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(51) INT CL:
F03D 3/04 (2006.01) ***F03B 17/06*** (2006.01)

(56) Documents Cited:
WO 2006/039727 A1 **WO 2005/064154 A1**
US 5332354 A **US 5083899 A**
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(58) Field of Search:
UK CL (Edition X) **F1T**
INT CL **F03D**
Other: **EPODOC, WPI**

(54) Abstract Title: **Turbine with fluid scoop**

(57) A vertical axis turbine comprises a bladed rotor 1 and a cover 5 having a shield 6 to deflect fluid from the blades travelling in an upstream direction, the cover 5 also having a scoop 7 to direct fluid onto the blades 1 travelling in an upstream direction, but from the opposite direction so as to provide additional driving force. The turbine is preferably a wind turbine and the scoop 7 may be located on the top or on a side (figures 11 and 12) of the cover 5. If the scoop 7 is mounted on the top of the cover 5, a plurality of directional blades (31, figure 18) may be provided to direct the fluid towards the blades 1 travelling in an upstream direction. A tail fin (8, figure 14) may be provided to control the turbine.

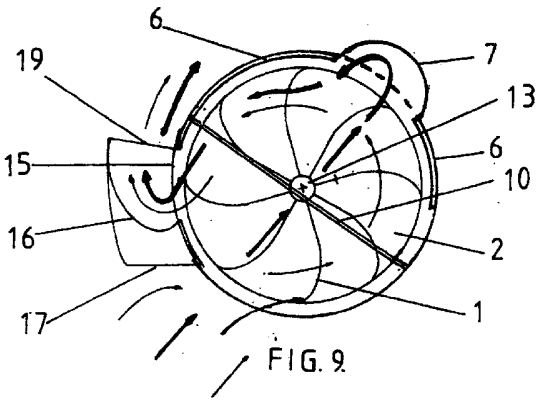

FIG. 9

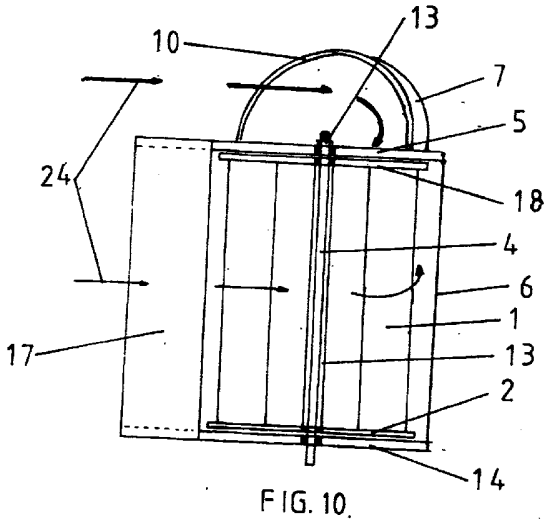

FIG. 10

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

This print takes account of replacement documents submitted after the date of filing to enable the application to comply with the formal requirements of the Patents Rules 2007.

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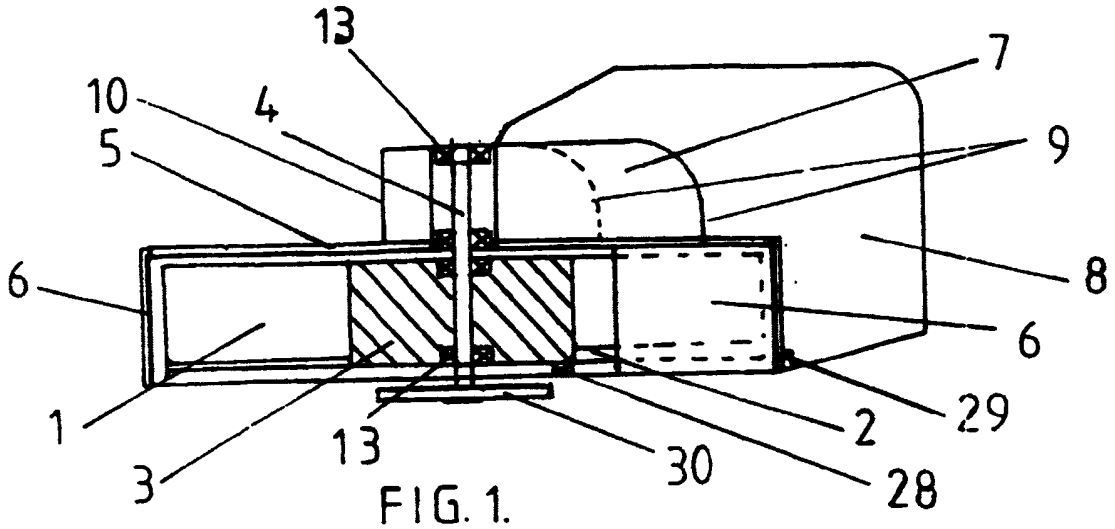

FIG. 1.

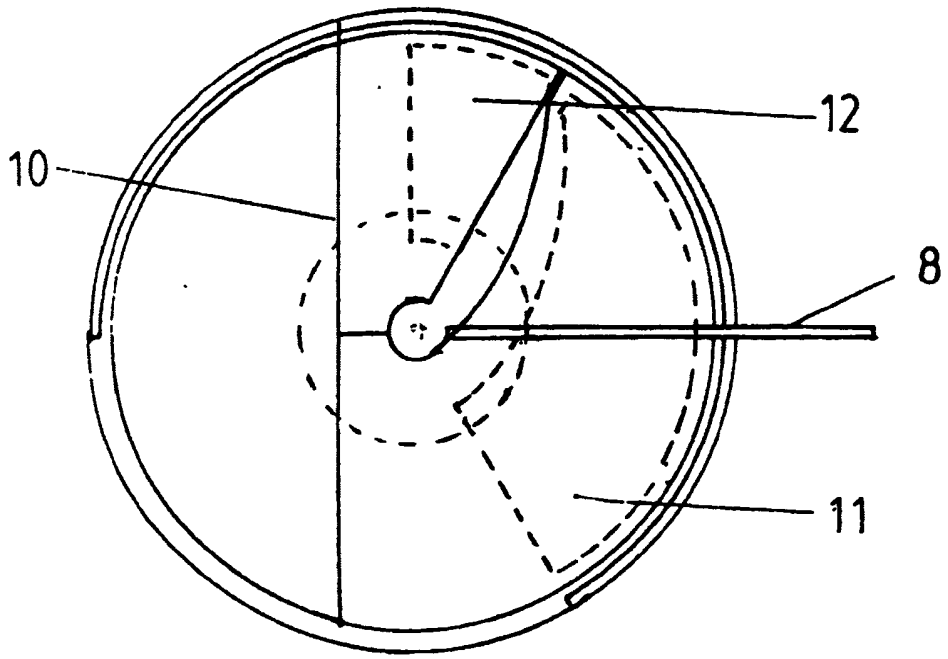

FIG. 2.

