39** is made of transparent materials with imprinted pattern without tiny holes. Tiny holes **45** are made in order to enable exit of the air from the air gap **40** out of the first outher layer **38**. In that way the first outer layer **38** with imprinted pattern with tiny holes **45** creates a zone of air whirling and low pressure, and hence increases the suction power (draft) in the cap **3** and the chimney **2**. The inner layer **41** is made as an shell with thermo accumulating properties. Between outer layers **38** and/or **39** and inner layer **41**, in the air gap **40** with air some pressure sensors are installed. The cap **3** is constructed with additional aerodynamic openings **43** on leeward side, for rapid air release from the

air gap **40**, and with flaps **44** to maintain direction of the cap according to wind direction **w**.

The cap **3**, must have aerodynamic shape, very light, that can be easily redirected toward the direction of the wind **w**, which is accomplished with the use of an rotating electromagnetic axial bearing **54**, which can hold the cap **3**, attached to the chimney **2**, and allows that the cap to swivel freely around longitudinal axis of the chimney **2**. The cap **3**, is pulled near the electromagnetic axial bearing **54**, with electromagnetic forces and then locked in place mechanically, in the way that is able to rotate around longitudinal axes of the chimney. Direction of the cap **3**, towards the wind, is accomplished with flaps **44**, and with non-equal distances between front and rear end of the cap **3** in favour to rear end, from longitudinal axes of the chimney **2**. The inner space of the cap **3** must be spacious for accommodation of all Helium balloons **48** under the atmospheric pressure or small pressure of around 0.1 till to 0.5 MPa, while the cabin **46**, must have enough space for the Helium bottles **53**, under very big pressure of up to 500 Mpa, and room for the compressor **50**, which is driven by the electric motor **51**, powered by electric batteries **52**. The cap **3**, which has all above mentioned properties, is similar to an air ship which uses Helium to inflate the balloons **48** from high pressure bottles **53**, and compressor **50**, is used to compress Helium from the balloons **48** back to the high pressure bottles **53**, and hence altering the caps altitude as needed. If the cap **3**, is separated from the chimney **2**, by releasing from the electromagnetic axial bearing **54**, it can be moved around freely through the space as an air ship which has rudder with electromotor fans **55**, for propulsion, powered by the batteries **52**, and land anywhere, on its own wheels **56**. The suction pipe **49**, that passes through the cabin **46**, and is its consisting part, has identical diameter as higher telescopic extension **34**, and connects the chimney **2** outlet with air gap **40**. The way that cap **3** operate is that the air stream from the chimney **2**, through the suction pipe **49**, which is in the cabin **46**, right to the air gap **40**, between the outher layer **38** and/or **39** and thermo accumulating inner layer **41**, which are separated with spacers **47**, only to be released in the

atmosphere through the cap **3**, or via tiny holes **45** on first outer layer **38**, as shown on figure 10. The air from the air gap **40**, can also exit out through additional openings **43**, placed on leeward side, to help the air transition from the air gap **40**, of the cap 3, as shown on figure 3. The air gets out of the air gap **40**, sucked by low pressure around cap **3**, which is present due to wind rapids flow over and around the cap **3**, as an aerodynamic obstacle, but also because of the first outer layer **38** with tiny holes **45**, which is creating additional pressure drop on its surface. So in a fact, that low pressure area, marked on the pictures with ----------, formed by the wind flow around the cap **3**, has role of a vacuum pump, vacuum is then transferred to the outlet of the chimneys upper cylindrical part **24**, or to its extensions **33** and **34**. In that way cap **3**, makes additional suction to the place of connection with the chimney, and hence has amplifying effect to the chimneys power.

Solar windmill, according to this invention has several operation modes, or to be more precise has four working regimes: propulsion by the energy of the wind, propulsion by the energy of the Sun, propulsion with the energy of the wind and the Sun, and at last a pump regime.

Solar windmill, powered on wind energy, collect the air flow close to the ground with part of collector **1** that is open to receive the wind **w**, with sectors **19**, of the collector **1**, which are at the windy side (or facing the wind). As the transparent roof planes **20**, of the sectors **19** are semi swivelled around its edge axes (μ, η, ξ), so they can accept additional air from the wind flow and redirect it toward the centre of the collector **1**, or the outlet of sector **19**, toward the inlet of spiral intake (not numbered in the blueprint drawings), in other words through the space between spiral walls **18**, toward the chimney **2**. As the space between partition walls **21** gets more and more narrow approaching the centre, and this reduction continues through spiral intake between spiral walls **18**, looking at the chimney direction, so it is obvious that increased air pressure will acquire +++++++, in the collectors part **1**. The air that is stuck in on

entrance of the chimney **2**, first must pass through the wind turbine rotor **27**, to spin that rotor **27** and then to enter in to the chimney **2** in form of a swirl. Wind that flows around cap **3**, creates the zone of increased air pressure ++++++++ (around the outher layer **39** with pattern without tiny holes) and the zone of decreased air pressure ---------- (around the first outher layer **38** with pattern with tiny holes **45**). That is how the air is propelled through the chimney from the zone with increased air pressure ++++++++ in collectors **1** surrounding area that is on the base level, up to zone of lowered air pressure ---------- around cap **3**, and that has an significant impact on nominal power of chimney **2**. With the use of collector **1**, and the cap **3**, more an updraft through the chimney **2**, can be achieved, the power of chimney is increased, which is then manifested on the wind turbine rotor **27**, which will tend to increase its rotation per minute (rpm), and finally it is manifested on the electric generator **32** as an increase of electric power. In the part of the collector **1** that is on the leeward side, or the opposite side of wind direction **w** (with sectors **19** which are in leeward side of the collector **1**) the solenoid valves **16**, in their corresponding spiral intakes (not numbered in the blueprint drawings) are semi opened, or even closed and preferably automatically regulated. Collector **1** is centrally symmetric and constructed in the way that the sectors **19** which are in the wind can be additionally opened according to the wind direction **w** – or on windy side, and the other side rotated for 180˚away from the first, or leeward side is then out of the function, and does not have any effect on rotor **27**, and if it is more appropriate it can be completely shut down with solenoid valves **16**. Windy side or leeward side are in the correlation with wind direction, but as all of the sectors **19** of the collector **1**, are identical, then all of them are able to catch the wind regardless of the wind direction.

