Claims

1. A turbine system comprising:

a support structure defining a first axis and a central hollow coinciding with the first axis, the support structure having an outer portion and an inner portion forming the periphery of the central hollow, the support structure comprising a plurality of inner rolling elements arranged to define a plurality of inner pathways;

a turbine assembly movably coupled to and configured to be supported from the inner portion of the support structure to enable rotational displacement thereof along the periphery of the central hollow and about the first axis, the turbine assembly comprising a plurality of inner guide rails; and

a guide vane assembly coupled to the outer portion of the support structure for circumscribing the support structure, the guide vane assembly comprising a plurality of guide vanes positionable for guiding fluids impinging thereupon towards the turbine assembly to thereby rotationally displace the turbine assembly about the first axis,

wherein each of the support structure and the turbine assembly having a tubular shape extending along the first axis between a first end and a second end, wherein the turbine assembly is configured concentric the support structure,

wherein each of the plurality of inner pathways corresponds with one of the plurality of inner guide rails, and

wherein the plurality of inner guide rails engages with the plurality of inner rolling elements to thereby movably couple the turbine assembly to the support structure and enable travel of each of the plurality of inner guide rails along the corresponding one of the plurality of inner pathways.

2. The turbine system as in claim 1, the plurality of inner guide rails being inter-coupled to form a rigid body and each of the plurality of inner rolling elements being one of a polymeric, an elastomeric and a metallic wheel being set with one of a bush and bearings on an axle coupled to the inner portion of the support structure.

3. The turbine system as in claim 1, the plurality of inner rolling elements being arranged for substantially impeding movement of each of the plurality of inner guide rails transverse the corresponding one of the plurality of pathways.

4. The turbine system as in claim 1, the turbine assembly comprising:

upper inner guide rails comprising at least one of the plurality of inner guide rails being disposed towards the first end of the turbine assembly; and

lower inner guide rails comprising at least one of the plurality of inner guide rails being disposed towards the second end of the turbine assembly.

5. The turbine system as in claim 4, further comprising:

a linear alternator coupled to and configured to interpose the turbine assembly and the support structure, the linear alternator for generating power from relative displacement between the turbine assembly and the support structure.

6. The turbine system as in claim 4, the turbine assembly comprising:

a plurality of rotor blades extending between the upper inner guide rails and the lower inner guide rails.

7. The turbine system as in claim 6, each of the plurality of rotor blades defining a rotor axis along the length thereof, the rotor axis of each of the plurality of rotor blades being substantially parallel the first axis.

8. The turbine system as in claim 7, each of the plurality of rotor blades being rotatably coupled to the upper inner guide rails and the lower inner guide rails to enable rotational displacement of each of the plurality of rotor blades about the rotor axis thereof.

9. The turbine system as in claim 8, further comprising:

a plurality of rotor actuators in signal communication with a controller for controlling operation thereof, each of the plurality of rotor actuators in operational engagement with one of the lower inner guide rails and the upper inner guide rails and a corresponding one of the plurality of rotor blades for angularly positioning the corresponding one of the plurality of rotor blades about the rotor axis thereof.

10. The turbine system as in claim 1, the support structure comprising:

an upper annular structure;

a lower annular structure; and

a plurality of pillars extending between and inter-coupling the upper annular structure and the lower annular structure,

wherein at least one of the upper annular structure, the lower annular structure and the plurality of pillars being formed from truss structures.

11. The turbine system as in claim 1, the guide vane assembly comprising a plurality of outer guide rails, and the support structure comprising a plurality of outer rolling elements arranged to define a plurality of outer pathways, each corresponding with one of the plurality of outer guide rails,

wherein the plurality of outer guide rails engages with the plurality of outer rolling elements to thereby movably couple the guide vane assembly to the support structure and enable travel of each of the plurality of outer guide rails along the corresponding one of the plurality of outer pathways.

