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**Declaration under Rule 4.17:**

— of inventorship (Rule 4.17(iv)) for US only

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For two-letter codes and other abbreviations, refer to the "Guid-  
ance Notes on Codes and Abbreviations" appearing at the begin-  
ning of each regular issue of the PCT Gazette.

(54) Title: AN AUXILIARY PROPELLER ROTOR FOR HORIZONTAL WIND TURBINE GENERATORS "BOOSTER/STA-  
BILIZER PROPS"

(57) Abstract: In a wind turbine generator, an auxiliary rotor is provided on an extended shaft of the wind turbine generator at a distance from a main rotor. Both the auxiliary and main rotors rotate together, from the energy of the wind, in the same direction. The extended shaft of the wind turbine generator is shaped multi-sided, e.g. hexagonally, to allow easy radial adjustment between the auxiliary rotor blades and the main rotor blades.



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## Auxiliary Propeller Rotor for Wind Turbine Generators

### DISCLOSURE

#### a) Field and Background of the Invention

- i) Humans have used wind as energy for thousands of years. Ancient Persians have used wind energy to pump water before the birth of Christ. Wind-driven ships explored the world, before the advent of engine power. For hundreds of years, the huge wind mills in Holland provided power to grind the grains and also to drain the seawater when reclaiming the land, and still do, from the sea. The old fashion pioneer wind vane windmills used traditionally in the early 1900's by the farmers and ranchers in the United States and Canada to pump water, are still used today.
- ii) The top base of the existing wind turbine generator structure is usually a round plate, which when set on a plate on top of a tower, 40-60-80 feet, permits the easy rotation, plate to plate, of the structure such that the propellers are always perpendicular to the wind movement for maximum power from the wind. Any deviation to the oblique from the perpendicular to the wind reduces the speed of rotation of the propellers and is one method for slowing the rotational speed of the propellers in high winds.
- iii) The wind turbine generators on towers are isolated individually or together as a community labeled as a wind farm and these farms are common in California with 4,000 or more turbines providing electricity to cities and local communities. Wind farms are being expanded nationally in European countries, especially Denmark, Germany, Holland, Sweden and England. Canada has great potential and is slowly expanding the use of wind turbine generator to supplement hydro and nuclear power.
- iv) Most of the modern turbine generators, as seen in photographs, have one propeller with either 2 blade or 3 blade rotors, and the rotor blade diameter may vary from 10 feet to 12 feet to as much as 60 to 80 feet more or less, on a tower 150 feet, more or less. Some wind turbine generators have one rotor with a multitude of acute angle vanes, (pioneer wind pumpers on farms and ranches) or recent models (Hornet Wind Turbines) with as many as 4 to 6 propeller blades on the same rotor.

- v) Most manufacturers of wind turbine generators use the 2 propeller rotor and the 3 propeller rotor as the most efficient, as observed in wind farms in the US and Europe.
- vi) However, the Hornet Wind Turbines of the US has demonstrated that a rotor with 4 or 5 blades has a higher torque at lower wind speeds, less variation in rotation, resulting in more constant energy output favorable for generating electricity.

a) Search of Patents

- I) Reviewing certain wind turbine generators patents filed with the Canadian and with the US Patent office, there is no patent for an auxiliary propeller rotor with the extended main shaft permitting a significant space on the main shaft between the 2 propellers. Certain patents show 2 propellers adjoining each other, with no space on the shaft between them, but rotating counter revolution to each other, one propeller is secured on a main shaft while the other propeller is secured on an outer tube outside of the main shaft and each counter rotating to the other.
- II) United States Patent No 6,713,893, Efficient Wind Generator. The wind generator has a first rotor disposed with a first axis of rotation.... and a second rotor disposed with a second axis of rotation different from the first axis of rotation, each rotor providing power to the field rotor of a generator.....electrical energy is generated.

Note: there is no obvious space between the two rotors.

- III) Patent CA 2193972. The Multi-Unit Rotor Blade System Integrated Wind Turbine.

The described wind turbine has a set of propeller type wind force collecting rotor turbines composed of an up-wind auxiliary rotor blade turbine being disposed on the front end of the combined bevel-planet gear assembly, and a down-wind main rotor blade turbine. These rotor blades rotate in opposite directions with respect to one another.

- IV) Aircraft Propeller System.

A lightweight counter-rotatable propeller system driven by a rotatable shaft...system includes first and second counter-rotatable propellers, each propeller including a plurality of blades mounted on first and second hubs, respectively.