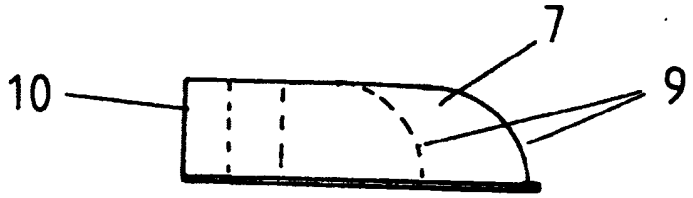

FIG. 3.

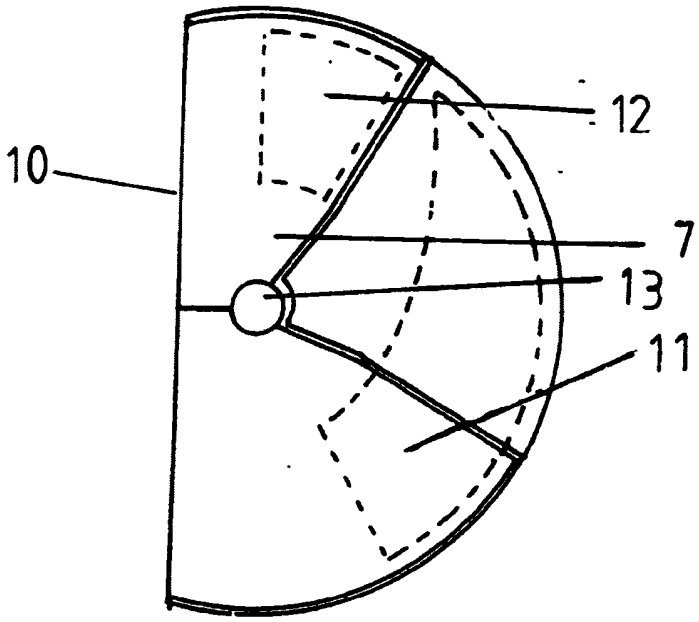

FIG. 4.

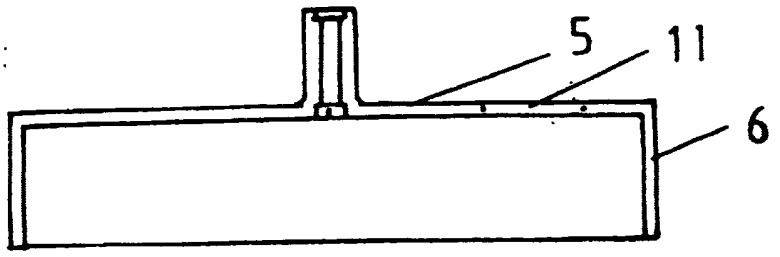

FIG. 5.

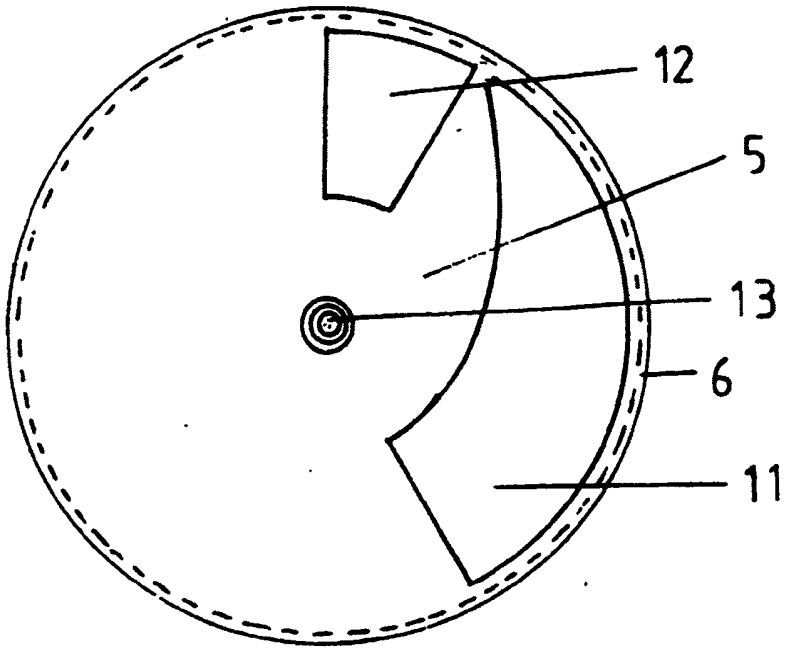

FIG. 6.

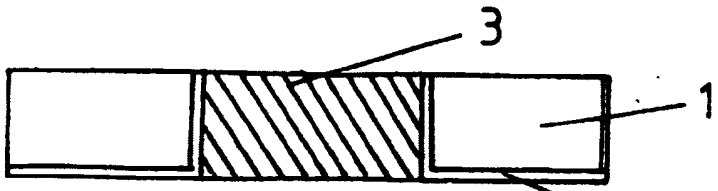

FIG. 7.

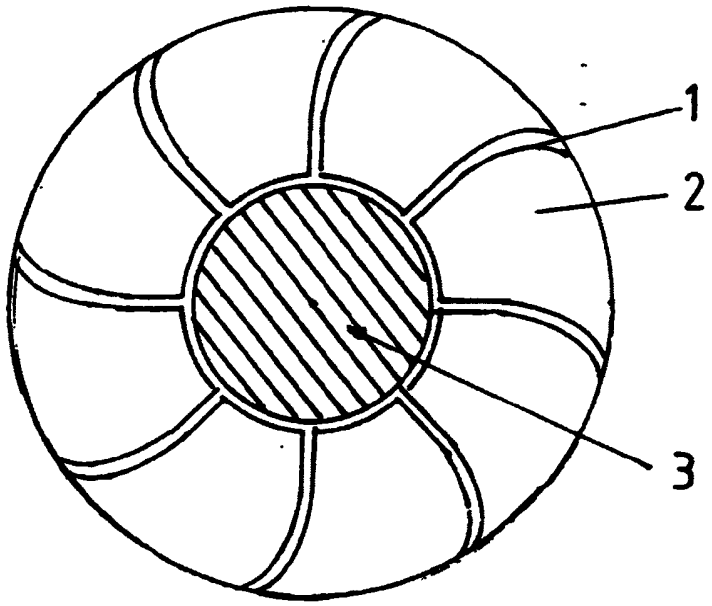

FIG. 8.

