

Clarke, Modet & Cº**COLOMBIA**

SEÑORES
DIVISIÓN DE NUEVAS CREACIONES
SUPERINTENDENCIA DE INDUSTRIA Y C
E. S. D.

OFICINA GENERAL DE INDUSTRIA Y COMERCIO



No. 06-030114- -00006-0000

FECHA DE RECEPCIÓN: 15 MAR 2006
 DIV. DE PATENTES I Lva. 570 PASSE NACIONAL II
 ACT. 534 PL. 10000 Folios 4

REF: EXPEDIENTE No. 06030114
FECHA DE LA SOLICITUD: MARZO 27, 2006
SOLICITANTE: ATLANTIS RESOURCES CORPORATION PTE
IMITED
TITULO: UN SISTEMA SUBACUÁTICO DE GENERACIÓN DE
ENERGÍA

ASUNTO: SOLICITUD EXAMEN DE PATENTABILIDAD

DILIA RODRÍGUEZ D'ALEMAN, en mi condición de apoderada de la Sociedad solicitante, por el presente escrito atentamente solicito a Usted que habiéndose surtido la publicación de la presente solicitud, en la Gaceta de la Propiedad Industrial No.587 de fecha 18 de enero de 2008 se proceda con el estudio de Fondo.

Para tal fin me permito anexar la tasa correspondiente.

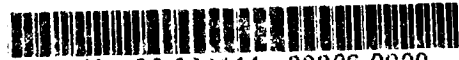
Agradezco continuar con el presente trámite.

Señor Jefe,


DILIA RODRÍGUEZ D'ALEMAN
C.C. 41.654.882 Bogotá
P. 766

164

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



No. 06-030114-00006-0000

RELACIONE
CONALII

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

NIT : 800176089-2

RECTO: TOTAL DE MONEDA : 00 - 35,590
FECHA : MAYO 6 DE 2000

CONSIGNACION

DEPOSITANTE	TIPO PAGO	BANCO	CUENTA	No. PAGO	FECHA PGO	Vr. PAGO
CLARKE MODET Y CIA. CALDERON	CONSIGNACION	BANCO DE BOGOTA	062754387	693055	06/05/2000	14,897,000.00

CONCEPTO

CANT. RECONSTRUCION	CONCEPTO	TOTAL CONCEPTO
1 50000-01-07	OTROS PRODUCTOS DE PROPIEDAD I	
	21 CERTIFICACIONES	11,000.00
	TOTAL :	\$ 11,000.00

SON: DICE MIL CERO

RESPONSABLE : _____

RECIBO DE CASH INFLUENCIA AL EXPEDIENTE NO. _____

P 766
2

105

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

NIT : 800176089-2

CERTIFICACION DE EXCEDENTE : 08 - 29,063
FECHA : ABRIL 10 DE 2008

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



No. 06 930114 00005 0000

LINEA
ALII

***** CONSIGNACION *****

DEPOSITANTE	TIPO PAGO	BANCO	CUENTA	No. PAGO	FECHA PGO	Vr. PAGO
CLARKE ROYET Y CO.	CONSIGNACION	BANCO DE BOGOTA	062754387	136008	09/04/2008	40,336,900.00

***** CONCEPTO *****

CANT. RENTISTICO	CONCEPTO	TOTAL CONCEPTO
1 50000 00 00	OTROS SERVICIOS DE PROPIEDAD I	42,000.00
	99 OTROS SERVICIOS ADMINISTRATIVOS	42,000.00
	TOTAL :	\$ 42,000.00

SON: CUARENTA Y DOS MIL PESOS

RESPONSABLE

LIBRO DE CANCELACION AL DEPOSITANTE No. _____

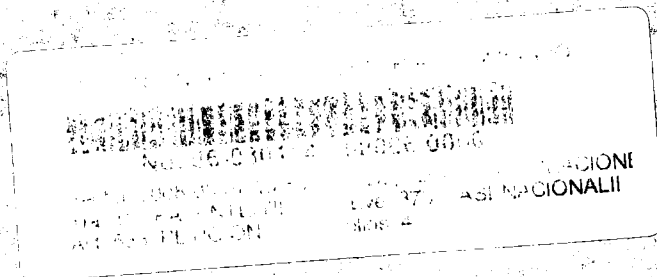
ESTA CERTIFICACION DE EXCEDENTE DE PAGO SOLO PODRA SER UTILIZADA
COMO PARTE DE LA CANCELACION DE UNA TARIFA VIGENTE Y NO PODRA SER
SUSTITUIDA POR NINGUN OTRO.

B

166

NIT : 800176089-2

RECIBO OFICIAL DE CAJA : 8 - 17,615
FECHA : FEBRERO 27 DE 2008



***** CONSIGNACION *****

DEPOSITANTE	TIPO PAGO	BANCO	CUENTA	No. PAGO	FECHA PAGO	Vr. PAGO
CLARIS S.A.	CO. COLONCONSIGNACION	BANCO DE BOGOTA	062754387	2661312	27/02/2008	25,070,000.00

***** CONCEPTO *****

CONCEPTO	TOTAL CONCEPTO
30003-04-09 OTROS SERVICIOS DE PROPIEDAD I	158,000.00
16 INFORME SOBRE EL ESTADO DE LA TEC	158,000.00
TOTAL :	\$ 158,000.00

SON: CIENTO CINCUENTA Y OCHO MIL PESOS

RESPONSABLE :

RECIBO DE CASH APPLICADO AL ASUNTO No.

DIVISIÓN DE NUEVAS CREACIONES

RADICACIÓN EXPEDIENTE No. 06-30114

EL EXTRACTO DE LA PRESENTE SOLICITUD DE **PATENTE DE INVENCION**

FUE PUBLICADO EN LA GACETA DE PROPIEDAD INDUSTRIAL No **587** DE

FECHA **18 DE ENERO DE 2008** EL TÉRMINO HÁBIL SEÑALADO POR LA LEY

EXPIRA EL **16 DE ABRIL DE 2008**

NOTA: Dentro del plazo de los seis (6) meses siguientes a partir de la fecha de publicación en la gaceta de Propiedad Industrial, deberá solicitar y cancelar el examen de patentabilidad so pena de que la solicitud caiga en abandono, de acuerdo con lo establecido en el Artículo 44 de la Decisión 486/2000.

SE PRESENTARON OPOSICIONES POR PARTE DE TERCEROS.

SI _____ NO X

United States Patent [19]
Davison

[11] **Patent Number:** 4,589,344
[45] **Date of Patent:** May 20, 1986

[54] **MONORAIL CONVEYANCE SYSTEM FOR WIND OR WATER POWERED GENERATOR APPARATUS**

- [76] **Inventor:** Fred E. Davison, Box 37, R.R. #1, Highwood, Mont. 59450
[21] **Appl. No.:** 452,957
[22] **Filed:** Dec. 27, 1982
[51] **Int. Cl.⁴** B60K 9/00
[52] **U.S. Cl.** 104/24; 104/118; 104/247; 105/141; 290/44; 290/55
[58] **Field of Search** 290/1 R, 1 C, 1 D, 290/4 D, 42, 43, 44, 53, 54, 55; 416/132 B; 417/330, 333, 334; 104/24, 89, 93, 94, 106-109, 118, 119, 245-247; 105/141, 144, 148, 150, 155, 156

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Primary Examiner—Randolph A. Reese

Attorney, Agent, or Firm—Workman, Nydegger & Jensen

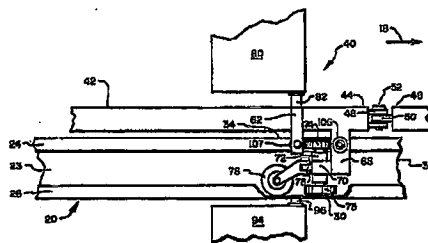
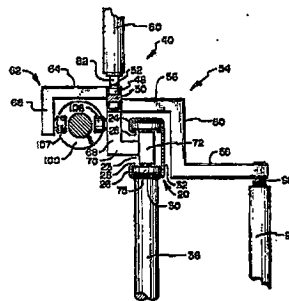
[57] **ABSTRACT**

