CLAIMS

1. A system for the generation of energy from the flow of water in a body of water, the system comprising:

a support assembly extending across at least a portion of the body of water;

a generator assembly mounted in the support assembly, the generator assembly comprising a first rotor assembly and a second rotor assembly, each rotor assembly comprising a vertical hub rotatable about a vertical axis and a plurality of vertical blades extending radially from the hub, the first and second rotor assemblies being arranged such that the volume swept by the blades of the first rotor assembly overlaps the volume swept by the blades of the second rotor assembly and

means to limit the speed of rotation of the rotor assembly, to thereby control the water level upstream of the system.

2. The system according to claim 1, wherein the support assembly comprises a fixed structure extending from the bed of the body of water.

3. The system according to either of claims 1 or 2, comprising a plurality of generator assemblies.

4. The system according to any preceding claim, wherein the support assembly extends across the body of water.

5. The system according to claim 4, wherein the support assembly extends substantially perpendicular to the banks of the body of water.

6. The system according to any preceding claim, wherein the support assembly extends substantially perpendicular to the normal flow of water in the body of water.

~~7. The system of any preceding claim, further comprising means to limit the speed of rotation of the rotor assembly, to thereby control the water level upstream of the system.~~

~~8~~7. The system according to any preceding claim, wherein the inner portion of each blade is spaced from the axis of rotation of the hub, providing an annular cavity between the inner portions of the blades and the inner portion of the hub.

~~9~~8. The system according to claim ~~8~~7, wherein the hub comprises an opening connecting each blade cavity with the annular cavity, to allow water to flow therethrough.

~~10~~9. The system according to either of claims ~~8~~ 7 or ~~9~~8, wherein the hub comprises an inner hub portion and a plurality of plates extending radially outwards from the inner hub, each blade being mounted at its inner portion to the outer edge of the plates.

~~11~~10. The system according to any of claims ~~8~~ 7 to ~~10~~9, wherein means are provide to selectively close the openings in the hub to prevent water flowing therethrough.

~~12~~11. The system according to any preceding claim, wherein the blades are substantially planar.

~~13~~12. The system according to any of claims 1 to ~~11~~10, wherein the blades are provided with a curved portion at their radially inner edge and/or outer edge.

~~14~~13. The system according to any preceding claim, wherein the or each generator assembly is disposed in a conduit extending through the support assembly.

~~15~~14. The system according to claim ~~14~~13, wherein the longitudinal axis of the conduit is substantially parallel with the general direction of flow of the water.

~~16~~15. The system according to claim ~~15~~14, wherein the rotor assemblies are arranged to extend on a line perpendicular to the longitudinal axis of the conduit.

~~17~~16. The system according to any of claims ~~14~~ 13 to ~~16~~15, wherein the rotor assemblies extend across the width of the conduit, thereby presenting an obstacle to the flow of water therealong.

~~18~~17. The system according to claim ~~17~~16, wherein the opposing sides of the conduit are each provided with a seal assembly to cooperate with the outer edges of the blades.

~~19~~18. The system according to any preceding claim, wherein the outer edges of the blades are provided with seals.

~~20~~19. The system according to any preceding claim, wherein a seal assembly is disposed on the upstream side of the rotor assemblies to prevent water entering the overlapping swept volume of the rotor assemblies.

~~21~~20. The system according to any preceding claim, wherein a seal assembly is disposed on the downstream side of the rotor assemblies to prevent water entering the overlapping swept volume of the rotor assemblies.

~~22~~21. The system according to any preceding claim, wherein a flow guide assembly is disposed on the upstream side of the rotor assemblies to direct water onto the upstream blades of the rotor assemblies at an angle to the general direction of flow of the water.

~~23~~22. The system according to any preceding claim, wherein a flow guide assembly is disposed on the downstream side of the rotor assemblies to direct water onto the upstream blades of the rotor assemblies at an angle to the general direction of flow of the water.