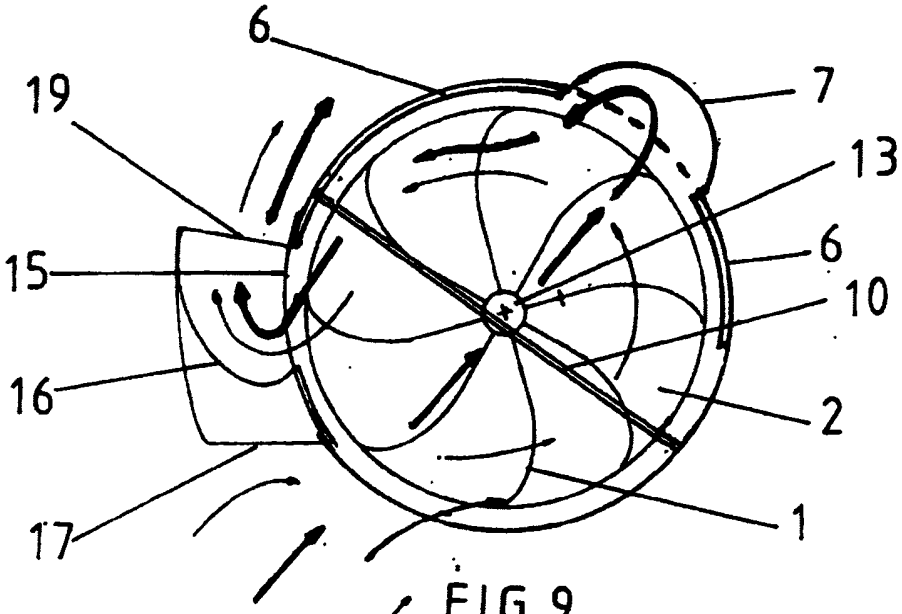

FIG. 9.

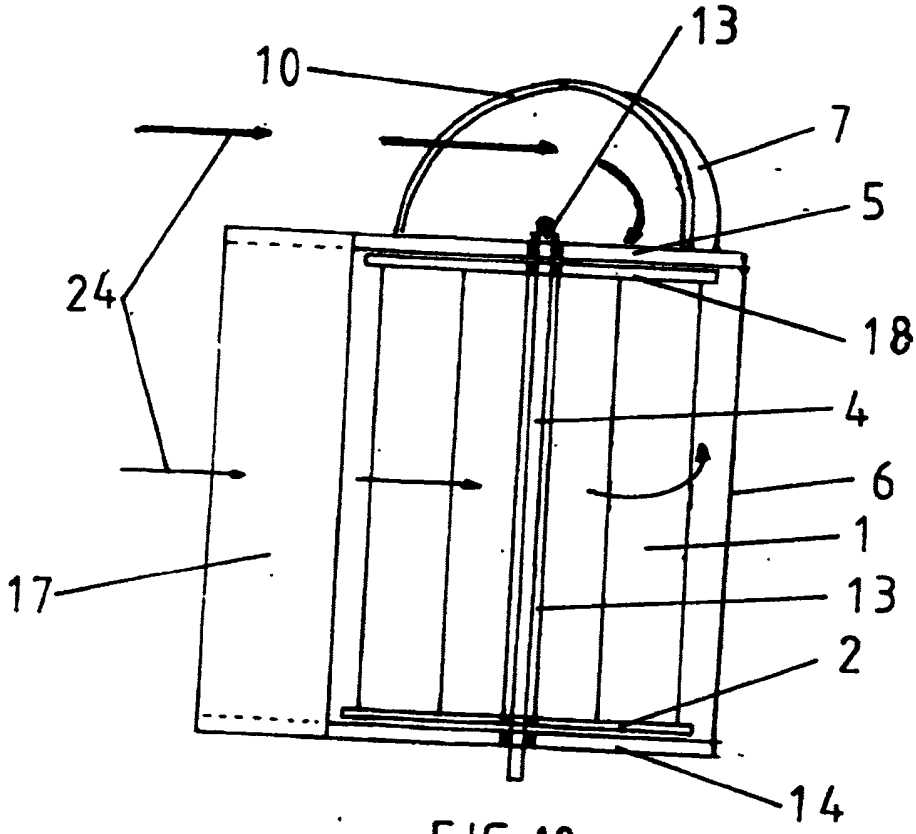

FIG. 10.

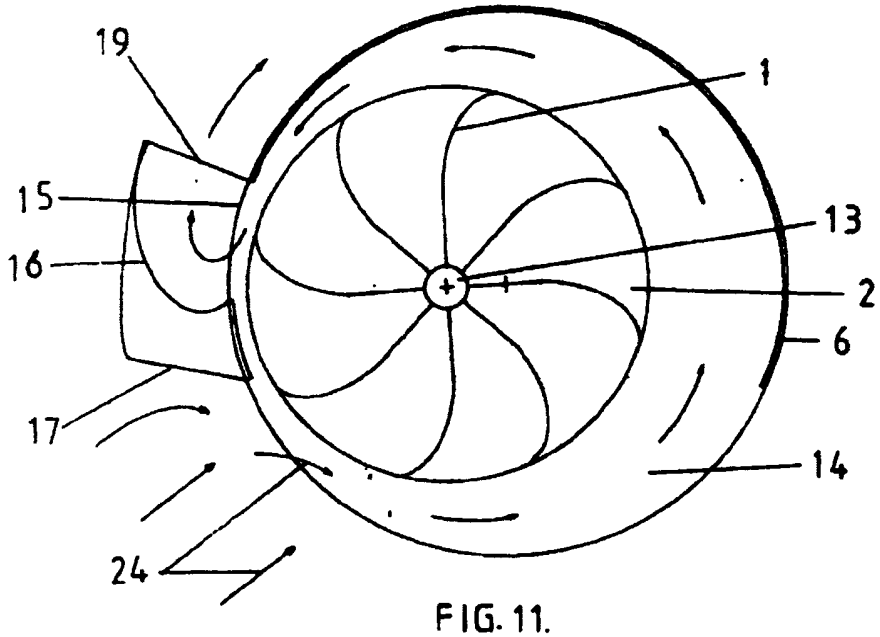

FIG. 11.