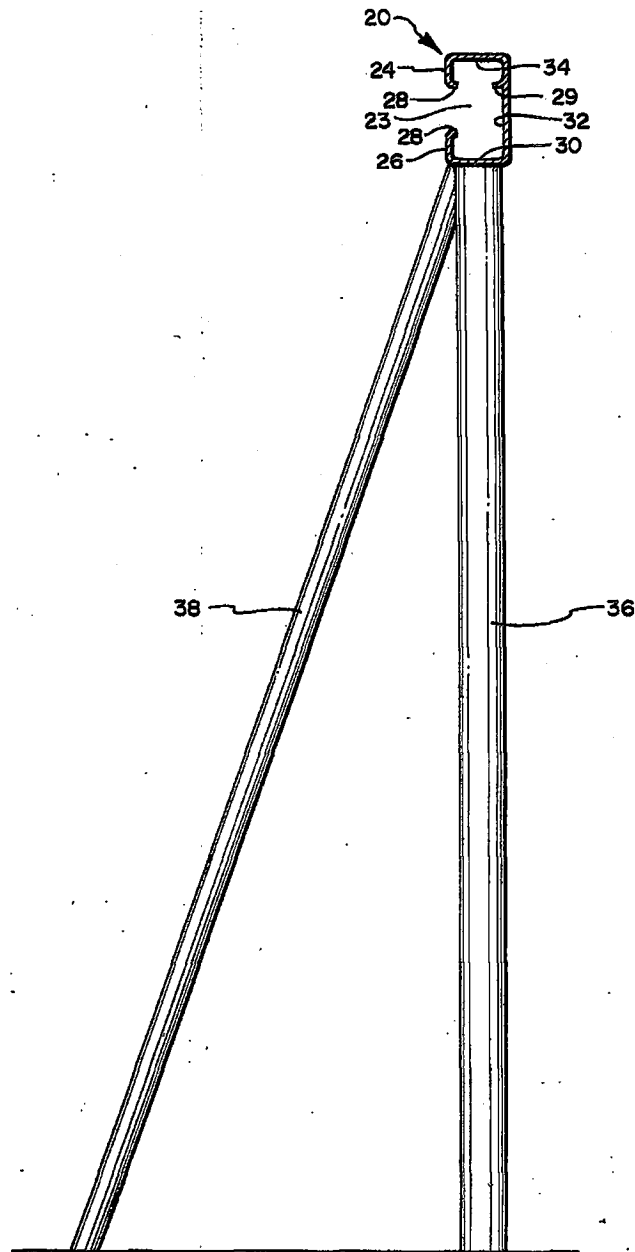
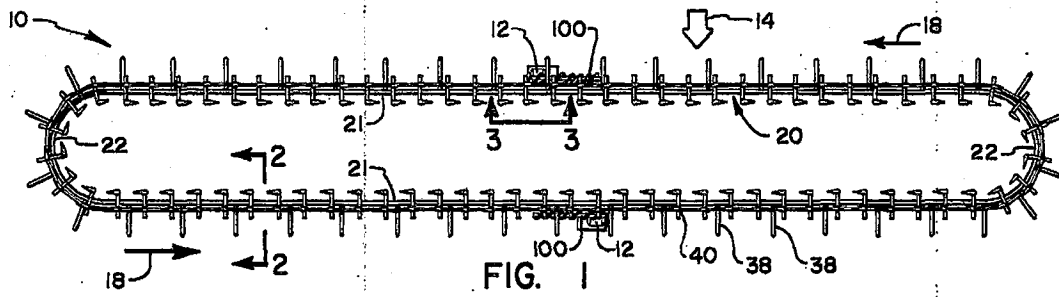
A novel wind or water powered generator apparatus is provided for generating substantial quantities of electricity. The apparatus includes a plurality of sail-driven cars connected to form a continuous chain and suspended from a monorail loop. The car suspension system has two horizontal guide wheels and one vertical carrier wheel. Substantially the entire weight of each car is carried by its vertical wheel, which is located near the car's center of gravity. Further, all three suspension wheels are located inside the monorail, thereby rendering car derailment virtually impossible.

Two sails are attached to each car, one being directed upwardly and the other being directed downwardly. The surface areas of the two sails are such that the average, total current force on each sail is approximately the same. Additionally, the novel sails are free to rotate 360 degrees about their support poles, but they are biased to a preferred orientation. Thus, as the current and biasing forces interact, the cars are propelled along the monorail. Importantly, in the event that destructive strength currents arise, the sails rapidly align themselves with the current, thereby preventing sail destruction.

One or more elongated augers are positioned adjacent the monorail loop. Auger drive rollers are attached to each car such that the adjacently moving cars rotate the auger. A generator is connected to the augers so as to be driven thereby.