Solar windmill, with propulsion on the Sun energy only, works in a way that collector **1** allows Sunrays to pass through transparent roof planes **20**, to thermo accumulating slopes **7**, and with constant heating of this slopes **7**, the heat transfers to the air by convection, which is moved toward rotor **27**, because it has been pushed by the colder

and more dense air outside of the collector **1**, almost radially through the collector **1**, toward centre, and chimney **2**. So collector **1** accepts and directs the air flow almost on the same way towards rotor **27** regardless of the cause of the air movement, whether is the wind or the Sun, only in the second case all solenoid valves **16** are completely opened, because the similar air pressure is expected in all sectors **19**, of the lower part **5**, of the collector **1**, if the Sun rays inclination angle isn't too big, or if it is close to vertical like on equator, or with in the summer mounts in the North geographic regions, on that latitude. On the exit of the chimney **2,** cap **3** is placed, and its side exposed to the Sun rays cap **3** passes through the Sun rays, which further pass through transparent outher layers **38** and/or **39** and fall to the thermo accumulating inner layer **41**, which transmits that energy to the surrounding air in air gap **40** and increase its potency to leave the cap **3**, through additional openings **43** on the top, or on the back end of the cap **3**, as well as on tiny holes **45**, of the first outer layer **38**, so again in this way cap **3** is used as an amplifier for the air stream out of the chimney **2**.

Solar windmill most often works in the combined regime, powered from both energy sources (wind and the Sun energy source), where sensors **17** for air flow and pressure feeds the central processing unit (not numbered in the blueprint drawings), with the data, which then regulate the level of inclination of the solenoid valves **16**, while regulation of the roof planes **20** inclination angle, according the wind **w** speed and direction, as well is being regulated with the same central processing unit (not numbered in the drawings) which are positioned somewhere within the collector **1**, of the solar windmill.

When the solar windmill work as a pump, it is necessary to obtain the movement of the cap **3**, positioned on the chimney **2** with telescopic extensions **33** and **34**, between two positions: lower and higher. Raising the cap to the higher position is accomplished via Helium balloons **48**, which are filed from pressure bottles **53** with Helium under vast pressure. The cap **3**, with the balloons **48** filed with Helium is than moving up, carrying

with it the extensions **33** and/or **34**, or more of them if there's more of them and with all of them gets to upper position. In this regime of work (like a pump), the valve **42**, is shut all the time.

When the cap **3**, moves to upper position, solenoid valves **16** and end valve **29** are opened, and solenoid valves **30** (minimum four of them or more), on angled pipes **28**, are closed as well as valve **8**, which then stands in upper position (**8-I**), so the air from sectors **19**, flows up towards the rotor **27**, moves wind turbine rotor **27** and does useful work, and then that air passes through chimney **2**.

When the cap **3** is moving to lower position, compressor **50** compress Helium from balloons **48** with Helium, back to the bottles **53** under high pressure, while solenoid valves **16** and valve **29** are closed, while solenoid valves **30** (minimum four or more) are opened, on angled pipes **28**, and the valve **8**, which than takes lower position (**8-II**), so the air can flow through free space for the elevator 9, and then through underground pipes 6 and enters the lower part **5**, of the collector **1**. In that part, the air is heated once more because of the stored heat in thermo accumulating slopes **7** and walls **21**, and in pipes **6**, and then moves up again, while cycle is repeating all over again between this two positions of the cap **3**, until stored heat is completely used.

If on some height of the chimney **2**, which is reached with its extensions **33** and **34**, and the cap **3**, exists enough energy of wind or/and of the Sun, then working regime of the solar windmill will accommodate that dominant energy source, and pumping regime will then be stopped.

The cap **3**, is constructed as double layered, that is, it has two shells, where air flow from the chimney **2**, after passing suction pipe **49**, enters in side of the air gap **40** which is the space between this outher layers **38** and/or **39**, and inner layer **41**, where first outer layer **38** is transparent with the pattern with tiny holes **45**, and second outer layer **39** with pattern without tiny holes, and inner layer **41** has thermo accumulating

properties. The air from the air gap **40**, between the outher layers **38** and/or **39** and the inner layer **41**, is released out by the suction of low pressure ------, through tiny holes **45**, of the first outher layer **38** and additional openings **43**. Lowered pressure --------, around the cap **3**, is transferred to the outlet of the chimney **2**, in order to increase the suction power of the chimney **2** (adding more draft to it).

Draft (suction power) is in the function of the temperature, and rise linearly with height of the chimney **2**, and flow of the gasses rise according to square root from the height of the chimney **2** (height above one that is necessary to obtain in order to overcome the resistance of the corresponding plant).

Besides that, amount of produced energy will correlate with surface area covered by the collector **1**, its shape, and of the way it is adapted to the local ground where it stands on, as well as, of the ability of the roof planes **20** to swivel according to wind blow and collect even more wind. Beside the collector **1** pulling power of the solar windmill will correlate with size and volume of the cap **3**, from its ability to swivel according to the wind direction, its aerodynamic profile, of the outer transparent layers **38** and **39**, and many other characteristics.

With this construction, made this way, the inventors basic idea to use the Suns or/and the winds energy in order to obtain the electric energy, is accomplished.

INDUSTRIAL AND OTHER USES OF THE PATENT

This invention belongs to the energetic domain and especially to production of electric energy from renewable sources, from wind and the solar energy, transformed to thermal movement of the air which propels production of electrical energy, and this is the basic purpose for the ***solar windmills***. Places where installation of those devices will bring biggest contribution are mountain tops and gorges, cliffs and coastal areas, islands, places where a lot of wind is expected for propulsion of wind-generator, but

also all other places with extensive solar radiation or with a large number of sunny days like tropical areas, savannahs or desert areas are eligible.