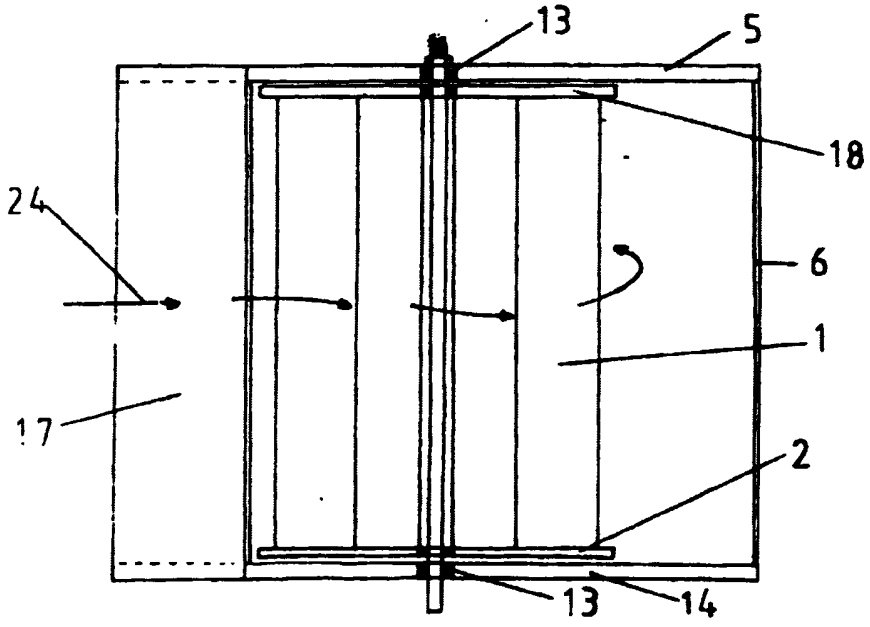

FIG. 12.

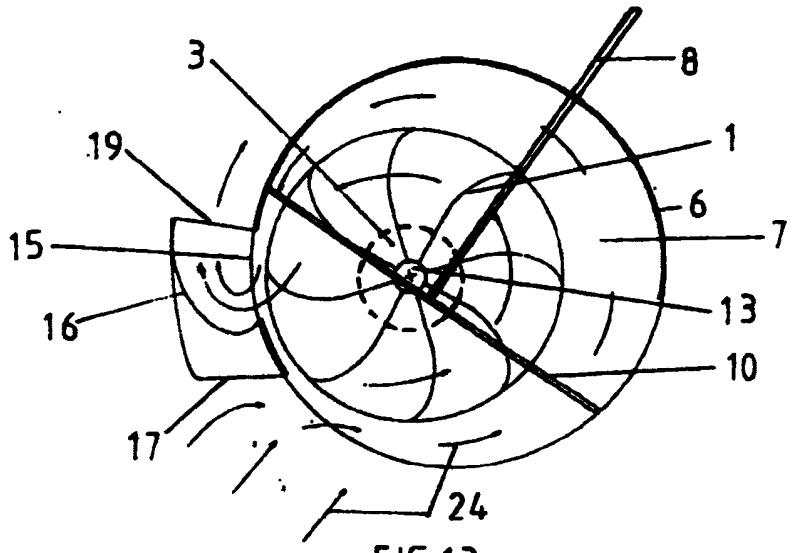

FIG.13.

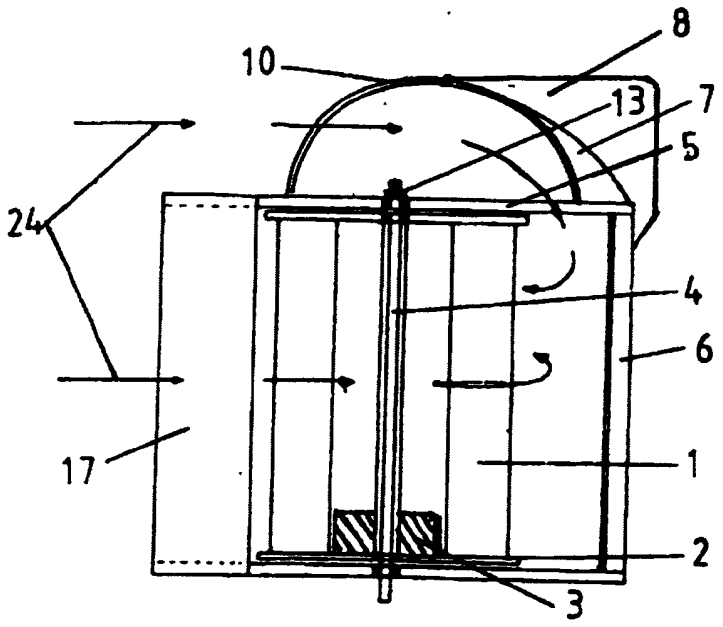

FIG.14.

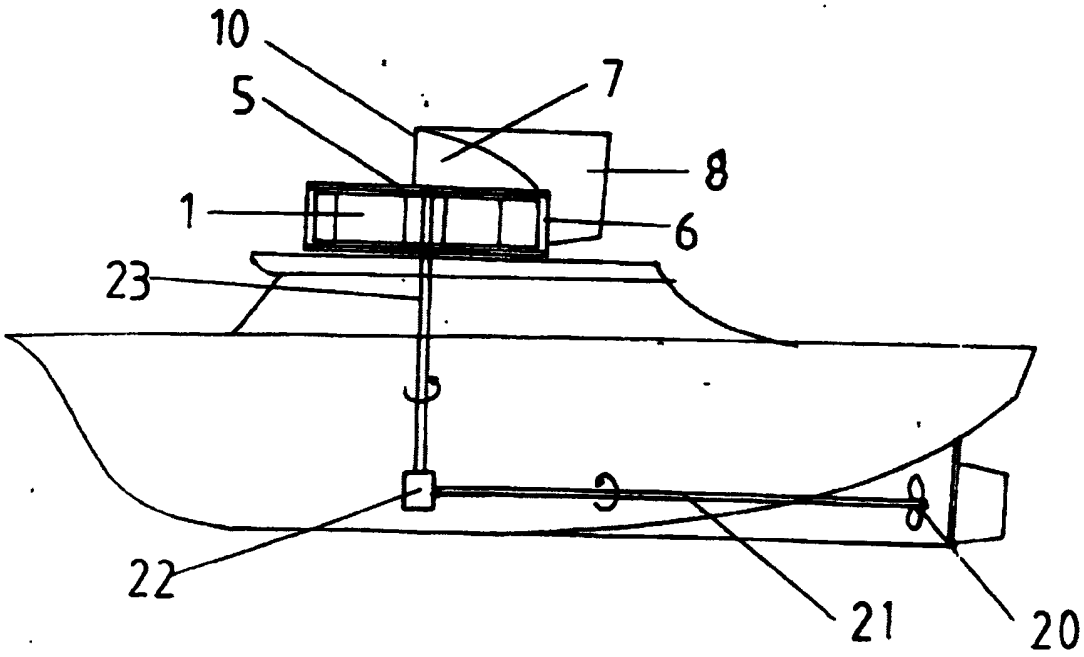

FIG.15.