10 Claims, 11 Drawing Figures





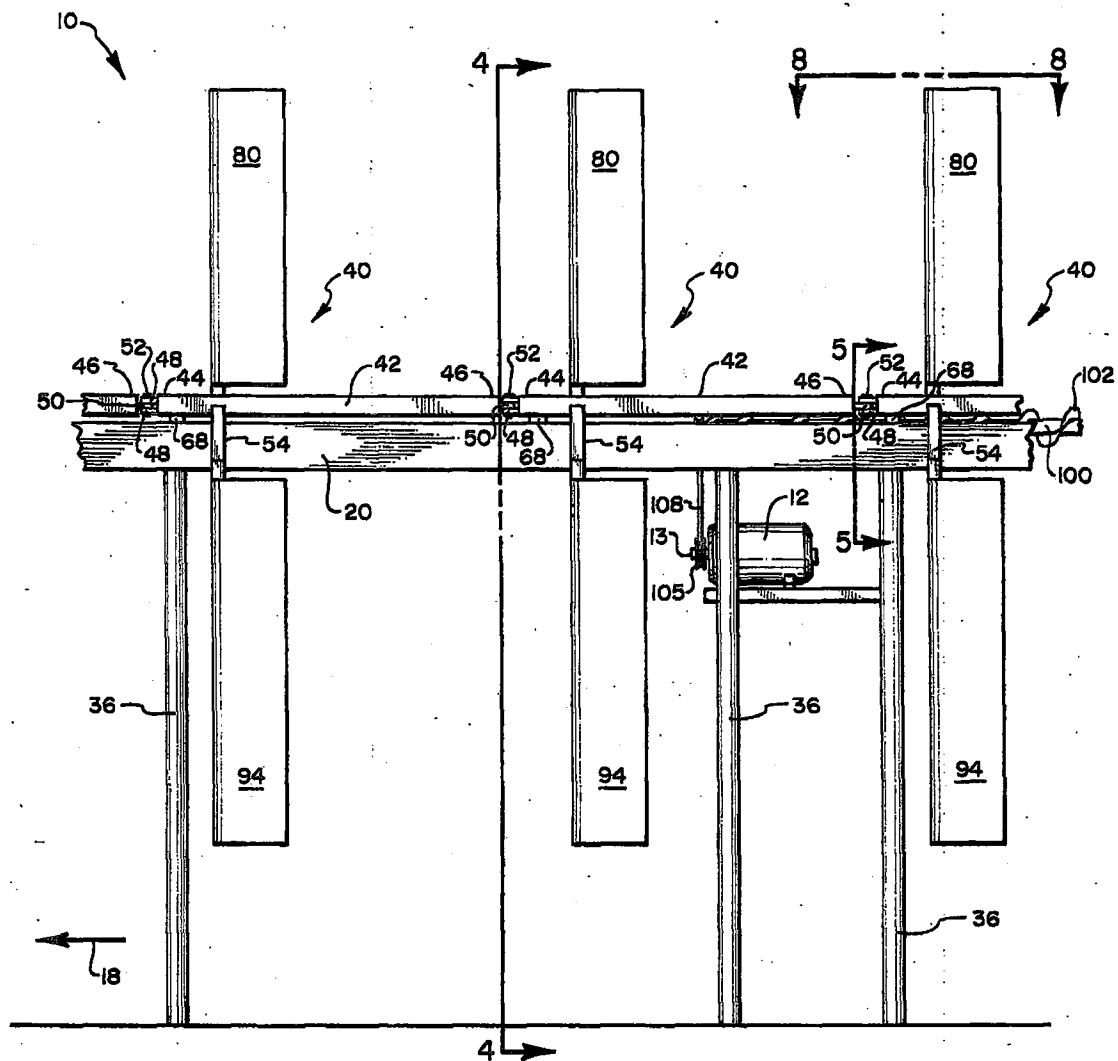


FIG. 3

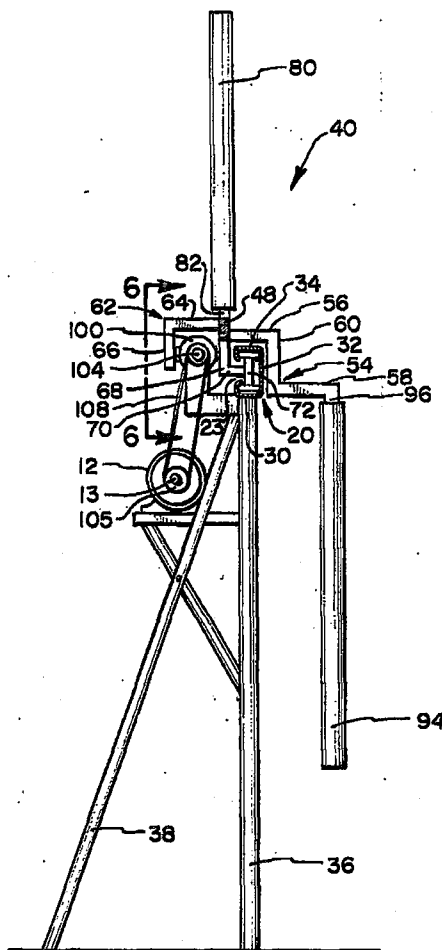


FIG. 4

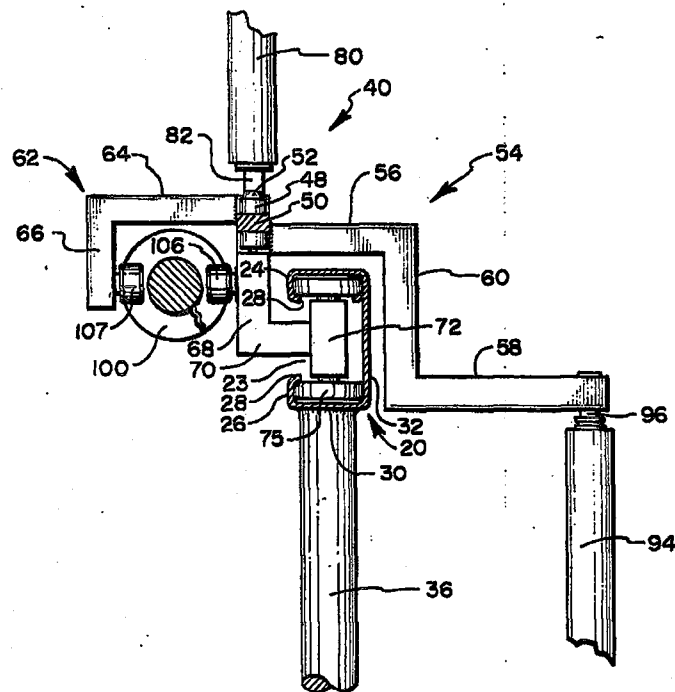


FIG. 5

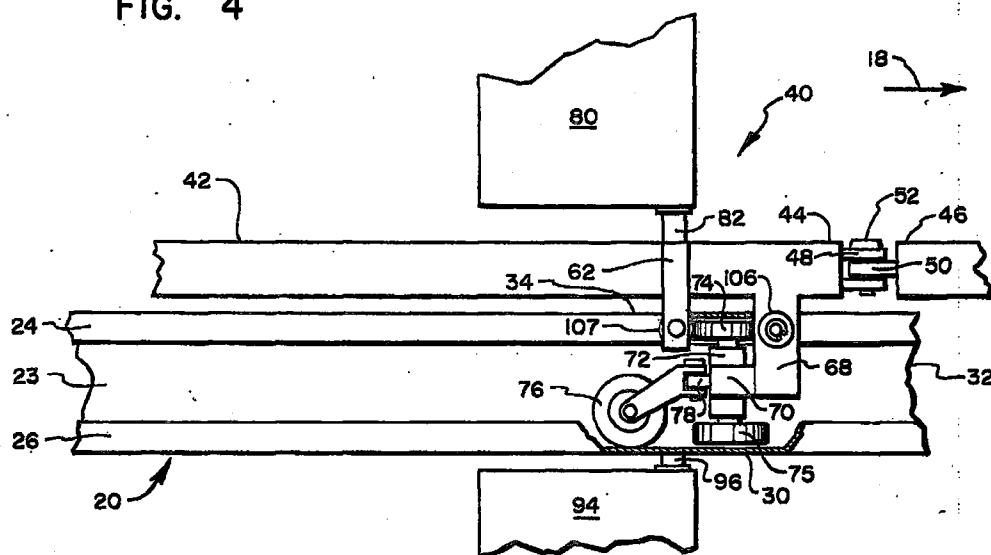


FIG. 6

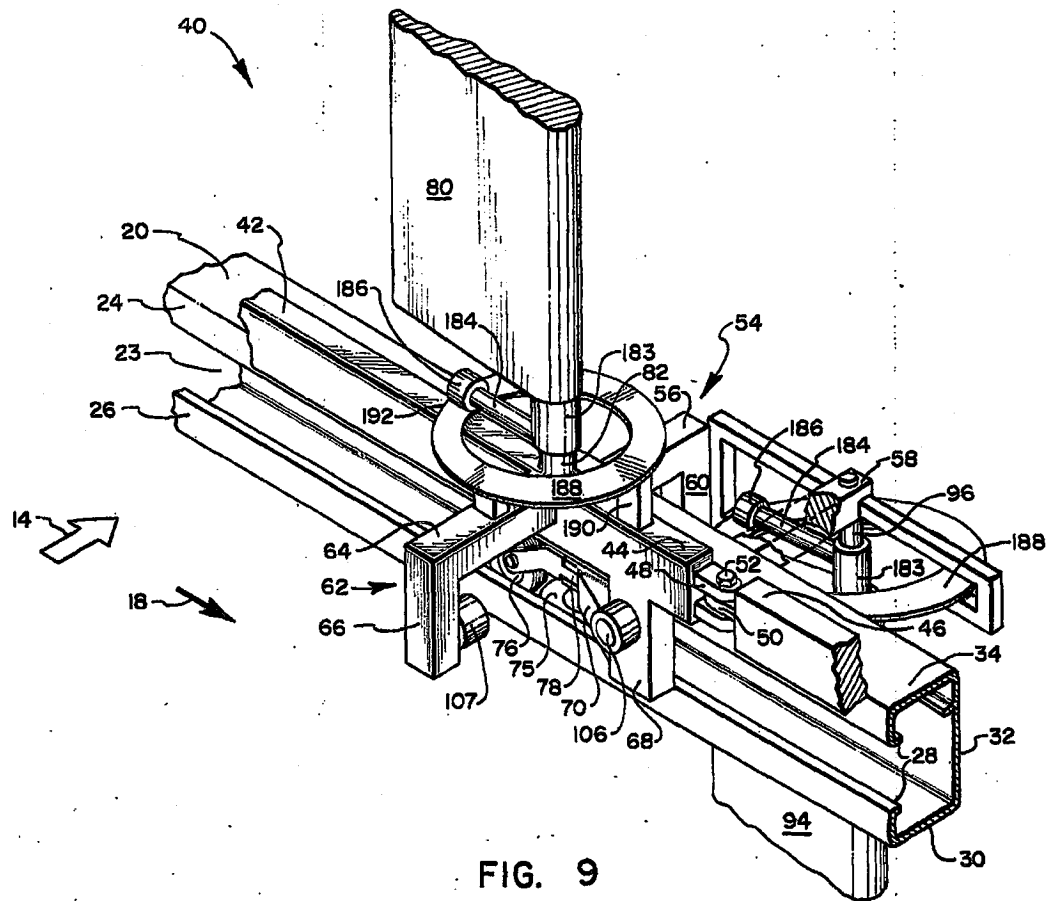


FIG. 9

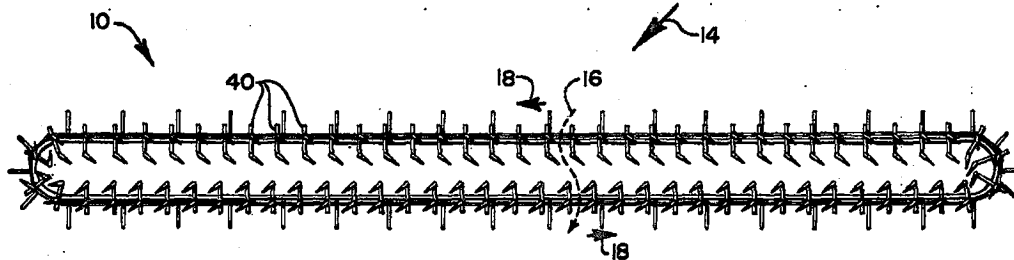


FIG. 10

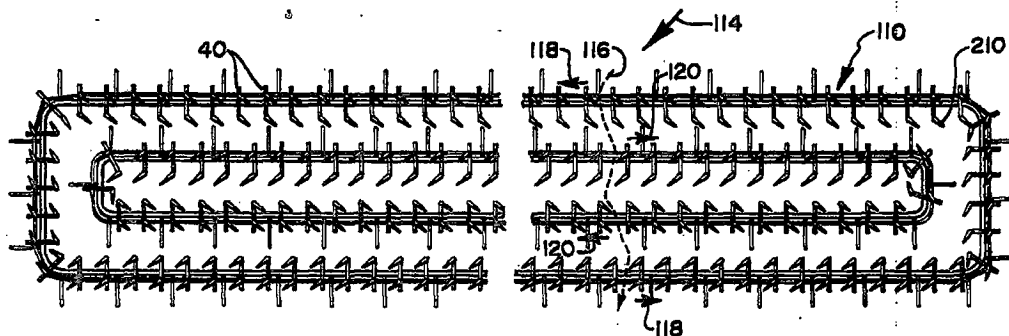


FIG. 11

MONORAIL CONVEYANCE SYSTEM FOR WIND OR WATER POWERED GENERATOR APPARATUS

BACKGROUND

1. Field of the Invention

This invention relates to apparatus and methods for generating electrical power and, more particularly, to novel apparatus and methods for generating electrical power from natural air or water currents.

2. The Prior Art

As a result of the rapid growth of technology in recent years, demand for electrical energy is enormous. In an effort to meet this demand, hundreds of electrical power plants have been built during the last decade. Most of these power plants have been of the more traditional type, e.g. hydroelectric generators and generators driven by the combustion of mineral resources. However, with the demand for electrical power continuing to grow, there is an increasing concern as to feasibility and desirability of using traditional electrical energy sources to supply future energy needs. Many of the present power plants, for example, produce considerable quantities of air and water pollution. The construction of additional dams and hydroelectric generators would have a significant impact on the surrounding environment. Additionally, as natural resources are consumed to produce electrical energy, there is great cause for concern about the possibility of severe resource shortages in future years. Also, the cost of operating traditional electrical power plants that generate electricity by the combustion of natural resources is increasing rapidly. As a result of these concerns, a great deal of attention has been directed toward the development of environmentally cleaner, more economical sources of electrical energy.

One possibility having great potential is the harnessing of the kinetic energy of natural air or water currents. The earth's atmosphere, oceans, and rivers are in constant motion, and if these air and fluid currents could be efficiently used to generate electricity, they would constitute a virtually inexhaustible source of electrical energy.

Unfortunately, major problems have been encountered in developing a structurally sound device which has the surface area needed to generate large quantities of electricity from air or water currents. Windmills and water wheels, for example, are suitable for small generating tasks, but have not proven useful in the generation of large quantities of electricity.

Another problem encountered when attempting to generate electricity from air or water currents is the fact that although there may be a generally prevailing direction of travel, at times the current may approach the generator from virtually any direction. Accordingly, it must either be accepted that the generator will occasionally be idle, or provision must be made to cause the generator device to be properly aligned with the oncoming current. However, as the generator's size is increased, so as to increase its generating capacity, movement of the generator device becomes much more difficult. Thus, those skilled in the art have faced a major challenge in attempting to develop an efficient wind or water powered apparatus having sufficient surface area to generate significant quantities of elec-

tricity and which is also capable of being quickly adjusted in response to changes in current direction.

Yet another problem inherent in the use of air or water currents to drive a generator is the fact that the strength of these currents may vary widely from one season to the next, or even from one day to the next. It has proven a very difficult task to provide an apparatus capable of structurally sustaining periods of strong current flow, and yet capable of generating electricity during periods of weak current flow.