The chimney of the solar windmill (or more of them together) may serve as support (bearing pillar-because there is no rotor outside to interfere) for different transportation systems, for example a cable car, where they can be propelled by electricity produced on the spot, and then used to power different electric motors of this transporters apropos cable cars. Besides that when the cap is separated from rest of construction, it can be used as specific airship and fly around like any other dirigible, and in that case this invention is used for transportation purposes with its own source of energy for propulsion. With more of the solar windmills in the system distributed throughout an area with caps like this, it could even be assigned a permanent timetable. As a solar windmill is foreseen to stand by itself on mountains, hill tops, or islands then it is obvious that even most remote and isolated villages or other settlements, where bringing electric power to them is not economically viable, due to losses caused from the long distances. With this invention every distant mountain or island village will have its own electric energy produced on that spot, which will fulfil their daily needs for energy or for transportation. Without that, but also even because of the permanent increase of electrical energy, partially because of the shortage of the fossil fuels, transport of electrical energy to these distant places isn't economically viable, and because of that these places will suffer a lack of electric energy for their needs and development. On the other hand, those rural and unpolluted places are now more in focus, because of the healthy food that can be produced there in conditions of high altitude and isolation, plant diseases do not exist, so pesticides aren't in use, therefore it is possible to produce organic food, or matical plantations, which is not possible for the lowland and a big scale modern agriculture. If with cable cars and dirigible-caps, we can achieve more rapid communication with capital cities, or at least with main roads and highways, then life in mountain villages will become sustainable again, and settling abandoned villages will start again. Besides transportation of electrical energy, goods

and people, with system of cable cars or/with caps – dirigibles, it would be possible to transport even water to remote places, and in case of forest fire incidents, special caps-dirigible can be used to extinguish forest fires from their flying height. Transportation system dirigible–cap and/or cable car together, and in symbiosis with solar windmill which energises them with electric energy, should ease communication and transport during winter months, when all other means of communication are blocked due to snowfall and snowdrift, but also as one additional alternative, and in the same time the shortest direction for people and goods from the base of the mountain to its top, or from one solar windmill to another solar windmill in form of a straight line, despite of roads which have curves and serpentines. Even the solar windmill itself would be some kind of a tourist attraction, which has touristic potential, and can be used as watchtower with a nice sight, or as a mountain residence or as a watchtower for foresters, for the forests' conservation etc. And if we add technical detail that is typical for solar windmills with telescopic extensions, that the cap can be erected up to the significant heights of 1000-2000m (and even more) and when we add mountain height then we can draw the conclusion what touristic potential one such construction might have. And that further means that in the pedestal of such an object, we could incorporate all kind of Mountain homes, forester homes, commercial objects like hotels, or ski resorts, or even spa centres, and for sure for all these resorts the electrical energy would be made on spot, and surplus of electrical energy would be directed to distant villages, or at the end, to the electric distribution system… Ultimately the cap itself, which is a special kind of dirigible which can be separated from the rest of the system, while the rest of the system can operate with reduced power, provides new possibilities of economic exploitation for touristic purposes, as well as for transportation purposes, or for monitoring, fighting against forest fires, for the evacuation of people due some disasters, and for many other situations and purposes.

PATENT CLAIMS

1. A solar windmill consists of a collector (**1**), a chimney (**2**), in which structure belongs the rotor of wind turbine (**27**) and electric generator (**32**), and a cap (**3**), **characterized in that** the collector (**1**) consists of an upper central glass part (**4**) and a lower peripheral transparent plastic part (**5**); the upper part (**4**) of the collector (**1**) consists of a minimum of four sectors; an inner cylindrical opening passes through the centre of the upper part (**4**) by the entire height of the upper part (**4**); the lower part (**5**), of the collector (**1**) consists of a minimum of four transparent sectors (**19**) whereby the transparent sectors (**19**) of the lower part (**5**), aligned mutually form a cylinder with an inner cylindrical opening in the centre, which passes through the entire height of the lower part (**5**); every transparent sector (**19**), of the collector (**1**), is covered with transparent roof planes (**20**), made from the plastic materials, which can rotate partially around axes (μ, η,ξ); the transparent roof planes (**20**) are standing on partition walls (**21**), which stand on striped fundament (**22**) and with thermo accumulating slopes (**7**), form sectors (**19**); furthermore away from transparent sectors (**19**), there are channels in form of the spiral intake (not particularly marked on drawings), bordered with thermo accumulating spiral walls (**18**); the steel construction of the upper glass part (**4**) consists of at least four segments in extension of transparent sectors (**19**), where every segment has its own pylon (**11**), which stands on its own fundament (**12**), while pylons (**11**) all together support sloped bearings (**13**), and a carrying ring (**14**), on which the entire chimney (**2**) stands, with the cap (**3**); the rotor (**27**) of the windmill consists of at least six or more arched segments (**37**) with blades, mounted on the arched segmented tracks (**36**) (which placed all together form circle), where on each segment (**37**) of the rotor (**27**) from bottom side the toothed arch lath (**35**) is attached (which all together form a circle); all arch segments (**37**) of the rotor (**27**) together and connected on tracks form an endless circular rotor (**27**) which rotates on arched segmented tracks (**36**) while from the bottom side it carries the toothed arch lath (**35**) which rotates together with

rotor (**27**); the toothed arch lath (**35**), transfers round motion from the rotor (**27**) to the mechanism of rotational transmission (**31**), which transmits rotational motion to electric generator (**32**); inside the lower cylindrical part (**26**), below the conical part (**25**), of the chimney (**2**) there is a partially placed rotor (**27**), in a way that inner diameter of rotor (**27**) equal to outer diameter of upper cylindrical part (**24**), of the chimney (**2**), and outer diameter of the rotor (**27**) is equal to inner diameter of the lower cylindrical part (**26**) of the chimney (**2**); because on the top of the upper cylindrical part (**24**) or on one of the extensions (**33**) or (**3**4), of the chimney (**2**), the cap (**3**) is placed, which stands on a spinning electromagnetic axial bearing (**54**), which hold the cap (**3**) connected to the chimney (**2**), in a way that it can rotate around vertical axes of the chimney (**2**), toward the wind, in the same way as the weather wanes.

2. The solar windmill according to claim 1, **characterized in that** a spiral intakes which are bordered with spiral walls (**18**), represent continuation of transparent sectors (**19**), and reach all the way to the rotor (**27**), where every spiral intake has its own solenoid valve (**16**), and sensors (**17**) for air flow and pressure.

3. The solar windmill of any one of the preceding claims, **characterized in that** the upper cylindrical part (**24**), of the chimney (**2**), can have telescopic extension (**33**) and (**34**), and more, which can be pack one in another, which allows that the cap to change its altitude.

4. The solar windmill of any one of the preceding claims, **characterized in that** one valve (**29**) is placed on the entrance, from the lower side, in the upper cylindrical part (**24**), and other valve (**42**) is placed on upper side, on the upper cylindrical part (**24**), or on one of the telescopic extensions (**33**) or (**34**) of the chimney (**2**), or on the cabin (**46**).