~~24~~23. A system for the generation of energy from the flow of water, the system comprising:

a support assembly extending across at least a portion of the body of water;

a generator assembly mounted in the support assembly, the generator assembly comprising a rotor assembly the rotor assembly comprising a vertical hub rotatable about a vertical axis and a plurality of vertical blades extending radially from the hub, adjacent blades of the rotor assembly defining between them a blade cavity;

wherein the hub comprises a cavity through which water may flow from a first blade cavity of the rotor assembly to a second blade cavity of the rotor assembly through the hub.

~~25~~24. The system according to claim ~~24~~23, wherein the support assembly comprises a fixed structure extending from the bed of the body of water.

~~26~~25. The system according to either of claims ~~24~~ 23 or ~~25~~24, comprising a plurality of generator assemblies.

~~27~~26. The system according to any of claims ~~25~~ 24 to ~~26~~25, wherein the support assembly extends across the body of water.

~~28~~27. The system according to claim ~~27~~26, wherein the support assembly extends substantially perpendicular to the banks of the body of water.

~~29~~28. The system according to any of claims ~~24~~ 23 to ~~28~~27, wherein the support assembly extends substantially perpendicular to the normal flow of water in the body of water.

~~30~~29. The system of any of claims ~~24~~ 23 to ~~29~~28, further comprising means to limit the speed of rotation of the rotor assembly, to thereby control the water level upstream of the system.

~~31~~30. The system according to any of claims ~~24~~ 23 to ~~30~~29, wherein the inner portion of each blade is spaced from the axis of rotation of the hub, providing an annular cavity between the inner portions of the blades and the inner portion of the hub.

~~32~~31. The system according to claim ~~31~~30, wherein the hub comprises an opening connecting each blade cavity with the annular cavity, to allow water to flow therethrough.

~~33~~32. The system according to either of claims ~~31~~ 30 or ~~32~~31, wherein the hub comprises an inner hub portion and a plurality of outer plates extending radially outwards from the inner hub, each blade being mounted at its inner portion to the outer edge of the plates.

~~34~~33. The system according to any of claims ~~31~~ 30 to ~~33~~32, wherein means are provide to selectively close the openings in the hub to prevent water flowing therethrough.

~~35~~34. The system according to any of claims ~~24~~ 23 to ~~34~~33, wherein the blades are substantially planar.

~~36~~35. The system according to any of claims ~~24~~ 23 to ~~35~~34, wherein the blades are provided with a curved portion at their radially inner edge and/or outer edge.

~~37~~36. The system according to any of claims ~~24~~ 23 to ~~36~~35, wherein the generator assembly is disposed in a conduit extending through the support assembly.

~~38~~37. The system according to claim ~~37~~36, wherein the longitudinal axis of the conduit is substantially parallel with the general direction of flow of the water.

~~39~~38. The system according to claim ~~38~~37, wherein the system comprises two rotor assemblies disposed within the conduit, the rotor assemblies being arranged to extend on a line perpendicular to the longitudinal axis of the conduit.

~~40~~39. The system according to any of claims ~~37~~ 36 to ~~39~~38, wherein the rotor assemblies extend across the width of the conduit, thereby presenting an obstacle to the flow of water therealong.

~~41~~40. The system according to claim ~~40~~39, wherein the opposing sides of the conduit are each provided with a seal assembly to cooperate with the outer edges of the blades.

~~42~~41. The system according to any of claims ~~24~~ 23 to ~~41~~40, wherein the outer edges of the blades are provided with seals.

~~43~~42. A system for the generation of energy from the flow of water, the system comprising:

a support assembly extending across at least a portion of the body of water;

a generator assembly mounted in the support assembly, the generator assembly comprising a first rotor assembly and a second rotor assembly, each rotor assembly comprising a vertical hub rotatable about a vertical axis and a plurality of vertical blades extending radially from the hub; and

a flow guide disposed upstream of and between the two rotor assemblies, the flow guide having respective first and second guide surfaces for directing a flow of water onto the blades of each of the first and second rotor assemblies and further comprising means to limit the speed of rotation of the rotor assembly, to thereby control the water level upstream of the system.