A typical approach in the construction of wind or water powered generators has been to interconnect a plurality of individual sail structures so as to form a closed loop, and cause them to travel in an oval-shaped path. As the wind or water current propels the sail structures around the oval-shaped path, the sail structures drive one or more electric generators.

However, devices which incorporate this general concept vary widely in structure. For example, in one such device, the several sail structures are attached to a looped cable which is suspended by a pair of spaced-apart wheels. As the current causes the sail structures to move around the loop, the cable travels around the wheels, thereby driving a single electric generator which is connected to one of the wheels. Other devices accomplish the same result by using a chain and a pair of sprocket wheels in place of the cable and wheels described above. Alternatively, an oval track is sometimes used to support and guide the individual sail structures, and some devices have a separate small generator mounted on each sail structure.

Various methods for aligning loop-type generators with the direction of the air or water current have also been employed. One approach has been to place the device in a canyon or channel, where the air or water current moves substantially in only one direction. This approach is clearly of limited utility.

A more useful approach for aligning the generator devices with an air or water current has been to manually or mechanically vary the orientation of the several said structures as the current direction changes. Such a method has also been used to make minor adjustments in the orientation of the sails of a device placed in a canyon or channel.

When the orientation of the sail structures is varied mechanically, each sail structure typically has a servomotor attached thereto. A separate apparatus detects the direction of the oncoming air or water current, and the servo-motors are programmed to position the sail structures accordingly. Some devices further have the ability to detect the velocity of the oncoming current. In these devices, the servo-motors are further programmed to orient the sail structures so as to present a minimum resistance in the event that the oncoming current becomes too strong and would otherwise cause damage to the sail structures.

Unfortunately, the servo-motors are generally unable to change the sail orientation very rapidly. Hence, the servo-motors may be incapable of adequately aligning the sails for minimum resistance in the event that a destructive current force arises. In any event, the servo-motors cannot respond rapidly enough to protect the sail structures from short, strong blasts of current force. Further, the complexity and sensitivity of the servo-motors and the accompanying current detection devices contribute to the possibility of frequent breakdowns and to the necessity for constant supervision and maintenance.

assemblies mounted for conveyance around a monorail loop.

FIG. 2 is an end cross-section view of the monorail track of the present invention taken along the line 2—2 of FIG. 1, the sail-car assemblies being omitted for purposes of illustration.

FIG. 3 is a side elevation view taken along the line 3—3 of FIG. 1.

FIG. 4 is an end cross-section view taken along the line 4—4 of FIG. 3.

FIG. 5 is an enlarged view of a portion of FIG. 3 with part of the auger broken away to show the position of the auger drive rollers.

FIG. 6 is a side elevation view taken along lines 6—6 of FIG. 4 with portions broken away to more particularly illustrate the sail-car suspension assembly.

FIG. 7 is a top elevation view of two sail-cars at a location on one of the curved end sections of the monorail, with portions of the monorail broken away to reveal the orientation of the suspension wheels.

FIG. 8 is a top elevation view taken along the line 8—8 of FIG. 3 with portions of the monorail broken away to show the suspension wheels.

FIG. 9 is a side elevation view of a portion of a sail-car showing an alternate means for biasing the sail structures to a preferred orientation.

FIG. 10 is a plan view illustrating one presently preferred configuration for a single monorail which uses deflected currents to increase generating efficiency.