5. The solar windmill of any one of the preceding claims, **characterized in that** an angled pipes (**28**) are placed directly above the conical part (**25**), of the chimney (**2**), which make the bridge connection of the chimney (**2**) with the spiral intake (not particularly

marked on the drawings), and on each entrance of angled pipes (**28**), from the chimney (**2**) direction, the electromechanical valve (**26**) is placed.

6. The solar windmill of any one of the preceding claims, **characterized in that,** in the area (**10**) beneath the rotor (**2**7) the electric generator (**32**) is placed, with all the mechanisms for rotational transmission (**31**) adjacent to the rotor (**27**) of wind turbine, while in the area (**9**) the valve (**8**) is placed, which can move up and down in the area (**9**) and can take two positions, upper (**8-I**) and lower (**8-II**).

7. The solar windmill of any one of the preceding claims, **characterized in that,** starting from area (9) from the bottom side there are underground pipes (**6**) leading to each segment (**19**), of the collector (**1**); at the same time the area (**9**) can be used as a home station for an elevator, which according to the need can be moved in and out of area (**9**), and then the valve (**8**) would move to the position (**8-II**).

8. The solar windmill of claim 1, **characterized in that,** the cap (**3**) is made with flaps (**44**) and with difference in distance between front and rear end of the cap (**3**) from the axis of the chimney (**2**), in order to make the cap (**3**) turn around according to the direction of the wind **W**, while additional openings (**43**) on the cap (**3**) are placed on the leeward side of the cap in order to increase the suction power of the cap (**3**), which is then transferred to the chimney (**2**) as additional draft.

9. The solar windmill of claims 1 and 8, **characterized in that,** the cap (**3**), is made with an outer layer (**38**) and/or (**39**) and inner layer (**41**), where first outer layer (**38**) is a transparent layer with an imprinted pattern with tiny holes (**45**), while the second outer layer (**39**), is a transparent layer with an imprinted pattern without tiny holes, and the inner layer (**41**) is a thermo accumulating layer, while between those layers spacers (**47**) are placed, which ensure the air gap (**40**) between the layers.

10. The solar windmill of claims 1, 8, and 9, **characterized in that,** the cap (**3**) contains helium balloons (**48**) with the low atmospheric pressure, while in cabin (**46**), there are high pressured bottles (**53**) with helium, a compressor (**50**) for helium compaction, an

electric motor (**51**) for the compressor drive and batteries (**52**) for the power supply of the electric motor (**51**); altitude of the cap (**3**) can be changed due to the helium being pumped and emptied in to the helium balloons (**48**) from the helium high pressure bottles (**53**), and this rises or descends the cap (**3**), together with telescopic extensions (**33**) and (**34**) the chimney's upper cylindrical part (**24**).

11. The solar windmill of claims 1, 8, 9, and 10, **characterized in that** in the cap (**3**), apropos in its cabin (**46**) is a suction pipe (**49**), which connects the chimney (**2**), with the air gap (4**0**); the suction pipe (**49**) passes through the entire cabin (**46**), and has one more function, which is to be the last stop for the elevator, if its use is foreseen. With an elevator, material goods and people could be elevated up to the cap (**3**).

12. The solar windmill of claima 1, 8, 9, 10, and 11, **characterized in that,** the electrical fans with rudder (**55**), serve to propel the cap (**3**), when it is separated from the chimney (**2**) and when it takes on the role of an airship with its own energy source, where the electric fans use the electricity stored in batteries (**52**) charged with electricity produced in the solar windmill, and where a wheels (**56**), are used for landing the airship wherever it is necessary.

Abstract

This invention refers to the solar windmill made of three main parts: collector 1, chimney 2 and cap 3.

Collector 1 consists of upper glass part 4 and lower plastic part 5. Lower plastic part 5 has transparent plastic roof planes 20 (which can partially rotate around the axis: μ, η, ξ). Roof planes 20 stands on border wals 21, in between the wals are slopes 7, and all of them together form sectors 19. All sectors 19 aligned side by side in a circle, form the lower part 5. In the middle of the lower plastic circle 5 there is a circular hole, in which there is cylindrical upper glass part 4 on the way that in extension of sectors 19 there exists a spiral entrance halls or spaces in between the spiral wals 18 which starts from pylons 11 and in the form of spirals goes to the rotor 27. Between the spiral walls 18, before the rotor 27 there are sensors 17 for air pressure and flow, on which basis the opening angle of solenoid valves 16 (doors) is regulated with compute guidance, and air inflow to the rotor 27.

Chimney 2, in its composition includes the rotor 27 (with electric generator 32), because it is based in the expanded part 26 of the chimney 2, on that way chimney 2 is empty inside with its entire height. External diameter of the rotor 27 corresponds to the internal diameter of the expanded part 26, and the inner diameter of rotor 27 is closely equal to the external diametar of the upper cylindrical part 24, both connected via a conical part 25. The upper cylindrical part 24 has telescopic extensions 33 and 34 which can fold and extract optionally. The lower expanded part 26 is used for the rotor 27, which consists of arched segments 37 with blades, a minimum of 6 or more, where each of them can be moved on the arched segmented tracks 36 with bearings, and underneath every arched segment 37 there is a toothed arch lath 35, which transfers circular motion to the system of gears and shafts 31 and then all the way to the electric generator 32, which produces electricity. All arched segments 37, aligned all together on the arched segmented tracks 36, form circular composition, or the rotor 27 which can rotate around vertical axis of the chimney 2.

Cap 3, stands on the top but can rotate around the vertical axes of the chimney 2, attached on the electromagnetic axial bearing 54. Cap 3 can take the wind direction like a weather vane, and perform the role of an amplifier of chimney power. That can be achieved due to wind blowing around cap 3, and it can make zones of low air pressure (---- FIG 3) which suck the air from the air gap 40 of the cap 3, constrained with transparent outer layers 38 and/or 39 and inner layer 41. This way aeration of the cap 3 is increased, and transferred to the chimney 2 through the suction pipe 49 which is placed in the cabin 46.

That is how cap 3 and collector 1, increase draft of chimney 2 and power as well. Cap 3 and collector 1 can absorb Sun rays and/or wind from their surrounding environment, and because of that, the solar wind mill can work whether is sunny and/or a windy day. That is why the solar windmill can be used in all places regardless of latitude, longitude or sea level, without any limitation (such as: dimensions, or weight).