~~44~~43. The system according to claim ~~43~~42, wherein the support assembly comprises a fixed structure extending from the bed of the body of water.

~~45~~44. The system according to either of claims ~~43~~ 42 or ~~44~~43, comprising a plurality of generator assemblies.

~~46~~45. The system according to any of claims ~~43~~ 42 to ~~45~~44, wherein the support assembly extends across the body of water.

~~47~~46. The system according to claim ~~46~~45, wherein the support assembly extends substantially perpendicular to the banks of the body of water.

~~48~~47. The system according to any of claims ~~43~~ 42 to ~~47~~46, wherein the support assembly extends substantially perpendicular to the normal flow of water in the body of water.

~~49. The system of any of claims 43 to 48, further comprising means to limit the speed of rotation of the rotor assembly, to thereby control the water level upstream of the system.~~

~~50~~48. The system according to any of claims ~~43~~ 42 to ~~49~~47, wherein the inner portion of each blade is spaced from the axis of rotation of the hub, providing an annular cavity between the inner portions of the blades and the inner portion of the hub.

~~51~~49. The system according to claim ~~50~~48, wherein the hub comprises an opening connecting each blade cavity with the annular cavity, to allow water to flow therethrough.

~~52~~50. The system according to either of claims ~~50~~ 48 or ~~51~~49, wherein the hub comprises an inner hub portion and a plurality of plates extending radially outwards from the inner hub, each blade being mounted at its inner portion to the outer edge of the plates.

~~53~~51. The system according to any of claims ~~50~~ 48 to ~~52~~50, wherein means are provide to selectively close the openings in the hub to prevent water flowing therethrough.

~~54~~52. The system according to any of claims ~~43~~ 42 to ~~53~~51, wherein the blades are substantially planar.

~~55~~53. The system according to any of claims ~~43~~ 42 to ~~54~~52, wherein the blades are provided with a curved portion at their radially inner edge and/or outer edge.

~~56~~54. The system according to any of claims ~~43~~ 42 to ~~55~~53, wherein the generator assembly is disposed in a conduit extending through the support assembly.

~~57~~55. The system according to claim ~~56~~54, wherein the longitudinal axis of the conduit is substantially parallel with the general direction of flow of the water.

~~58~~56. The system according to claim ~~57~~55, wherein the rotor assemblies are arranged to extend on a line perpendicular to the longitudinal axis of the conduit.

~~59~~57. The system according to any of claims ~~56~~ 54 to ~~58~~56, wherein the rotor assemblies extend across the width of the conduit, thereby presenting an obstacle to the flow of water therealong.

~~60~~58. The system according to claim ~~59~~57, wherein the opposing sides of the conduit are each provided with a seal assembly to cooperate with the outer edges of the blades.

~~61~~59. The system according to any of claims ~~43~~ 42 to ~~60~~58, wherein the outer edges of the blades are provided with seals.

~~62~~60. The system according to any of claims ~~43~~ 42 to ~~61~~59, wherein a seal assembly is disposed on the upstream side of the rotor assemblies to prevent water entering the overlapping swept volume of the rotor assemblies.

~~63~~61. The system according to any of claims ~~43~~ 42 to ~~62~~60, wherein a seal assembly is disposed on the downstream side of the rotor assemblies to prevent water entering the overlapping swept volume of the rotor assemblies.

~~64~~62. The system according to any of claims ~~43~~ 42 to ~~63~~61, further comprising a flow guide disposed downstream of and between the two rotor assemblies, the flow guide having respective first and second guide surfaces for directing a flow of water onto the blades of each of the first and second rotor assemblies.

~~65~~63. The system according to any of claims ~~43~~ 42 to ~~64~~62, comprising first and second rotor assemblies, the flow guide being provided with first and second guide surfaces for directing water onto the blades of the respective first and second rotor assemblies.