Auxiliary Propeller Rotor for Wind Turbines GeneratorsThe Technology of the Invention in which an Exclusive Property or Privilege is Claimed is Defined as Follows:

1. A second rotor with two or more propellers, termed rear-auxiliary or front auxiliary that is installed with a space, in front, or in rear of the main propeller rotor that also has two or more propellers, and together are on the extended (16-24 inch /40-60cm, more or less), shaft, or axle of an up-wind generator turbine is an exclusive property.
2. A space of between (12-18 inches/30-45 cm, more or less) is allocated on the extended shaft or axle of the wind turbine between the auxiliary propeller rotor and the main propeller rotor is an exclusive property.
3. The axis of rotation of the auxiliary propeller rotor and the front propeller rotor that are secured on the shaft or axle of the wind turbine generator, and rotate together either clockwise or counter-clockwise from the wind energy is an exclusive property.
4. The extended part of the shaft or axle of the wind turbine generator can be shaped multi-sided such as hexagonally to allow easy adjustment of the circumferential arrangement between the auxiliary rotor propellers and the main rotor propellers, so that essentially there are 6 settings between the two rotor propellers and instead of being in line with each other they can be offset so as to achieve maximum power output from the flow-through of the wind energy and attain greater energy efficiency is an exclusive property.
5. The auxiliary rotor propellers and the main rotor propellers are on the same extended shaft or axle of the wind turbine generator and permit many variations of the propellers such as each having the same or different length of blades, widths of blades, and number of blades, (3 to 5, more or less), and together achieve a lower start-up speed, more stability in varying winds, and are ideal for low wind speed sites is an exclusive property.
6. This plurality of propeller blades on two adjoining rotors with one half the blade length has the same power output, more or less, as a standard rotor with two or three blades with twice the diameter on a high tower supporting the wind turbine, thus effectively the height of the tower is reduced by one half, more or less is an exclusive property.

7. The auxiliary propeller rotors and the main propeller rotor with an allocated space between the two, is applicable for down-wind turbine generators, and for tidal and stream water generator turbines is an exclusive property.
8. The auxiliary propeller rotor and the main propeller rotor, with an allocated space between the two, each with its befitting number of blades, is applicable to airplanes with one or two motor driven propeller rotor(s), or with one or two turbo rotor propellers is an exclusive property.
9. The auxiliary propeller rotor and the main propeller rotor, with an allocated space between the two is applicable to water conveyances powered by one or more separate propellers, such as boats and ships is an exclusive property.