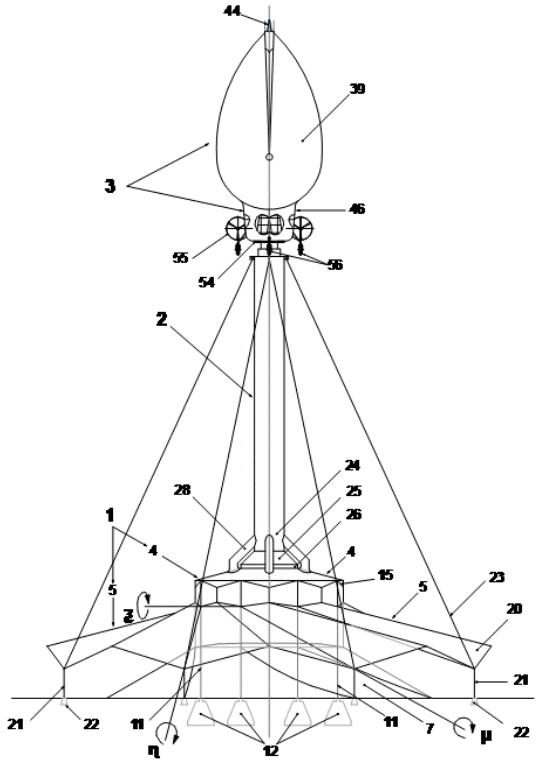

44
39
3
46
55
54
56
2
24
25
26
28
1
4
4
15
5
5
23
20
21
21
22
11
11
7
22
η
12
μ

FIG 1

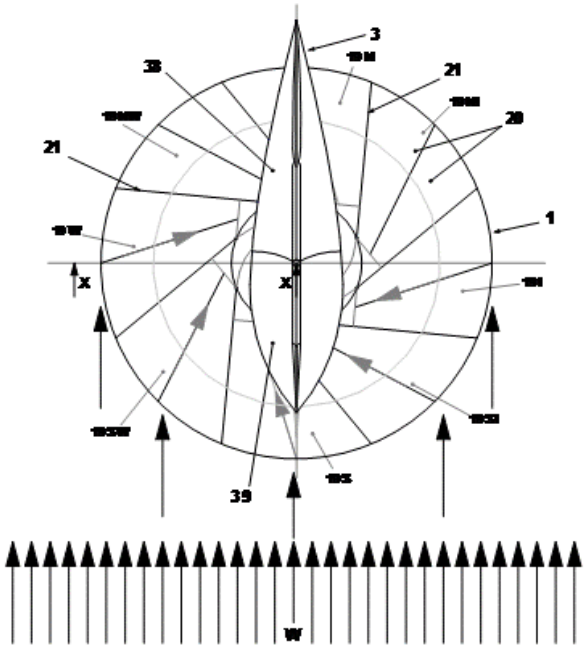

3
38
21
28
21
1
X
X
39