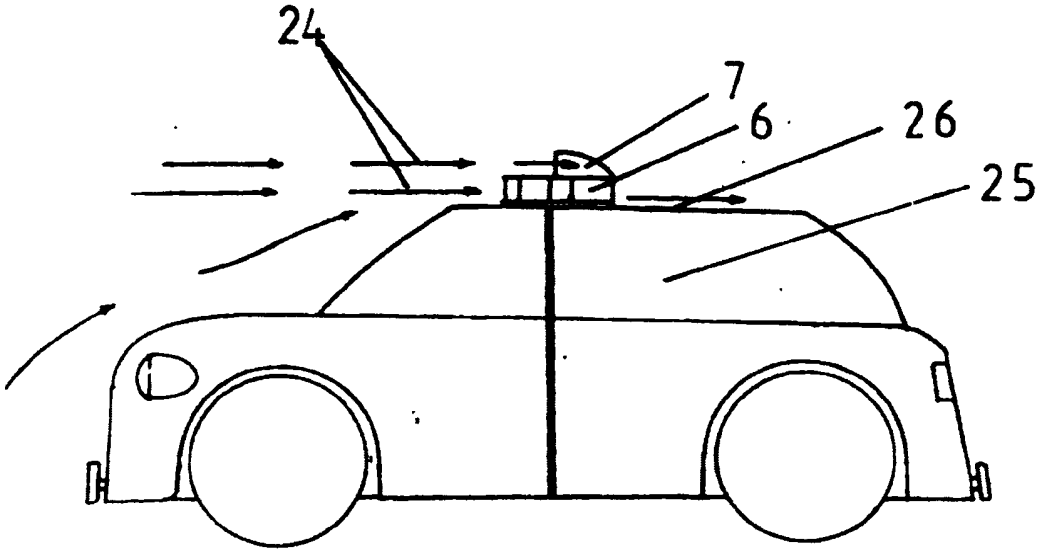

FIG. 16.

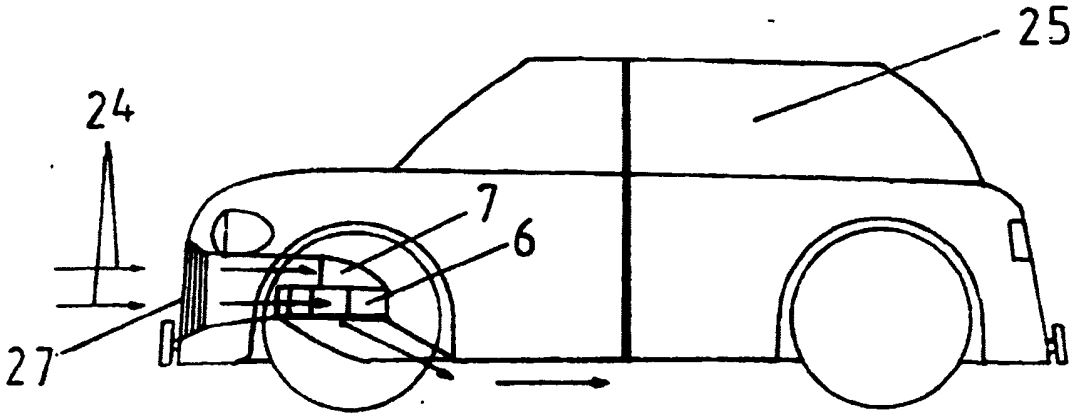

FIG. 17.

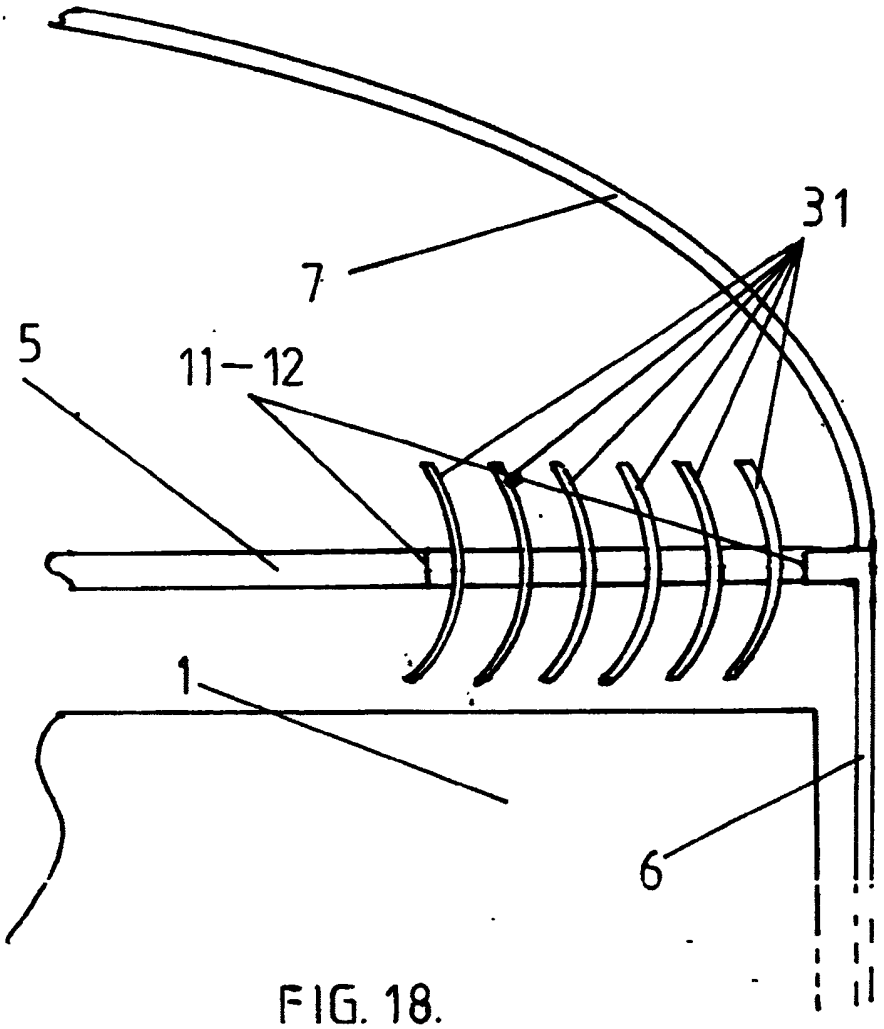

FIG. 18.