FIG. 11 is a plan view of one presently preferred configuration incorporating two concentric monorails which use deflected currents to increase generating efficiency.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The presently preferred embodiments of the invention will be best understood by reference to the drawings, wherein like parts are designated with like numerals throughout.

One presently preferred embodiment of the wind or water powered generator apparatus of the present invention, generally designated 10, is illustrated in FIG. 1. As shown in FIG. 1, generator apparatus 10 comprises monorail 20, sail-cars 40, augers 100, and electric generators 12.

Monorail 20 forms an essentially ovate loop, having two substantially linear, parallel side track segments 21 which are joined by two substantially semi-circular end track segments 22. A plurality of sail-cars 40 are suspended from monorail 20 so as to be constrained to travel around monorail 20. Sail-cars 40 are also coupled together, thereby forming a conveyance system comprised of a continuous sail-car chain. As a current (illustrated by arrow 14), passes through the area of generator apparatus 10, sail-cars 40 will be caused to travel along monorail 20 in the direction indicated by arrows 18.

One or more augers 100 are positioned adjacent and substantially parallel to monorail 20 and are turned by the passing sail-cars. Electric generators 12 are coupled to the augers such that the rotation of the augers drives the generators, thereby generating electricity.

The preferred construction of monorail 20 is best shown by FIG. 2, although it will be appreciated that various changes may be made without departing from the inventive concepts described herein. As illustrated in FIG. 2, the monorail is hollow and has a generally

rectangular cross-section, with the longer sides of the rectangle being substantially vertical. The vertical sidewall of monorail 20 which is toward the outside of the monorail loop (see FIG. 1), is advantageously provided with a continuous channel 23 opening into the interior of the monorail although it is to be understood that channel 23 could alternatively be located on the interior of sidewall 32 of the monorail. Importantly, channel 23 is sufficiently narrow that an upper partial vertical sidewall 24 and a lower partial vertical sidewall 26 lie directly above and below the channel, respectively. Also, the free edges 28 of partial vertical sidewalls 24 and 26 are advantageously turned slightly inward toward the interior of monorail 20. As best seen in FIG. 2, it is also advantageous to provide an interior free edge or lip 29 opposite upper free edge 28. As will be more fully explained below, sidewalls 24 and 26 cooperate with the suspension system of the sail-car.

Monorail 20 is supported by support posts 36 and support braces 38. As depicted in FIG. 2, support posts 36 are vertically oriented and are connected to the bottom wall 30 of monorail 20. Support braces 38 are attached to the upper end of each support post 36 so as to form an acute angle with respect to the support post, and extend outwardly from the monorail loop (see FIG. 1), thereby affording lateral stability to the support posts. Alternatively, the support posts could be oriented toward the interior of the loop, and guy wires (not shown) could be attached to opposite sides of the loop to maintain the monorail under tension. When this approach is taken, the orientation of the sail-cars on the monorail should be reversed so that they will not be obstructed by the guy wires or support posts.

One preferred embodiment of sail-cars 40 is illustrated in FIGS. 3—8. With particular reference to FIG. 3, it can be seen that each sail-car includes a horizontal beam 42 constructed to facilitate the joining of adjacent sail-cars so as to form one continuous chain. For example, as shown in FIGS. 3 and 6, the forward end 44 of horizontal beam 42 is advantageously provided with a coupling bracket 48, and the rearward end 46 of the horizontal beam is provided with a corresponding coupling tab 50. Holes may then be formed through both coupling bracket 48 and coupling tab 50 such that a coupling pin 52 may be inserted through the holes, thereby joining the two horizontal beams 42 together in a tail-to-nose configuration.

While each sail-car must be of sturdy construction so as to maintain its structural integrity while being subjected to various stresses during operation, it will be appreciated that the sail-cars should also be constructed so as to be as light as possible so that as little current force as possible will be required in order to cause them to be conveyed around the monorail.

Thus, each horizontal beam 42 of the illustrated embodiment has three rigid structures extending therefrom: a vertical frame support 68, an inside frame extension 54, and an outside frame extension 62. These three structures, together with horizontal beam 42, form the sail-car frame.

As shown best in FIGS. 4 and 5, vertical frame support 68 extends from the underside of horizontal beam 42 at a position near the forward end thereof. An inside auger drive roller 106 is attached to vertical frame support 68 so as to extend outward from the monorail loop (see FIG. 1), at a distance and height such that the roller is capable of properly engaging the inner side of the augers when sail-car 40 is suspended from monorail 20.

Inside frame extension 54 extends inwardly from horizontal beam 42 toward the interior of the monorail loop (see FIG. 1). As shown in FIGS. 4 and 5, the inside frame extension comprises a pair of horizontal arms 56 and 58 connected by a vertical arm 60. Advantageously, horizontal arm 56 is slightly longer than the width of the monorail; horizontal arm 58 is slightly longer than the width of the downward sail 94 so as to permit downward sail 94 to rotate about downward sail support pole 96 without colliding with monorail support posts 36; and vertical arm 60 is approximately as long as the height of monorail 20.

Thus, horizontal arms 56 and 58 are each connected at one end to opposite ends of vertical arm 60 such that the inside frame extension formed thereby, lies substantially in one vertical plane. The other end of horizontal arm 56 is attached to the inward side of horizontal beam 42 at a point slightly rearward of the point at which vertical frame support 68 is attached (see FIG. 3). With inside frame extension 54 thus attached, and with sail-car 40 properly suspended from monorail 20, there is a relatively small space between inside frame support 54 and monorail 20 and between vertical frame support 68 and monorail 20. As pointed out more fully below, minimizing this space helps prevent sail-car derailment.

Outside frame extension 62 extends from the outward side of horizontal beam 42 away from the exterior of the monorail loop (see FIG. 1). As illustrated in FIGS. 4 and 5, outside frame extension 62 is comprised of horizontal arm 64 and vertical arm 66. One end of horizontal arm 64 is connected to one end of vertical arm 66 such that the vertical arm extends downwardly from the horizontal arm. The other end of horizontal arm 64 is perpendicularly attached to the outward side of horizontal beam 42 such that the outside frame extension and the inside frame extension lie substantially in one vertical plane (see FIGS. 7 and 8).

An outside auger drive roller 107 is attached to the inward side of vertical arm 66, and the lengths of horizontal arm 64 and vertical arm 66 are such that the outside auger drive roller will properly engage the outer side of augers 100 when sail-car 40 is suspended from monorail 20. Importantly, inside auger drive roller 106 and outside auger drive roller 107 lie substantially in the same horizontal plane and simultaneously engage opposite sides of augers 100 so as to minimize the lateral stress upon the augers and their bearings.

One manner in which sail-cars 40 may be suspended from monorail 20 is illustrated in FIGS. 4-7. As shown best in FIG. 5, suspension arm 70 extends horizontally from the lower end of vertical frame support 68. When sail-car 40 is properly positioned over monorail 20, suspension arm 70 passes through channel 23 into the interior of monorail 20.

A vertical axle assembly 72 is connected to the end of suspension arm 70 situated within monorail 20. Two horizontal guide wheels 74 and 75 are mounted on the vertical axle assembly so as to be adjacent and substantially parallel to top wall 34 and bottom wall 30 of monorail 20, respectively. The diameter of horizontal guide wheels 74 and 75 is slightly less than the width of monorail 20, such that horizontal guide wheels 74 and 75 are free to rotate within monorail 20.

Swivel member 78 is attached to the rearward side of vertical axle assembly 72. A vertical carrier wheel 76 is connected to swivel member 78 so that the vertical carrier wheel may swivel about a vertical axis passing through swivel member 78.

As sail-car 40 travels along monorail 20, vertical carrier wheel 76 rolls along bottom wall 30 of monorail 20, supporting substantially the entire weight of sail-car 40. Horizontal guide wheels 74 and 75, simultaneously roll along the side walls of the monorail and stabilize sail-car 40, making sail-car derailment virtually impossible. Optional free edge or lip 29 on the interior surface side wall 32 of the monorail further supports wheel 74 and gives even greater protection from possible derailment.