W

FIG 2

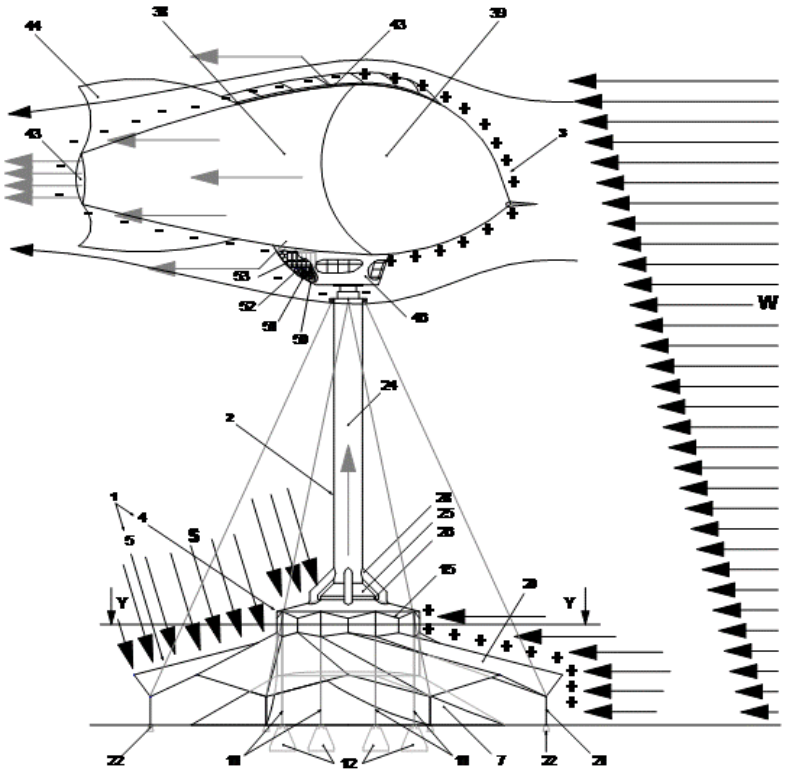


FIG 3

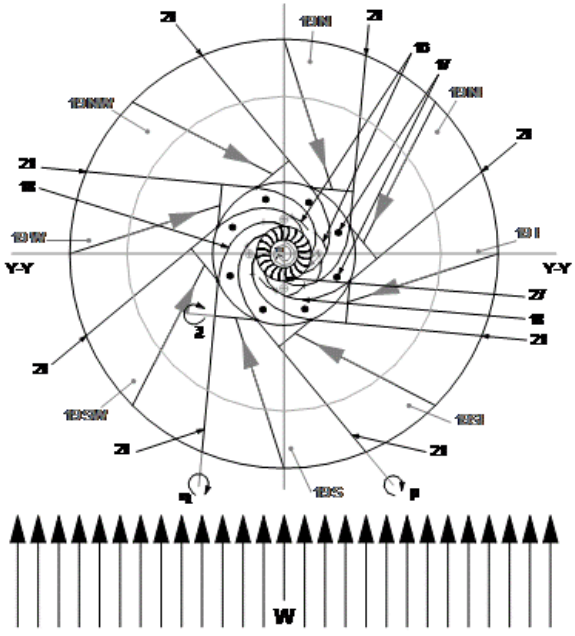


FIG 4

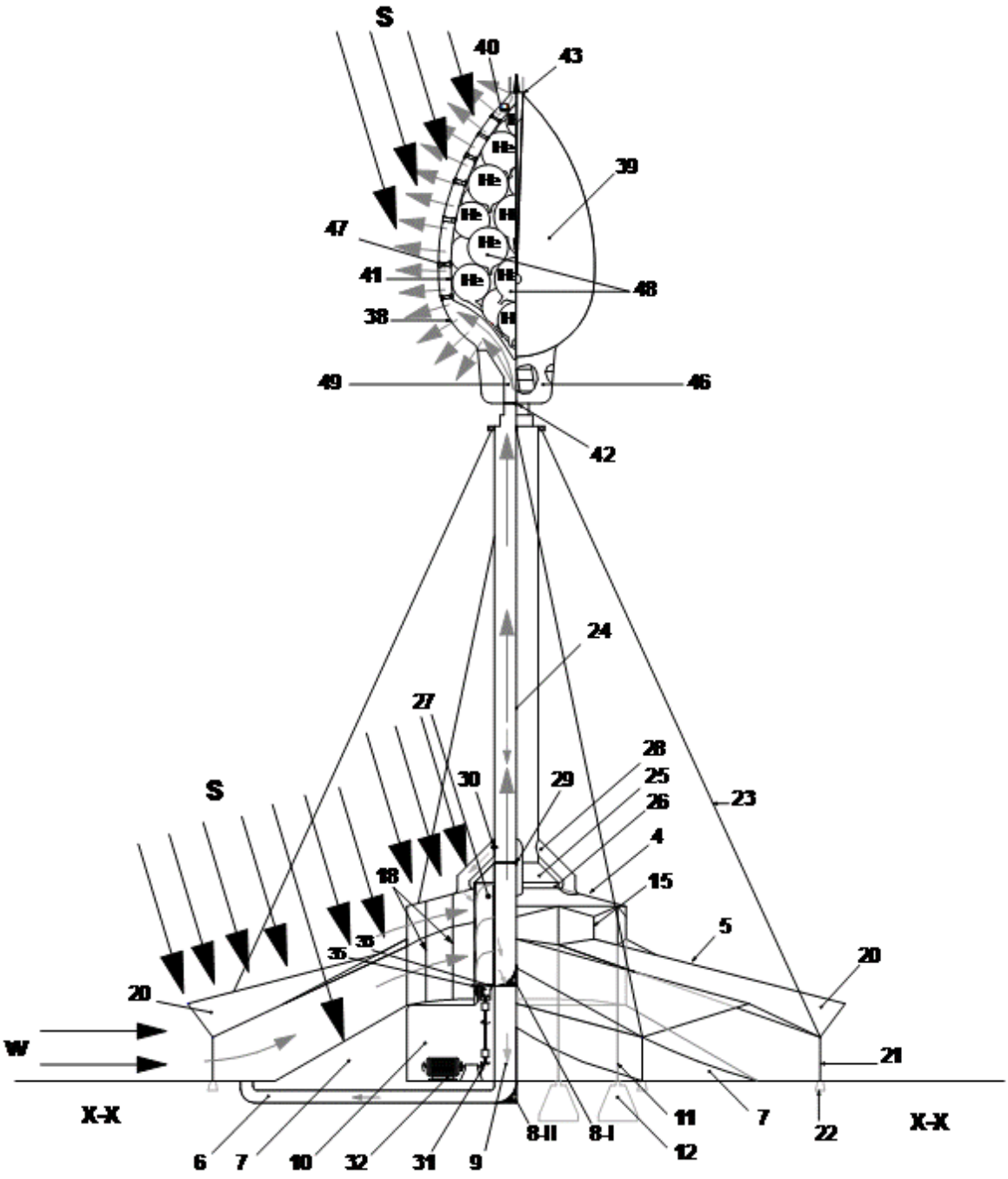
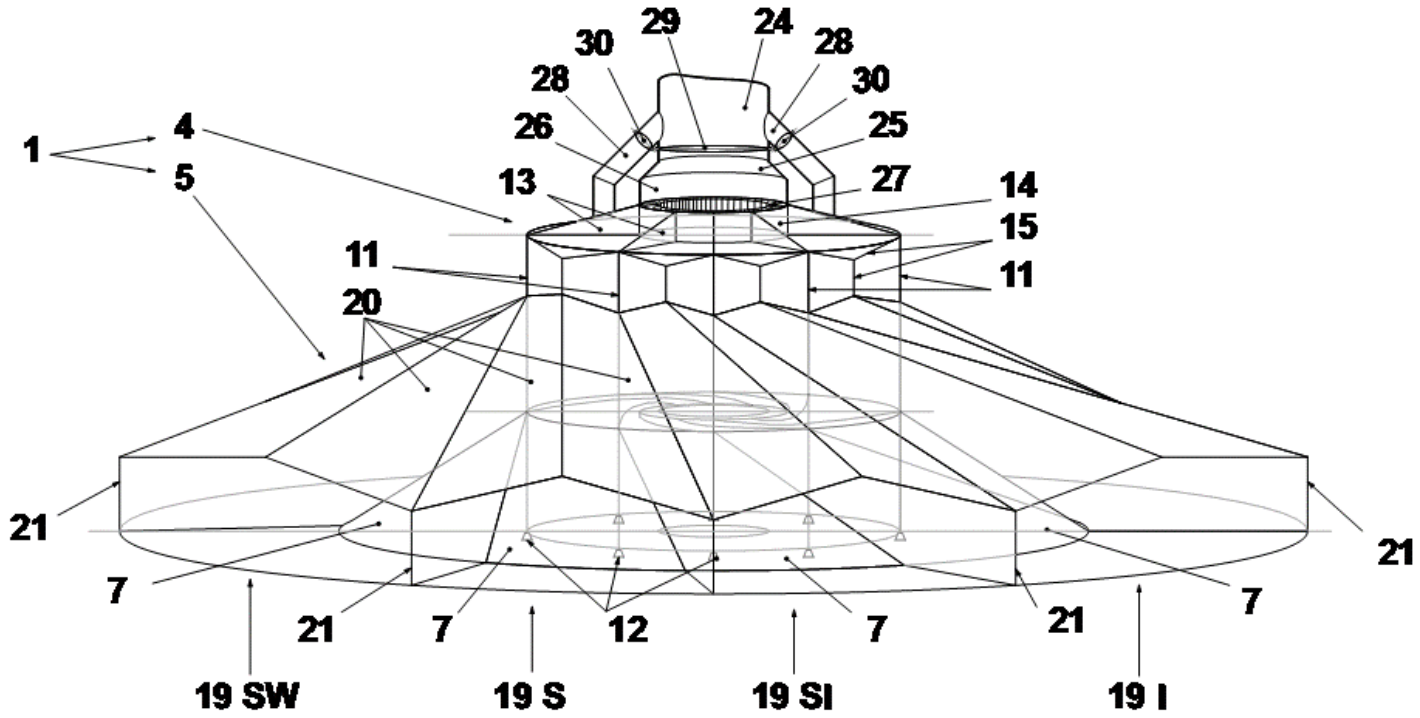