Complete Specification for Invention titled

" Improved Rotary Turbine Device "

The following statement is a full description of this invention, including the best method of performing it known to me:

Prior Art.

Rotary Turbine Devices can be used with liquids or gasses, and although this specification deals with wind turbines, it is not restricted to just wind energy. Rotary wind powered devices or more commonly called vertical axis wind turbines are commonly used as Rotary Ventilators, Rotary Turbine Ventilators, and even as Wind Generators, but there poor performance and torque generated has limited such devices to applications which require minimum torque for the area exposed to the wind. The reason for there poor efficiency is due to the positioning and angle of the blade or blades, and the small segment of the power stroke. The blades are driven by the wind for Approximately 180 degrees then for the remainder of the turn, 180 degrees, the blade is effectively being driven, and using up energy to over come wind resistance. Unlike a radial propeller or sail device, commonly called a horizontal axis wind turbine, which has all its blades facing the wind at the same time, with all the blades producing power for 360 degrees or one turn. The advantages of a Rotary wind powered device is its simplicity, as there are no mechanical means required to face the blades into the wind, or follow changes in the wind direction. Unlike the radial propeller (wind generator) or sail device (wind mill), which must be mechanically rotated to keep the blades or sails facing into the direction of the wind. Such devices also

require a means to feather, or reduce there efficiency in strong winds, or they can achieve speeds beyond there mechanical and structural limits, causing them to self destruct. Machines of this type also require a large flat surface area facing the direction of the wind, for the blades to rotate in, and operate best in clean air, so the rotating blades are held off the ground as in a wind mill or current wind generators, such devices are often considered as having an unacceptable visual appearance on the local environment, as they are readily seen from a long distance away. Because the outer propeller or sail tips travel at very high speeds they create a lot of noise, which can confine there use to away from populated areas.

The object of this invention is to provide a rotary wind powered device of the vertical shaft wind turbine type which is driven by the wind for the full 360 degrees or one turn of the shaft, and by the use of a wind shield and wind scoop or scoops fitted above or on the side of the wind shield, to use the wind to drive the turbine blades when they are rotating into the direction of the wind. This will mean the that the turbine blades are driven by the wind for the full 360 degrees or one turn of the shaft, and are not using power to move into the wind. This Improved Rotary Wind Powered Device will also be suitable for use on an electric vehicle, either mounted on the roof or in the front section of the vehicle. It will have the advantage of having the wind shield fixed in a given position, or allowed to rotate to find the direction of the strongest wind. The wind scoop or scoops are positioned to collect the clean air and then to blow the collected air on to the

turbine blades, so as to drive them in the same direction of rotation as the wind. The wind shield can be used to feather the oncoming wind by simply rotating the wind shield, with the air scoops attached, so that less of the oncoming wind can act on the turbine blades, reducing there speed and torque generated. The front of the wind scoops are mounted in front of the center line of the turbine blades so as to reduce the amount of mechanical effort needed to control the wind scoops and wind shield facing the desired direction. This type of wind turbine does not require the large diameter sweep of propeller blades, and does not have the very high surface speeds of the propeller tips, which creates lots of noise, the base of the turbine blades has a much smaller diameter, and the turbine blades rely on surface area, more than propeller tip speeds.

In the Drawings.

Fig.1. Shows the cross section view of a wind turbine, fitted with a generator, with wind scoops fitted above the rotor, so the wind which would normally pass over the wind turbine can be deflected on to the turbine blades.

Fig.2. Shows the plan view of a wind turbine as in fig.1.

Fig.3. Shows the side view of the upper air scoops, illustrated in fig.1.

Fig.4. Shows the Plan view of the upper air scoops, illustrated in fig.1.

Fig.5. Shows the side view of the wind shield, illustrated in fig.1.

Fig.6. Shows the plan view of the wind shield, illustrated in fig.1.

Fig.7. Shows the side view of the wind turbine rotor, illustrated in fig.1.

Fig.8. Shows the plan view of the wind turbine rotor, illustrated in fig.1.

Fig.9. Shows the plan view of the wind turbine illustrated in Fig, 1. with the upper scoop directing the air through an opening in the wind shield.

Fig.10. Shows the side view of the wind turbine illustrated in Fig. 1. with the upper scoop directing the air through an opening in the wind shield.

Fig.11. Shows the plan view of a wind turbine with wind scoops fitted on the sides of the wind shield.

Fig.12. Shows a side view of a wind turbine with wind scoops fitted on the side of the wind shield.

Fig.13. Shows the Plan view of a wind turbine as in Fig. 9 with an upper wind scoop fitted.

Fig.14. Shows the Side view of a wind turbine as in Fig.10 with an upper wind scoop fitted.

Fig. 15. Shows a wind turbine fitted to a boat.

Fig. 16. Shows a vehicle with the Improved Rotary Wind Powered Device fitted with a generator mounted on the roof.

Fig. 17. Shows a vehicle with the Improved Rotary Wind powered Device fitted with a generator mounted behind the grill or lower front of the vehicle.

Fig. 18. Shows the openings in the top cover fitted with curved direction vent blades to force the air in the above scoop to act on the blades of the turbine from a predetermined direction.

Description of this invention.

This Invention in its simplest form, consists of referring to Fig.1.wq&2. a rotary wind powered device, which has a round base 2., which has a center shaft 4. on bearings at its center. There are turbine blades 1. radiating from the center of the base 2. The turbine blades 1. are fixed to the bottom rotating base 2. Fitted above the top of the turbine blades 1. is a flat section of sheet material with a aero dynamically shaped curved air dome or air scoop 7. which has two individual sections going across the width of the bottom rotating base 2. This top cover 5. is independent of the bottom base 2., and can rotate independently to the base 2. The top cover 5. has aero dynamically shaped holes 11, 12, to correspond with the two individual sections in the air scoop 7.,these aero dynamically shaped holes 11, 12, in the top cover 5. are fitted with curved direction vent blades 31. to force the air in the above scoop 7. to act on the blades 1. or sales which are not being driven by the wind, from a predetermine direction. This top cover 5. has a wind shield 6. fitted to prevent the on coming wind directly acting upon the returning turbine blades 1. This has the effect of deflecting or changing the direction of the wind, indicated by arrows on to the top of the edges of the turbine blades 1. passing between the wind shield 6. and the base of the turbine blades 2., so it continues to drive the turbine blades 1., even when it normally would not be driven. The wind acts on the curved turbine blades 1. on one side of its rotation to provide a power stroke, but on the returning side the inner faces of the air scoop 9. directs the wind down on to the