As best seen in FIG. 7, suspension arm 70 advantageously serves as a common support for the carrier and guide wheels. When viewed from above, the suspension arm advantageously forms an acute angle with the rearward portion of horizontal beam 42, so that when the sail-car travels around one of the semicircular end track segments of the monorail, the suspension arm will rotate slightly about vertical axis assembly 72 so as to form an angle with monorail 20 which is more nearly perpendicular, as illustrated in FIG. 7. Even though vertical axle assembly 72 is thus rotated, however, swivel member 78 allows vertical carrier wheel 76 to continuously align itself with the direction of travel. Further, because of the configuration of suspension arm 70, this slight rotation provides additional clearance between vertical frame support 68 and the monorail, and between vertical arm 60 and the monorail while the sail-car travels along the curved end track segment. This additional clearance is necessary when there is only a small clearance between the sail-car and the monorail. As previously mentioned, it is desirable to maintain a small clearance between the monorail and the sail-car because this minimizes the possibility of sail-car derailment. For example, if wheels 74, 75, or 76 should fail (as is possible if inflatable tires are used), the sail-car will come to rest on the monorail rather than being derailed. Similarly, use of a narrow clearance between the sail-car and monorail also reduces the likelihood of damage in the event of other failures of the sail-car suspension system.

Each sail-car is preferably provided with a pair of sails 80 and 94. As illustrated in FIGS. 3 and 4, sail 80 extends vertically upward from sail-car 40 and sail 94, vertically downward.

In order to minimize the structural stress and wear on the sail-car, and to provide for a smoother sail-car ride, it is desirable to construct sails 80 and 94 such that the average, total current force on each sail is approximately the same. Accordingly, sails 80 and 94 may have unequal surface areas to account for differing current velocities at different altitudes. For example, it has been observed that wind velocities are often greater at higher altitudes. In such a case, therefore, it would be desirable to provide downward sail 94 with a slightly larger surface area than upward sail 80.

For the same reasons, it is also advantageous to construct sail-car 40 such that the sail-car's center of gravity is located at the point where vertical carrier wheel 76 contacts bottom wall 30 of the monorail. Thus, sails 80 and 94 should be attached so as to balance the sail-car on vertical carrier wheel 76.

Sails 80 and 94 are advantageously mounted on support poles 82 and 96, respectively. Upward sail support pole 82 is rigidly attached to the top of horizontal beam 42 so as to extend vertically upward from the horizontal beam and lie substantially in the same vertical plane as inside frame extension 54 and outside frame extension 62 (see FIGS. 7 and 8). Downward sail support pole 96, on

the other hand, extends vertically downward from the inward end of inside frame extension 54.

With particular reference now to FIG. 8, sails 80 and 94 have a generally wedge-shaped horizontal cross section, and support poles 82 and 96 extend through the thicker portion of sails 80 and 94, respectively. Importantly, sails 80 and 94 are capable of rotating 360 degrees about support poles 82 and 96. This result may be achieved, for example, by forming a vertical, cylindrical sleeve through the thicker portion of sails 80 and 94 and inserting support poles 82 and 96 into such sleeves. Of course, downward sail 94 must also be secured on support pole 96 by some suitable means, such as by an enlarged collar member (not shown) around the downward end of support pole 96.

Despite the rotational capability of sails 80 and 94, however, sails 80 and 94 are biased to a preferred orientation, which in the illustrated embodiment is a direction opposite the direction of travel. Nevertheless, sails 80 and 94 may be temporarily deflected into other orientations under the influence of wind or water currents.

The presently preferred means for biasing sails 80 and 94 is illustrated in FIG. 8, and will be described with particular reference to upward sail 80. The preferred biasing means comprises a rigid biasing arm 84 and a tension spring 88. As shown in FIG. 8, the rigid biasing arm extends horizontally from the upward end of upward sail support pole 82 in a direction opposite the direction of travel. One end 90 of the tension spring is then connected to the end of rigid biasing arm 84 so as to be capable of rotating freely about a vertical axis passing through the connection point. One preferred means for connecting end 90 of tension spring 88 is to provide an upward vertical post 86 on the end of rigid biasing arm 84. When this approach is taken, end 90 of tension spring 88 is advantageously formed into a corresponding circular loop which may be placed over and secured upon the upward vertical post.

End 92 of tension spring 88 is similarly connected near the narrow edge of upward sail 80. Importantly, the tension spring is connected to the sail such that there is always some degree of tension in the tension spring. Advantageously, the tension in tension spring 88 may also be variable.

The preferred means for biasing downward sail 94 is virtually identical to that just described with respect to upward sail 80. The only difference between the preferred means for biasing the two sails is that rigid biasing arm 84 and tension spring 88 are connected to the downward ends, rather than the upward ends, of downward sail support pole 96 and downward sail 94, respectively.

With sails 80 and 94 being constructed and biased as described above, tension springs 88 have a tendency to force sails 80 and 94 to assume the preferred orientation. When a current passes sails 80 and 94 in the direction of arrow 14, the sails are deflected, as shown by dashed lines in FIG. 7. With sails 80 and 94 so deflected, the force of tension springs 88 and of current 14 propels the sail-car along the monorail in the direction of arrow 18.

Because of the unique construction of the sails and biasing tension spring, the sail-cars will be propelled in the direction of arrow 18 regardless of the current direction, although the optimum movement is realized when the current approaches the monorail perpendicular to the linear parallel side track segments 21. Further, adjustments to variations in the current direction are

made automatically with no need to mechanically adjust the orientation of the sails.

In the event the current becomes destructively strong, it will overcome the bias applied by tension springs 88, thus causing the sails to rotate about the support poles so as to align themselves with the current, thereby affording minimum resistance to the current. When the current strength once more decreases to an acceptable level, tension springs 88 again force the sails to return to a position suitable for propelling the sail-cars. The tension in tension springs 88 should, therefore, be selected both to allow sails 80 and 94 to align themselves quickly with destructively strong currents, thus minimizing the possibility of damage, and also to provide the appropriate thrust to the sail-cars under normal conditions.

An alternate means for biasing sails 80 and 94 is illustrated in FIG. 9. Using this alternate biasing means, sails 80 and 94 are mounted on support poles 82 and 96, respectively so as to be capable of rotating 360 degrees about support poles 82 and 96, and simultaneously of being vertically lifted along support poles 82 and 96. With the sails thus mounted, sails 80 and 94 may be biased to a preferred orientation by the force of their own weight. As with the presently preferred biasing means, this alternate biasing means will first be described with particular reference to upward sail 80.

As illustrated in FIG. 9, upward sail 80 may be biased by attaching an inclined, slightly elliptical ring 188 to sail-car 40 adjacent to the downward end of sail 80 such that, when viewed from above, ring 188 appears to be a circle which is concentric with support pole 82. Importantly, the lowest point along inclined ring 188 is rearward of support pole 82.

Inclined elliptical ring 188 may be attached to sail-car 40 by any suitable means. For example, it is shown in FIG. 9 as being attached to horizontal beam 42 of sail-car 40 by means of long vertical support 190 and short vertical support 192. As illustrated, long vertical support 190 and short vertical support 192 are each attached at one end to the underside of inclined elliptical ring 188. Supports 190 and 192 are attached at the other end to horizontal beam 42 so as to lie forward and rearward of support pole 82, respectively.

A rigid arm 184 aligned with sail 80 is advantageously secured to a rigid sleeve 183 extending from the lower end of the sail and surrounding support pole 82.

A wheel 186 is provided on the end of rigid arm 184 so as to facilitate rolling along inclined elliptical ring 188. Importantly, elliptical ring 188, rigid arm 184, and wheel 186 are all attached such that wheel 186 is constantly in contact with inclined elliptical ring 188 and continually carries the weight of the sail.

Downward sail 94 may be biased in a similar manner. However, as depicted in FIG. 9, elliptical ring 188, rigid sleeve 183, rigid arm 184, and wheel 186 are all preferably located adjacent to the upward end, rather than the downward end, of sail 94. Additionally, vertical supports 190 and 192 are attached to elliptical ring 188 so as to provide sufficient clearance for wheel 186, as illustrated.

With this construction, sails 80 and 94 tend to orient themselves such that wheels 186 are at the lowest point along elliptical rings 188. Thus, when this lowest point is rearward of the support poles, the sails will again tend to be oriented parallel to the horizontal beam.