S
40
43
39
47
41
48
38
49
46
42
24
27
28
25
26
23
30
29
4
15
18
5
35
36
20
20
W
21
X-X
X-X
6
7
10
32
31
9
8-II
8-I
11
12
7
22

FIG 5


1
4
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26
25
13
27
14
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11
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21
21
7
21
7
12
7
21
7
21
19 SW
19 S
19 SI
19 I

FIG 6

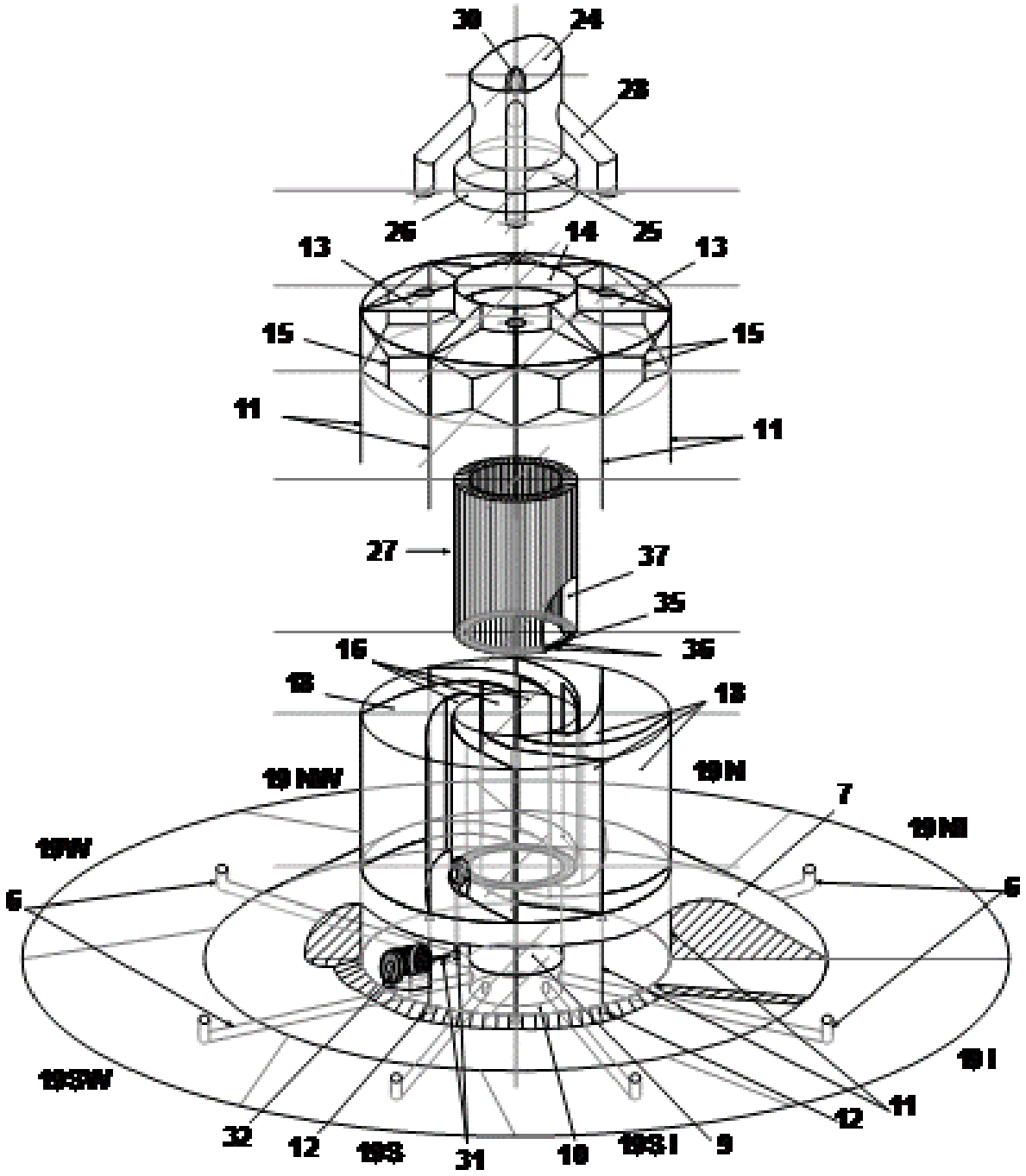
38
24
28
26
14
25
13
13
15
15
11
11
27
37
35
36
16
18
18
19 NW
19N
7
19NE
19W
6
6
19SW
19 I
11
12
32
12
19S
31
19
19SI
9