curved surface at the back of the turbine blades 1., which forces the returning turbine blades 1. in the same direction as the power stroke. In Fig.1. with two scoop sections in the air scoop, the wind powers the turbine blades for 120 degrees, the number 11 opening from 120 degrees to 240 degrees, and number 12 opening from 240 degrees to 360 degrees. The air scoop 7. would also have a frontal opening area to optimise performance as if the wind was directly coming on to the turbine blades 1. The inner faces of the air scoops 9. are arranged to have the incoming air channeled to provide a blast of air to act upon the turbine blades 1., continuing to drive them in the same direction of rotation, effectively providing three power strokes for one revolution. It may be desirable to allow the air to escape between the bottom of the wind shield 6. and the outer edge of the turbine base 2. It may also be more desirable to make the leading edge of the air scoop 10. straight across the width of the turbine blades 1., and to fit a directional fin 8. to the outside back of the air scoop 7.to ensure that the opening 10. is facing directly into the wind. It will depend on the application of this improved rotary wind powered device. Fig.3, Fig.4, Fig.5, Fig6, Fig.7 and Fig.8. are showing views of the components that go together to make up Fig.1 and Fig.2 the dimensions and shape of this Improved Rotary Turbine Machine will be to suit application and performance requirements. It may also be desirable to feed the wind into openings on the side of the wind shield 6., instead of through the openings in the top cover 11., 12. In Fig.9, Fig.10, Fig.11, Fig.12, Fig.13 and Fig. 14 the air scoop 7. has been moved to the side, of the wind shield 6. and

incorporated with the wind shield 6. The wind shield 6. has been moved out away from the base of the turbine blades 2., but the operation and object of the invention is still the same. In Fig. 9, Fig.10, Fig.11, Fig.12, Fig.13 and Fig.14 the turbine blades 1. have a top base 18 and a bottom base 2., the wind acts on the turbine blades 1. where it is trapped by the wind shield 6. it changes direction 24. and moves in a reducing area, while still maintaining intensity, until it reaches the outlet on the wind shield 15. and is exhausted by the wind deflector on the wind outlet 16. through the outlet opening 19. In Fig.11, Fig. 12, Fig. 13. and Fig.14, the wind deflector 17. is fitted in front of the wind deflector on the wind outlet 16. and directs the oncoming wind onto the turbine blades 1. Fig. 9, Fig.10, Fig.13 and Fig.14.shows the wind shield 6. fitted with a top cover 5. and a bottom cover 14. which suits the design when the wind shield 6 gets to wide, it needs the support. Fig.13. and Fig.14. are the same as Fig.11. and Fig.12. but with an upper wind scoop 7. fitted to increase wind velocity. Fitted to this rotary wind powered device Fig.1 can be a mechanical system, or magnetic devise 29. which when the rotation speed of the turbine blades 1. obtain a predetermined rotational speed, the device 29. will cut in, or be turned on to turn the air scoop 7. to face away from the direction of the wind, which will reduce the amount of air that can act on the turbine blades 1., reducing there efficiency. The device 29. described above, could be to fit with permanent magnets 29. on the perimeter of the directional scoop 8., so when a predetermined speed is reached, or a predetermined electric current is generated, an electric coil 28. mounted on the

fixed, stationary mounting base 30. will be switched on to act with the permanent magnets 29 in the perimeter of the base for the turbine blades 2. and act as a braking system, which will prevent the rotational speed exceeding a desirable level, or if a generator 3. is fitted in the center of the base of the turbine blades 2. it could be electronically controlled to act as a braking system. A top cover tail or direction fin 8. is shown in Fig.1 which is there to have the upper air scoops 7. facing the direction of the wind, indicated by arrows 24. but in some applications, like in Fig.17. when fitted behind the grill 27 at the front of a vehicle, the upper air scoops 7 will be fixed, and not allowed to rotate. When fitted to the roof of a vehicle 26. Fig. 16 it may be desirable to fix the upper air scoops 7. in the forward facing direction when the vehicle 25. is moving, but be able to be released when the vehicle 25. is parked so it can rotate to find the direction of the wind 24. Those skilled in the art would know that the center area of the turbine blades 1. provides only a small amount of the power stroke, and that the further away from the center provides a greater mechanical advantage, for this reason a generator 3. could be incorporated into the center of the base 2., with very little loss of efficiency of the rotary wind powered device, but with a saving in weight and area, to produce a compact wind generator. Those skilled in the art would also know that this devise could have one or more wind scoops 7 fitted either above the turbine blades fig.1. or on the sides of the wind shields fig.9 and fig.10., In Fig.15. it could also by fixing the center shaft 4. to the base 30. , and mounting it in bearings provide a power take off shaft 23., which could be used

for what ever use was required. Such a system could be used on a sailing ship Fig.15, by replacing the mast and sails, and fitting a rotary wind powered device, and connecting the power take off shaft 23 through a gearbox 22 connected to a propeller shaft 21.to an underwater propeller 20., the sailing ship could be powered in any direction, regardless of the direction of the wind. A rotary wind powered device would be smaller, have an overall smaller wind sail or propeller area, and be visually pleasing on the environment, and because of the reduced size, particularly the outside diameter, the surface speeds on the turbine blades 1. would reduce noise.

I Claim.

1. A Rotary turbine device which has a rotating base, onto which are fixed one or more turbine blades, or sails which when acted upon by the oncoming liquid or gas rotate in the direction the liquid or gas is moving, this base with fixed turbine blade or blades is fitted with a cover that has an attached shield to protect the returning blade or blades of the turbine from the oncoming liquid or gas, this cover has an aero dynamically shaped scoop or scoops fitted with directional blades attached to the top, so the on coming liquid or gas can be diverted into the tunnel formed by the turbine base, the cover and attached shield, to drive the turbine blades that are moving in the opposite direction of the oncoming wind, the cover and shield can be fixed in position, rotated by a tail fin in the liquid or gas flow or by mechanical means to feather and control the speed of the rotation of the turbine base with the fixed turbine blades, preventing it from reaching rotational speeds beyond its mechanical and structural limits.

2. A wind powered turbine which has a rotating base, onto which are fixed one or more turbine blades, or sails which when acted upon by the oncoming wind rotate in the direction of the wind, this base with fixed turbine blade or blades is fitted with a cover that has an attached wind shield to protect the returning blade or blades of the turbine from the oncoming wind, this cover has a aero dynamically shaped wind scoop or scoops fitted with directional blades attached to the top, so the on coming wind can be diverted through the top of the cover into the top of the tunnel formed by the turbine base, the cover and attached wind shield, to drive the turbine blades that are moving into the direction of the

oncoming wind, the cover and shield can be fixed in position, rotated by a tail fin in the wind flow or by mechanical means to feather and control the speed of the rotation of the turbine base with the fixed turbine blades, preventing it from reaching rotational speeds beyond its mechanical and structural limits.