When a current acts upon sails 80 and 94 in the direction of arrow 14, the sails will rotate and also be lifted

slightly as wheels 186 roll along inclined elliptical rings 188. The weight of sails 80 and 94 resisting the force of current 14 will then cause the sail-car to be propelled along monorail 20 in the direction of arrow 18.

In the event that the current force applied to sails 80 and 94 becomes too strong, the sails are again free to align themselves with the current. Then, when the current force decreases, sails 80 and 94 will once more orient themselves so as to propel the sail-car.

The force which is necessary to rotate and lift the sails may be predetermined by choosing the incline of the elliptical ring. Advantageously, a short vertical support 192 may be provided with a swivel attachment (not shown) at the point where it is connected to the inclined elliptical ring, and the long vertical support 190 may be variable in length, thereby making the incline of elliptical ring 188 adjustable.

A variation of this approach would be to bias the sails by mounting the inclined elliptical ring on a compressible spring (not shown). For example, a spring may be substituted for the long vertical support 190 such that the spring is compressed as wheel 186 travels along the inclined elliptical ring. The tension of the spring would then determine the force necessary to rotate the sail and the sail would not itself have to be lifted.

As explained previously, the translational motion of the chain of sail-cars is converted to rotational motion by engagement with an auger 100. The specific construction of one preferred embodiment of the auger is best shown in FIG. 8, where it is seen that the auger is preferably an elongated, cylindrical member having a continuous spiral fin 102 attached thereto. In order to provide for the smooth, continuous rotation of the auger 100, it is presently preferred that the auger be long enough to be engaged by at least two sail-cars simultaneously.

As previously mentioned, auger 100 is positioned adjacent and substantially parallel to the monorail. Specifically, auger 100 is positioned so that outside frame extensions 62 of adjacent sail-cars pass above auger 100, with corresponding auger drive rollers 106 and 107 simultaneously engaging spiral fin 102 at opposite sides of the auger (see FIGS. 4, 5, and 8). The use of two auger drive rollers 106 and 107, which simultaneously engage spiral fin 102 as indicated above, minimizes the stress on the auger and the possibility that the auger will be bent.

The rotational motion of the auger may then be used to run an electric generator 12. By way of illustration, such a generator may advantageously be mounted on a horizontal platform located adjacent to the auger, as shown in FIGS. 3 and 4. Pulley wheels 104 and 105 may then be attached to one end of auger 100 and to shaft 13 of the electric generator, respectively, such that pulley wheels 104 and 105 are vertically aligned, as shown. Drive belt 108 may therein be placed snugly around the pulley wheels such that any rotation of auger 100 will drive the electric generator. Alternatively, a transmission may be incorporated between the auger and generator if deemed advisable.

As illustrated in FIG. 1, the generating capacity of generator apparatus 10 may be increased by positioning additional augers 100 and electric generators 12 at various locations along monorail 20 in the manner described above. Alternatively, such generating capacity could also be increased by connecting several augers 100 to one, centrally located electric generator (not shown) by means of belts or shafts.

In addition to the basic requirements set forth above, the augers could advantageously include other features and details which would further contribute to smooth, continuous rotation. For example, the end sections of spiral fins 102 could be flared to provide for smooth engagement of auger 100 by auger drive rollers 106 and 107. Further, such flared sections could be lined with leather, or some suitable material, to provide additional smoothness and continuity. Additionally, a fly wheel could be connected to each auger 100 to help govern the rotation of augers 100. Augers 100 could also be equipped with a braking system to assist in system shut down.

As best seen in FIG. 8, it would also be advantageous to provide a raised lip 103 on the side of spiral fin 102 that comes in contact with drive rollers 106 and 107, so that only a narrow portion of the auger comes in contact with drive rollers 106, 107, thus minimizing torsional stresses which may occur when substantially cylindrical drive rollers are used. Alternatively, such stresses may be relieved by utilizing tapered drive rollers.

The efficiency of the wind and water powered apparatus of the invention can be further improved by careful attention to the monorail loop configurations. FIGS. 10 and 11 illustrate two possible monorail loop configurations which maximize the efficient use of natural air or water currents. In FIG. 10, a single monorail loop is shown wherein the side track segments 21 of monorail 20 are situated very close together, although not close enough to permit a collision between downward sails 94 of the several sail-cars 40. With such a monorail loop configuration, both incident and deflected currents will assist in sail-car propulsion. Thus, as illustrated in FIG. 10, when a current passes the first row of sail-cars in the direction of arrow 14, the current is deflected as shown by dotted lines 16. The deflected current 16 is then more optimally directed to forcefully propel the second row of sail-cars along the monorail.

Similarly, the monorail configuration illustrated in FIG. 11 uses both incident and deflected currents to optimize motion of the sail-cars around the monorail. This configuration comprises two separate, concentric monorail loops 110 and 210. As shown in FIG. 11, a chain of sail-cars are positioned on outer monorail loop 110 so as to travel in the direction of arrow 118. Concurrently, another chain of sail-cars are positioned on inner monorail loop 210 so as to travel in the opposite direction, the direction of arrow 120. Importantly, the distance between monorail loops 110 and 210 is as small as possible while avoiding a collision between the several sail structures.

When a current approaches the two monorail loops in the direction indicated by arrow 114, it is deflected by the first row of sail-cars 40, as shown by arrow 116. The deflected current 116 is then better directed to forcefully propel the second row of sail-cars 40 along monorail 210. Once again, the current will be deflected, this time back toward its original direction. Thus, when the current reaches the third row of sail-cars 40, it is again moving substantially in the direction of arrow 114. As before, the current is deflected as shown by dotted lines 116, and thus forcefully propels the third and fourth row of sail-cars 40 in the direction of arrows 120 and 118, respectively. By thus making use of both incident and deflected currents, the efficiency of the generating systems shown in FIGS. 10 and 11 is increased.

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO
DIVISIÓN DE NUEVAS CREACIONES

2020
Bogotá, D.C.,

Abogado (a)
DILIA MARIA RODRIGUEZ D'ALEMAN

ASUNTO Radicación 06-30114
 Trámite 011
 Evento 379
 Actuación 430
 Oficio 10165
 Folios 015

Patente de Invención ☒ Patente de Modelo de Utilidad ☐
Vía Nacional ☐
Vía PCT (fase nacional) ☒ Cap. I ☐ Cap. II ☒

No. Sol. Internacional PCT/AU2004/001281
Fecha de Presentación Internac. 20 septiembre 2004

Como resultado del examen de fondo, realizado con fundamento en el artículo 45 de la Decisión 486 de la Comisión de la Comunidad Andina, se le comunica:

1. Documentos estudiados

- 1.1. Descripción: Folios: 46 a 86 como se radicó inicialmente
- 1.2. Reivindicaciones: Folios: 87 a 90 como se radicó inicialmente
 Folios: 155 a 160 Pliego modificado
- 1.3. Dibujos: Folios: 27 a 45 como se radicó inicialmente
- 1.4. Prioridad: Folio: 1
 (Sept. 19 2003, AU, N° 2003905107)
 (Nov. 27 2003, AU, N° 2003906557)
 (Mar. 26 2004, AU, N° 2004901628)
 (Junio. 1 2004, AU, N° 2004902885)

2. Objeto de la invención

La presente solicitud se titula "UN SISTEMA SUBACUÁTICO DE GENERACIÓN DE ENERGÍA", Folio N° 1.

El objeto de la presente solicitud se refiere a un sistema subacuático de generación de energía que tiene un carrito que se mueve a lo largo de una trayectoria definida por un riel, y donde el carrito es impulsado por un número de hojas metálicas que utilizan el flujo de corriente de agua para generar el impulso

De otra parte, el pliego reclama: un sistema de generación de energía adaptado para proporcionar energía de salida a partir de flujo de agua, relacionado en las reivindicaciones 1 a 15, y un método para generar energía a partir de corriente de agua, relacionado en las reivindicaciones 16 a 20.

El objeto de la solicitud definido anteriormente se clasificó en la IPC F03B 9/00, 13/00, 17/00.