~~66~~64. The system according to claim ~~65~~63, wherein the first and second guide surfaces are arranged symmetrically about the flow guide.

~~67~~65. A system for the generation of energy from the flow of water, the system comprising:

a support assembly extending across at least a portion of the body of water;

a generator assembly mounted in the support assembly, the generator assembly comprising a rotor assembly the rotor assembly comprising a vertical hub rotatable about a vertical axis and a plurality of vertical blades extending radially from the hub;

wherein the blades are pivotably mounted to the hub and moveable between an extended position and a retracted position as the rotor assembly rotates and the system further comprising means to limit the speed of rotation of the rotor assembly, to thereby control the water level upstream of the system.

~~68~~66. The system according to claim ~~67~~65, wherein the support assembly comprises a fixed structure extending from the bed of the body of water.

~~69~~67. The system according to either of claims ~~67~~ 65 or ~~68~~66, comprising a plurality of generator assemblies.

~~70~~68. The system according to any of claims ~~67~~ 65 to ~~69~~67, wherein the support assembly extends across the body of water.

~~71~~69. The system according to claim ~~70~~68, wherein the support assembly extends substantially perpendicular to the banks of the body of water.

~~72~~70. The system according to any of claims ~~67~~ 65 to ~~71~~69, wherein the support assembly extends substantially perpendicular to the normal flow of water in the body of water.

~~73. The system of any of claims 67 to 72, further comprising means to limit the speed of rotation of the rotor assembly, to thereby control the water level upstream of the system.~~

~~74~~71. The system according to any of claims ~~67~~ 65 to ~~73~~70, wherein the inner portion of each blade is spaced from the axis of rotation of the hub, providing an annular cavity between the inner portions of the blades and the inner portion of the hub.

~~75~~72. The system according to claim ~~74~~71, wherein the hub comprises an opening connecting each blade cavity with the annular cavity, to allow water to flow therethrough.

~~76~~73. The system according to either of claims ~~74~~ 71 or ~~75~~72, wherein the hub comprises an inner hub portion and a plurality of plates extending radially outwards from the inner hub, each blade being mounted at its inner portion to the outer edge of the plates.

~~77~~74. The system according to any of claims ~~74~~ 71 to ~~76~~73, wherein means are provide to selectively close the openings in the hub to prevent water flowing therethrough.

~~78~~75. The system according to any of claims ~~67~~ 65 to ~~77~~74, wherein the blades are substantially planar.

~~79~~76. The system according to any of claims ~~67~~ 65 to ~~77~~74, wherein the blades are provided with a curved portion at their radially inner edge and/or outer edge.

~~80~~77. The system according to any of claims ~~67~~ 65 to ~~79~~76, wherein the generator assembly is disposed in a conduit extending through the support assembly.

~~81~~78. The system according to claim ~~80~~77, wherein the longitudinal axis of the conduit is substantially parallel with the general direction of flow of the water.

~~82~~79. The system according to claim ~~81~~78, wherein the rotor assemblies are arranged to extend on a line perpendicular to the longitudinal axis of the conduit.

~~83~~80. The system according to any of claims ~~80~~ 77 to ~~82~~79, wherein the rotor assemblies extend across the width of the conduit, thereby presenting an obstacle to the flow of water therealong.

~~84~~81. The system according to claim ~~83~~80, wherein the opposing sides of the conduit are each provided with a seal assembly to cooperate with the outer edges of the blades.

~~85~~82. The system according to any of claims ~~67~~ 65 to ~~84~~81, wherein the outer edges of the blades are provided with seals.

~~86~~83. The system according to any of claims ~~67~~ 65 to ~~85~~82, wherein the blades are free-moving about the pivotal mounting.

~~87~~84. The system according to claim ~~86~~83, wherein the blades are arranged to approach the upstream position in the retracted position and be moved to the extended position under the action of water.

~~88~~85. The system according to claim ~~87~~84, further comprising a guide having a surface contacted by the blades as they move past the downstream position, the guide urging the blades into the retracted position.