12. The turbine system as in claim 1, the guide vane assembly comprising:

upper outer guide rails comprising at least one of the plurality of outer guide rails being disposed towards the first end of the support structure; and

lower outer guide rails comprising at least one of the plurality of outer guide rails being disposed towards the second end of the support structure.

13. The turbine system as in claim 12, the guide vane assembly further comprising:

an outer frame inter-coupling the plurality of outer guide rails and spatially displacing the upper outer guide rails from the lower outer guide rails and each of the plurality of outer rolling elements being one of a polymeric, an elastomeric and a metallic wheel being set with one of a bush and bearings on an axle coupled to the outer portion of the support structure.

14. The turbine system as in claim 13, the guide vane assembly comprising:

an outer rack extending along an arcuate adjacent one of the upper outer guide rails and the lower outer guide rails, the outer rack being engageable with an outer actuator-driven one of a pinion and a worm gear to thereby enable control by the outer actuator for angular positioning of the guide vane assembly about the first axis.

15. The turbine system as in claim 13, the plurality of guide vanes being rotatably coupled to the outer frame and spatially distributed about the first axis, each of the plurality of guide vanes comprising:

a rig structure having an inner portion and an outer portion forming extremities thereof, the rig structure defining a rig plane and a vane axis adjacent the inner portion thereof, the angle of the rig plane with the turbine assembly being variable about the vane axis, the inner portion being positioned nearer to the turbine assembly than the outer portion;

a sail coupled to the rig structure and shaped for presenting a trough to a flow of impinging fluid, the trough having a depth defined from the rig plane, the sail extending from the outer portion towards the inner portion of the rig structure to terminate at an inner edge whereat a vent is defined, the fluid impinging on the sail being concentrated at the trough and redirected towards the turbine from the vent; and

an actuator assembly coupled to the rig structure and whereto the portion of the sail at the vent is anchored, the actuator assembly being operable for

positioning the inner edge of the sail one of towards and away from the rig plane for varying the depth of the trough at the vent.

16. The turbine system as in claim 15, the actuator assembly comprising a winch and a control line whereto the inner edge of the sail is coupled, the winch for one of taking and releasing slack in the control line to thereby displace the inner edge of the sail one of towards and away from the rig plane,

wherein the sail being formed from a flexible material for enabling displacement of the trough across the rig plane by the impinging fluid.

17. The turbine system as in claim 15, the rig structure comprising:

a post configured at the inner portion of the rig structure;

a pair of booms extending from the post; and

a pulley system and a pair of cross bars, each of the cross bars being configured substantially perpendicular one of the pair of booms with exteremities thereof being coupled to an actuator via the pulley system for controlling angular positioning of the pair of booms about the vane axis by the actuator.

18. The turbine system as in claim 17, the rig structure comprising an actuator and at least one of a pulley, a translational linkage and a plurality of gears interposing the actuator and the pair of boom for communicating displacement thereto about the vane axis.

19. The turbine system as in claim 17, the rig structure further comprising a plurality of stiffeners formed with the sail for shaping the trough, each of the plurality of stiffeners being elongated and spatially inter-displaced along a medial segment of the sail from the outer portion towards the inner portion of the rig structure with each of the plurality of stiffeners extending between the outer portion and the inner portion of the rig structure.

20. The turbine system as in claim 19, the plurality of stiffeners being disposed for defining folding lines parallel thereto, the sail being substantially kinked along the folding lines when presented to fluids impinging thereupon to thereby shape the trough of the sail.

21. The turbine system as in claim 18, each of the pair of boom having a mast coupled thereto, the sail being slidably coupled to the mast of each of the pair of boom for being slidably displaceable for collapsing towards the outer portion of the rig structure.

22. The turbine assembly as in claim 21, the rig structure further comprising a sheath formed along the outer portion thereof for receiving the sail when crumpled towards the outer portion of the rig structure and thereinto, the sheath being shaped and dimensioned for shielding the sail received therein from fluids directed thereat.

23. The turbine system as in claim 18, each of the pair of mast comprising a pair of flange extending therefrom oblique the rig plane to reduce escape of fluid from the trough theretowards.