# Auxiliary Propeller Rotor for Wind Turbine Generators

## DRAWINGS.

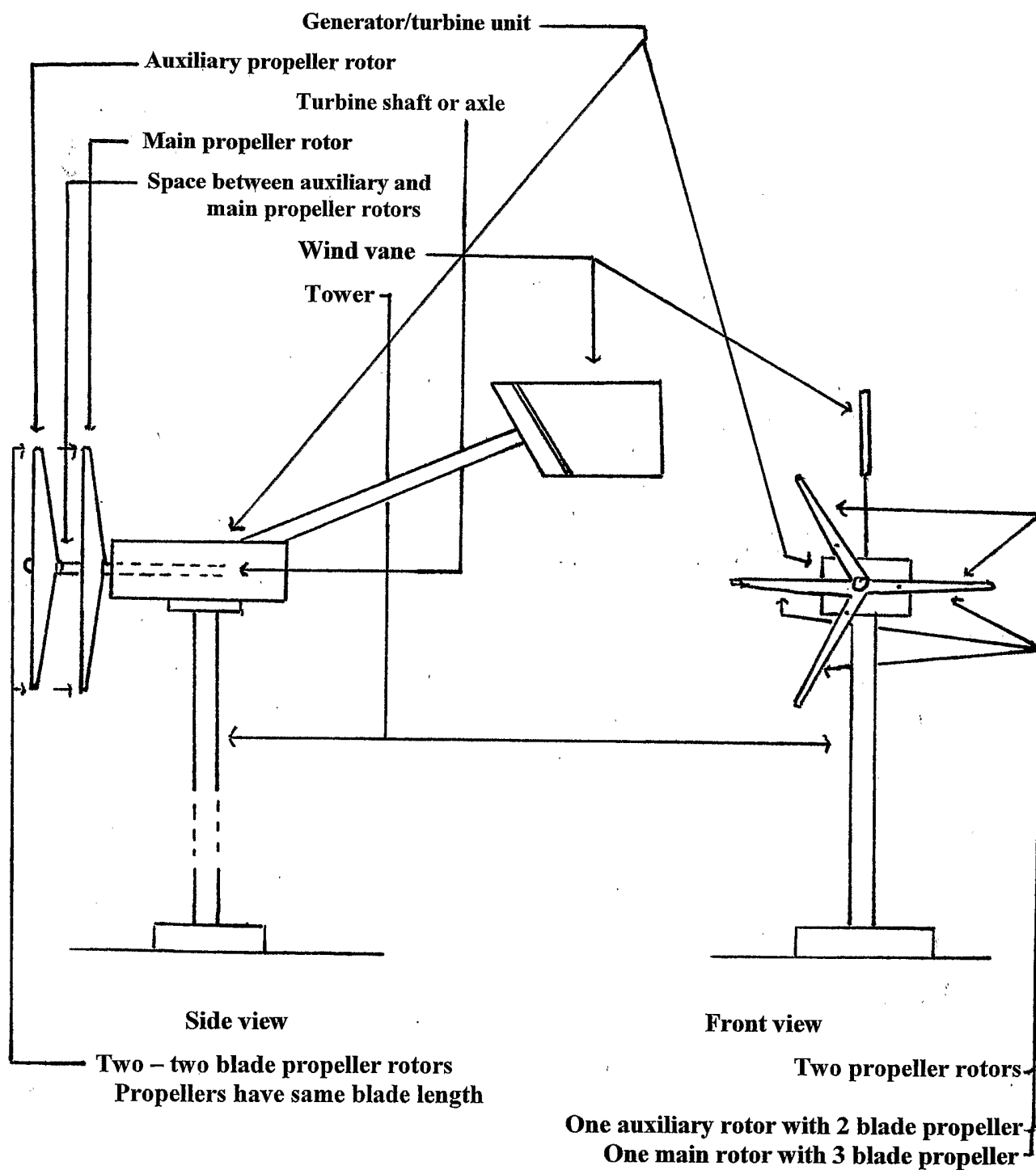
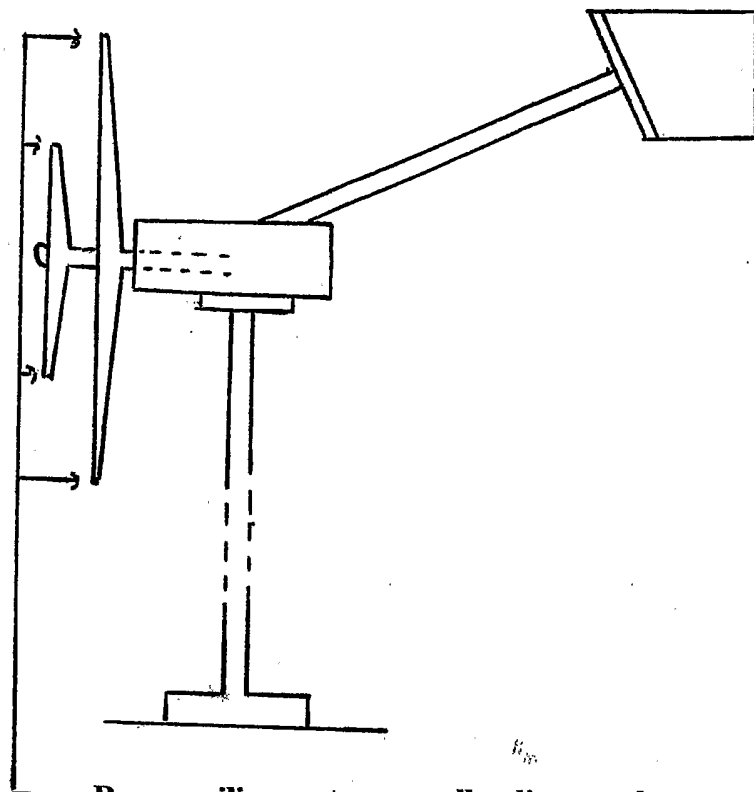