3. A wind powered turbine which has a rotating base, onto which are fixed one or more turbine blades, or sails which when acted upon by the oncoming wind rotate in the direction of the wind, this base with fixed turbine blade or blades is fitted with a cover that has an attached wind shield to protect the returning blade or blades of the turbine from the oncoming wind, this cover has a wind scoop attached to the top, so the on coming wind can be diverted through openings in the side of the wind shield into the tunnel formed by the turbine base, the cover and attached wind shield, to drive the turbine blades that are moving into the direction of the oncoming wind, the cover and shield can be fixed in position, rotated by a tail fin in the wind flow or by mechanical means to feather and control the speed of the rotation of the turbine base with the fixed turbine blades, preventing it from reaching rotational speeds beyond its mechanical and structural limits.

4. A wind powered turbine which has a rotating base, onto which are fixed one or more turbine blades, or sails which when acted upon by the oncoming wind rotate in the direction of the wind, this base with fixed turbine blade or blades is fitted with a cover that has an attached wind shield to protect the returning blade or blades of the turbine from the oncoming wind, this cover has a wind scoop

attached to the top, so the on coming wind can be diverted into the tunnel formed by the turbine base, the cover and attached wind shield, to drive the turbine blades covered by the wind shield into the direction of the oncoming wind, the cover and shield can be fixed in position, rotated by a tail fin in the wind flow or by mechanical means to feather and control the speed of the rotation of the turbine base with the fixed turbine blades, preventing it from reaching rotational speeds beyond its mechanical and structural limits.

Amendments to the claims have been filed as follows:

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I Claim.

1. A Rotary turbine device which **relies on the surface area of the blades or sails, not on aero dynamics, to drive the blades or sails for the full 360 degrees of every one turn and** has a rotating base, onto which are fixed one or more turbine blades, or sails which when acted upon by the oncoming liquid or gas rotate in the direction the liquid or gas is moving, this base with fixed turbine blade or blades is fitted with a cover that has an attached shield to protect the returning blade or blades of the turbine from the oncoming liquid or gas, this cover has an aero dynamically shaped scoop or scoops fitted with directional blades attached to the top, so the on coming liquid or gas can be diverted into the tunnel formed by the turbine base, the cover and attached shield, to drive the turbine blades that are moving in the opposite direction of the oncoming wind, the cover and shield can be fixed in position, rotated by a tail fin in the liquid or gas flow or by mechanical means to feather and control the speed of the rotation of the turbine base with the fixed turbine blades, preventing it from reaching rotational speeds beyond its mechanical and structural limits.

2. A wind powered turbine which **relies on the surface area of the blades or sails, not on aero dynamics, to drive the blades or sails for the full 360 degrees of every one turn and** has a rotating base, onto which are fixed one or more turbine blades, or sails which when acted upon by the oncoming wind rotate in the direction of the wind, this base with fixed turbine blade or blades is fitted with a cover that has an attached wind shield to protect the returning blade or blades of the turbine from the oncoming wind, this cover has a aero

dynamically shaped wind scoop or scoops fitted with directional blades attached to the top, so the on coming wind can be diverted through the top of the cover into the top of the tunnel formed by the turbine base, the cover and attached wind shield, to drive the turbine blades that are moving into the direction of the on coming wind, the cover and shield can be fixed in position, rotated by a tail fin in the wind flow or by mechanical means to feather and control the speed of the rotation of the turbine base with the fixed turbine blades, preventing it from reaching rotational speeds beyond its mechanical and structural limits.

3. A wind powered turbine which **relies on the surface area of the blades or sails, not on aero dynamics, to drive the blades or sails for the full 360 degrees of every one turn and** has a rotating base, onto which are fixed one or more turbine blades, or sails which when acted upon by the oncoming wind rotate in the direction of the wind, this base with fixed turbine blade or blades is fitted with a cover that has an attached wind shield to protect the returning blade or blades of the turbine from the oncoming wind, this cover has a wind scoop attached to the top, so the on coming wind can be diverted through openings in the side of the wind shield into the tunnel formed by the turbine base, the cover and attached wind shield, to drive the turbine blades that are moving into the direction of the oncoming wind, the cover and shield can be fixed in position, rotated by a tail fin in the wind flow or by mechanical means to feather and control the speed of the rotation of the turbine base with the fixed turbine blades, preventing it from reaching rotational speeds beyond its mechanical and

structural limits.

4. A wind powered turbine which **relies on the surface area of the blades or sails, not on aero dynamics, to drive the blades or sails for the full 360 degrees of every one turn and** has a rotating base, onto which are fixed one or more turbine blades, or sails which when acted upon by the oncoming wind rotate in the direction of the wind, this base with fixed turbine blade or blades is fitted with a cover that has an attached wind shield to protect the returning blade or blades of the turbine from the oncoming wind, this cover has a wind scoop attached to the top, so the on coming wind can be diverted into the tunnel formed by the turbine base, the cover and attached wind shield, to drive the turbine blades covered by the wind shield into the direction of the oncoming wind, the cover and shield can be fixed in position, rotated by a tail fin in the wind flow or by mechanical means to feather and control the speed of the rotation of the turbine base with the fixed turbine blades, preventing it from reaching rotational speeds beyond its mechanical and structural limits.

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Application No: GB0625629.1 **Examiner:** Alex Swaffer

Claims searched: 1-4 **Date of search:** 3 April 2008

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1-4	AU2005203573 A1 (Ettridge): See whole document.
X	1, 2, 4	US5332354 A (Lamont): See wind scoop 26 on top of cover 22 in figure 1, and the wind from the scoop being directed onto the upstream traveling blades in figures 2 and 3.
X	1, 3, 4	WO2005/064154 A1 (Johnson): See wind scoop 9 in figure 1.
X	1, 3, 4	US5083899 A (Geph Enterprises Inc): See wind scoop 27 and directional blades 28 in figure 1.
X	1, 3, 4	US2004/012207 A1 (Siemens AG): See wind scoop 5 and directional blades 3 in figure 1.
X	1, 3, 4	WO2006/039727 A1 (Des Ligneris): See wind scoops 28 in figure 6.

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^{X} :

F1T

Worldwide search of patent documents classified in the following areas of the IPC

F03D

The following online and other databases have been used in the preparation of this search report

EPODOC, WPI

International Classification:

Subclass	Subgroup	Valid From
F03D	0003/04	01/01/2006
F03B	0017/06	01/01/2006