FIG 7

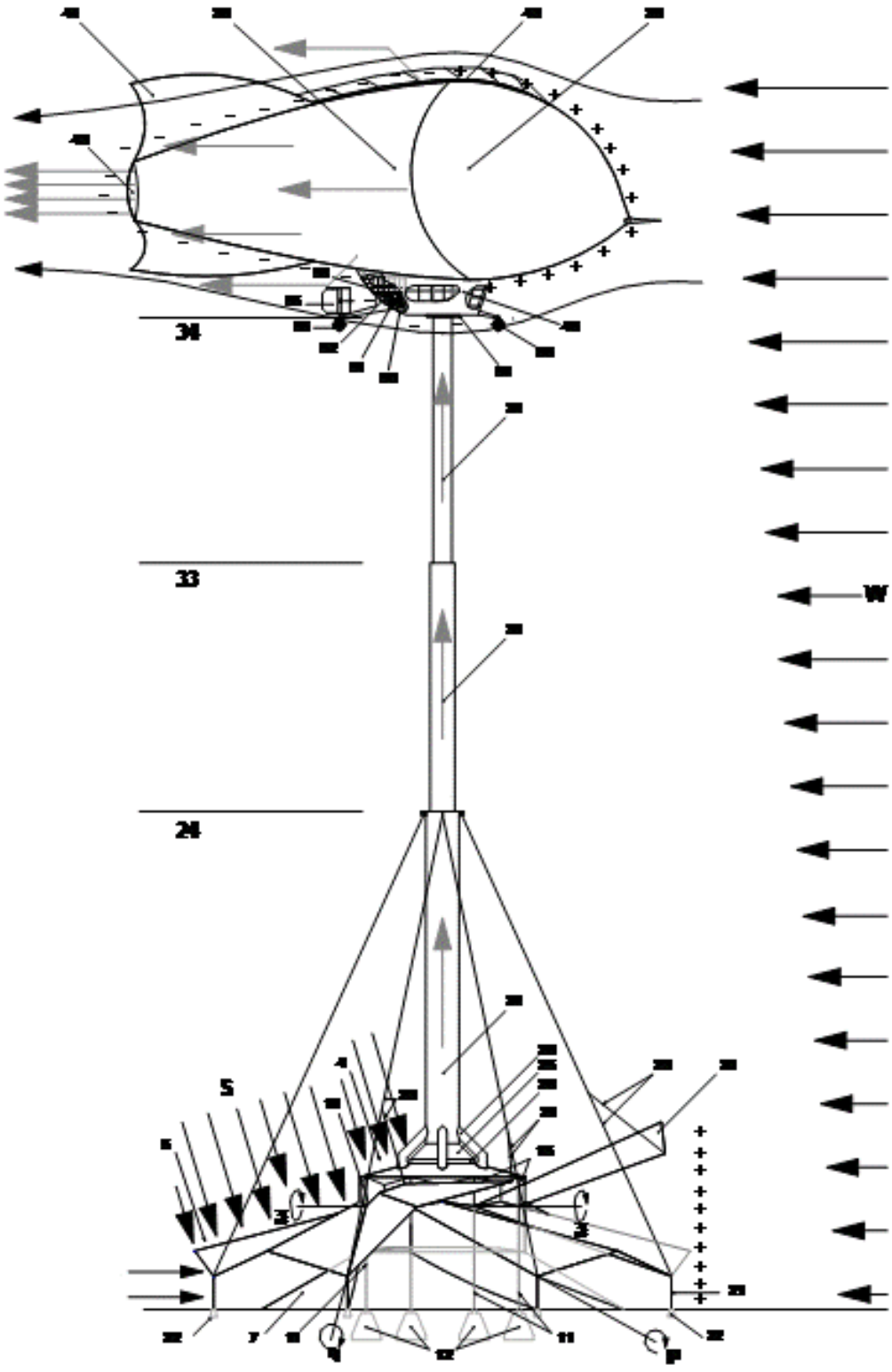

FIG 8

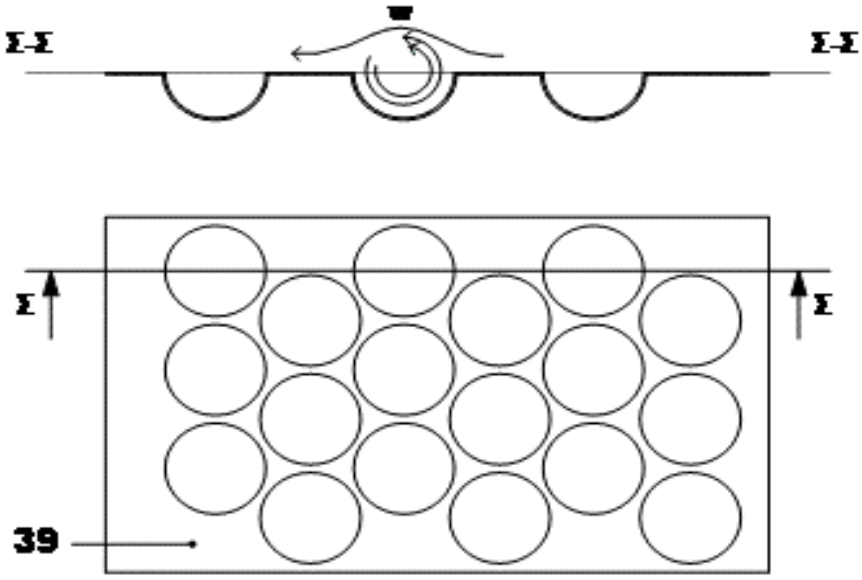

FIG 9

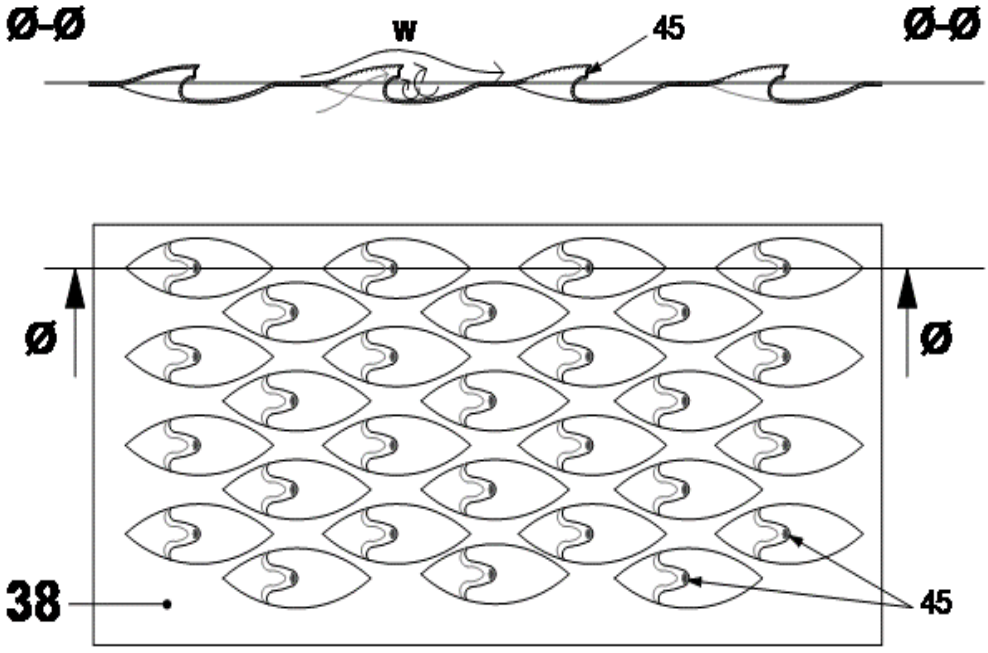

FIG 10