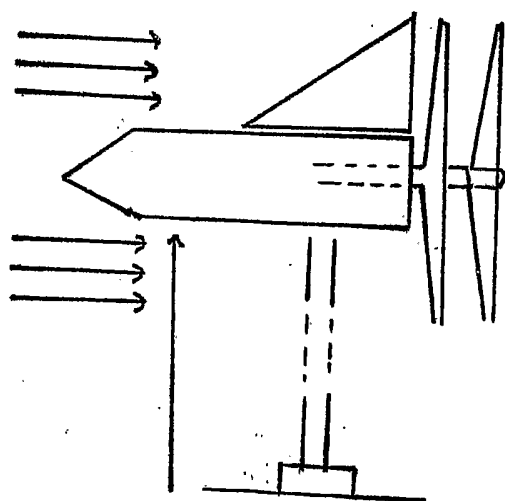
figure 1

# Auxiliary Propeller Rotor for Wind Turbine Generators

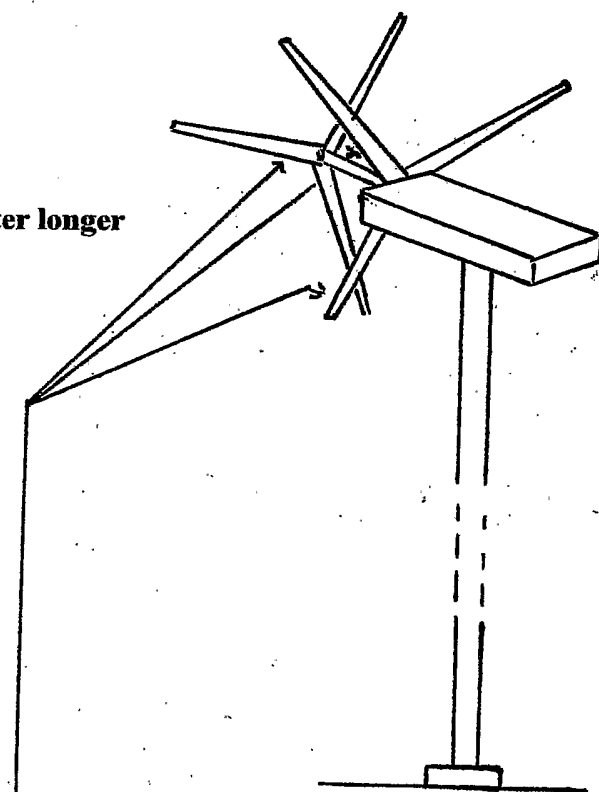
## DRAWINGS.



Rear-auxiliary rotor propeller diameter longer than main rotor propeller.



Down-wind Turbine adaptation



Two, spaced, three blade propeller rotors  
Rear auxiliary rotor propeller blades offset from main rotor propeller blades.

figure 2

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/CA2005/000033

## A. CLASSIFICATION OF SUBJECT MATTER

IPC<sup>7</sup>: F03D-1/02, F03D-1/06, F03D-11/00

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC<sup>7</sup>: F03D

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

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

WEST, Delphion, Esp@cenet (wind, turbine, windmill, propeller, rotor, coaxial, auxiliary)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No(s).
X	CA 2193972 A1 (SHIN, C.) 4 January 1996 (04-01-1996) * Figs 1A-1B; page 3, lines 2-7 *	1, 2, 7
X	CA 2395612 A1 (WOBEN, A.) 2 August 2001 (02-08-2001)	3
Y	* Fig. 4; page 4, line 25 *	1, 2, 4-8
X	US 1717663 A (CHECKLEY, G.) 18 June 1929 (18-06-1929)	9
Y	* Whole document *	1, 2, 4-8
X	US 1637398 A (SYRACUSA, M.) 2 August 1927 (02-08-1927) * Fig. 1; page 1, lines 1-20 *	8

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

\* Special categories of cited documents:  
 "A" document defining the general state of the art which is not considered to be of particular relevance  
 "E" earlier application or patent but published on or after the international filing date  
 "L" document which may throw doubt on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)  
 "O" document referring to an oral disclosure, use, exhibition or other means  
 "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  
 "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone  
 "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

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# INTERNATIONAL SEARCH REPORT

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PCT/CA2005/000033

## Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of the first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons :

1. ☐ Claim Nos. :

because they relate to subject matter not required to be searched by this Authority, namely :

2. ☒ Claim Nos. : 6

because it relates to parts of the international application that does not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically :

The present application (description, drawings and claims) does not present a clear and definite inventive concept. It appears that all of the claims on file are drafted as independent claims. Claim 6 could not be searched because only the desired result of achieving a preferred power output and reducing the height of a tower is stated, rather than the physical configurations and the essential features required to achieve this result.

3. ☐ Claim Nos. :

because they are dependant claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows :

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claim Nos. :
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claim Nos. :

**Remark on Protest** ☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.  
PCT/CA2005/000033

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US 1637398 A	02-08-1927	NONE	