3. De la solicitud de Patente

3.1. Reivindicaciones (artículo 30 D 486)

Las reivindicaciones calificadas no definen la materia que se desea proteger por las siguientes razones:

La reivindicación 1, no aclara cual es el aporte del solicitante al estado del arte, ya que se refiere a una serie de elementos sin hacer la distinción entre la materia conocida y la materia **característica** propia de la invención.

No es clara la relación estructural de los soportes móviles, ya que no se entiende a que se refiere con que estén ligados en serie junto a una pista. Por otra parte la expresión "sustancialmente", usada para definir la ubicación de la pista, no es aceptable ya que se trata de un término indefinido.

La expresión "un riel que soporta los soportes móviles unidos a la estructura", no es clara porque da a entender que los soportes móviles son parte de la estructura de montaje.

Se debe especificar la relación estructural del separador de energía, ya que el término "operativamente" es indefinido. Igual situación ocurre con las reivindicaciones 2, 13 y 14.

La reivindicación 11 debe especificarse, ya que el término "generalmente" es subjetivo.

La reivindicación 15 no es clara porque no especifica como es la relación estructural entre los componentes de la primera unidad de impulsión, y tan solo nombra la segunda unidad de impulsión, sin especificar ningún detalle de esta.

Las reivindicaciones 16 a 20, no son aceptables por las siguientes razones:

- i) El método solicitado no tiene sustento descriptivo, ya que el documento radicado trata exclusivamente la forma estructural de diversas plantas de generación subacuáticas.
- ii) El método no conlleva a la obtención de un producto, porque se trata es de la producción de un servicio tal como lo es el suministro de energía.
- iii) Los pasos característicos que conforman el método, corresponden a instrucciones de operación (utilización) de un sistema de generación de energía, por lo cual el mencionado método no puede ser objeto de patente.

En conclusión, el pliego reivindicatorio calificado no cumple los requisitos de claridad y sustento descriptivo, exigidos en el Art. 30 de la decisión.

4. Determinación del Estado de la Técnica

Considerando que la solicitud reclama prioridad del 19 de septiembre de 2003, se buscaron documentos del estado de la técnica relacionados, con fecha de publicación anterior a esta. Se realizó búsqueda de documentos relevantes dentro del estado de la técnica, entendiendo como estado de la técnica la definición provista en el Art. 16 D 486, y las excepciones fijadas en el Art. 17 de la misma.

No obstante, la solicitud presenta problemas de claridad y patentabilidad, se realizó una búsqueda parcial la cual se complementara una vez se realicen los ajustes a la solicitud.

Se encontró como anterioridades los documentos relacionados a continuación que pueden afectar la patentabilidad del objeto de la presente solicitud

N°	Documento*	Título	Fecha de publicación
D1	US4589344	MONORAIL CONVEYANCE SYSTEM FOR WIND OR WATER POWERED GENERATOR APPARATUS	1986-05-20

*los documentos mencionados se anexan al expediente

5. Análisis de patentabilidad (artículo 14 D486)

En cumplimiento del Art. 14 D486 se procedió a evaluar los requisitos de novedad, nivel inventivo y aplicabilidad industrial, con el fin de establecer la patentabilidad de la invención reivindicada de la solicitud en estudio.

5.1. Novedad (artículo 16 D486)

La novedad se evaluó por comparación entre lo solicitado y los documentos citados en el numeral 4. El estudio no fue realizado a las reivindicaciones 16 a 20, por los motivos expuestos en el numeral 3 del presente folio.

La presente solicitud de patente se refiere a un sistema de generación de energía el cual cuenta con los siguientes elementos (reivindicación 1):

- Una estructura
- Soportes móviles ligados a una pista
- Una pista
- Un riel que soporta los soportes móviles
- Láminas montadas en los soportes móviles
- Un separador de energía

La anterioridad **D1** se refiere a un aparato para generar energía eléctrica a partir de aire o flujos de agua **10**, que comprende:

- Una estructura de generación de energía **10**.
- Montajes de carro de vela **40** (unidades móviles) acoplados entre sí suspendidos por el monorriel **20** y limitados a transitar por él (col. 5 líneas 52 a 55)
- Un monorriel **20** esencialmente ovalado (col. 5 línea 47)
- Cada montaje de carro esta provisto con un par de veletas **80** y **94**, suspendidas por medio de los soportes **82** y **96** respectivamente.
- Una estructura para la conversión de energía, formadas por uno o más rodillos **100** acoplados a generadores eléctricos **12**.

La reivindicación 2, especifica que el sistema comprende una cadena de impulsión que conecta los soportes móviles.

El documento **D1** especifica que las unidades móviles **40** están unidas por una cadena simple **42**.

La reivindicación 4 especifica que los soportes móviles comprenden un cuerpo, un par de ruedas adaptadas para rodar junto con un borde de las placas del riel, y una rueda adaptada para rodar a lo largo de una trayectoria interna del riel

El documento **D1** presenta una unidad móvil **40**, la cual consta de un cuerpo **42**, **68**, **70**, con un par de ruedas **74** y **75** adaptadas para rodar junto a los bordes del riel **28** y una rueda **76** adaptada para rodar a lo largo de la pared interna de fondo **30** del monorraíl **20**.

La reivindicación 8 a 10 especifica que la invención comprende un anclaje para montar el sistema en el lecho de un océano o un río.

La anterioridad **D1** presenta una estructura de montaje formada por postes de soporte **36** y brazos de soporte **38**. Esta estructura sostiene un monorraíl **20**

La reivindicación 11 especifica que la pista tiene una forma "generalmente" ovalada.

El documento **D1** presenta un monorraíl **20** que forma una trayectoria esencialmente ovalada (col. 5 línea 47)

La reivindicación 12 especifica que las láminas se forman a partir de dos alas desplegadas y un brazo de conexión.

La anterioridad **D1**, muestra una unidad móvil **40** con dos velas desplegadas **80** y **94** unidas mediante un brazo de conexión **60**, **58**.

La reivindicación 13 menciona la asociación entre un separador de energía y un generador.

Como ya se había dicho, el documento **D1** se refiere una estructura de conversión de energía formada por un rodillo **100** (separador de energía) acoplado a un generador eléctrico **12**

Finalmente, la reivindicación 15 especifica una primera y una segunda unidades de impulsión dispuestas adyacentes una a la otra.

La anterioridad **D1**, muestra en la Fig. 11 dos monorraíles **110** y **210** separados, dispuestos de forma que viajen en direcciones opuestas uno del otro (col. 12 líneas 44 a 50)

Por los motivos anteriores, se encontró que la solicitud de patente no presenta ninguna ventaja o efecto novedoso con respecto al estado del arte, por consiguiente se considera que el objeto de la solicitud no tiene Novedad y no cumple con los requisitos de los artículos 14 y 16 de la decisión.

6. Conclusión:

Los requisitos de patentabilidad de la presente solicitud se encuentran afectados así:

N°	Documento N°	Reivindicaciones afectadas	Requisito que afecta
D1	EP1074949	1, 2, 4, 8 a 13 y 15	Novedad

Si el interesado desea continuar la tramitación, deberá presentar una o más reivindicaciones que definan la materia que se desea proteger, en forma clara, concisa y acorde a lo que establece la ley.

Se recomienda, que tenga en cuenta que el replanteamiento de esos apartes NO podrá implicar una ampliación de la protección que correspondería a la divulgación contenida en la solicitud inicial, de acuerdo a lo que establece el artículo 34 de la Decisión 486.

En cumplimiento del artículo 45 de la Decisión 486 de la Comisión de la Comunidad Andina, se le indica que debe dar respuesta dentro del término de sesenta días contados a partir de la fecha de notificación de la presente comunicación. En caso de no dar respuesta al presente requerimiento, o si a pesar de la respuesta subsistieran los impedimentos para la concesión, se denegará la patente.

Notifíquese el presente oficio conforme a lo dispuesto en el numeral 5.2, literal e), del capítulo quinto del título primero de la Circular Única N° 10 de 2001.


ALIX CARMENZA CÉSPEDES DE VERGEL
Jefe de División de Nuevas Creaciones

El anterior requerimiento fue notificado por fijación en lista, de fecha
08 AGO. 2000

CONCEPTO TÉCNICO No. 2033	EXAMINADOR TÉCNICO Código No. 202082
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