~~89~~86. The system according to any of claims ~~67~~ 65 to ~~87~~84, wherein the position of the blades is controlled by a control means.

~~90~~87. The system according to claim ~~89~~86, wherein the control means comprises a cam.

~~91~~88. The system according to claim ~~90~~87, wherein the control means further comprises a lever extending from each blade to contact the cam.

~~92~~89. A system for the control of the water level upstream of the system, the system comprising:

a support assembly having a conduit through which the water may flow;

a rotor assembly disposed in the conduit, the rotor assembly comprising a vertical hub rotatable about a vertical axis and a plurality of vertical blades extending radially from the hub;

the conduit comprising first and second opposing surfaces contacted by the radially outer edge regions of each blade as the rotor assembly rotates,

whereby there is at least one position of the rotor assembly when a blade is in contact with each of the first and second opposing surfaces;

means for controlling the speed of rotation of the rotor assembly.

~~93~~90. The system according to claim ~~92~~89, wherein the support assembly extends substantially perpendicular to the banks of the body of water.

~~94~~91. The system according to either of claims ~~92~~ 89 or ~~93~~90, wherein the support assembly extends substantially perpendicular to the normal flow of water in the body of water.

~~95~~92. The system according to any of claims ~~92~~ 89 to ~~94~~91, wherein the inner portion of each blade is spaced from the axis of rotation of the hub, providing an annular cavity between the inner portions of the blades and the inner portion of the hub.

~~96~~93. The system according to claim ~~95~~92, wherein the hub comprises an opening connecting each blade cavity with the annular cavity, to allow water to flow therethrough.

~~97~~94. The system according to either of claims ~~95~~ 92 or ~~96~~93, wherein the hub comprises an inner hub portion and a plurality of plates extending radially outwards from the inner hub, each blade being mounted at its inner portion to the outer edge of the plates.

~~98~~95. The system according to any of claims ~~95~~ 92 to ~~97~~94, wherein means are provide to selectively close the openings in the hub to prevent water flowing therethrough.

~~99~~96. The system according to any of claims ~~92~~ 89 to ~~98~~95, wherein the blades are substantially planar.

~~100~~97. The system according to any of claims ~~92~~ 89 to ~~99~~96, wherein the blades are provided with a curved portion at their radially inner edge and/or outer edge.

~~101~~98. The system according to any of claims ~~92~~ 89 to ~~100~~97, wherein the longitudinal axis of the conduit is substantially parallel with the general direction of flow of the water.

~~102~~99. The system according to claim ~~101~~98, wherein the system comprises a plurality of rotor assembly, the rotor assemblies being arranged to extend on a line perpendicular to the longitudinal axis of the conduit.

~~103~~100. The system according to claim ~~102~~99, wherein the rotor assemblies extend across the width of the conduit, thereby presenting an obstacle to the flow of water therealong.

~~104~~101. The system according to any of claims ~~92~~ 89 to ~~103~~100, wherein the opposing sides of the conduit are each provided with a seal assembly to cooperate with the outer edges of the blades.

~~105~~102. The system according to any of claims ~~92~~ 89 to ~~104~~101, wherein the outer edges of the blades are provided with seals.

~~106~~103. The system according to any of claims ~~92~~ 89 to ~~105~~102, wherein the means for controlling the rotation of the rotor assembly comprises a means for generating energy.

~~107~~104. The system according to any of claims ~~92~~ 89 to ~~105~~102, further comprising means for rotating the rotor assembly.

~~108~~105. A method for controlling the water level of a flowing body of water, the method comprising:

providing an obstacle to the flow of water;

providing a conduit in the obstacle for the passage of water therethrough;

providing a rotor assembly in the conduit, the rotor assembly comprising a vertical hub rotatable about a vertical axis and a plurality of vertical blades extending radially from the hub;

the conduit comprising first and second opposing surfaces contacted by the radially outer edge regions of each blade as the rotor assembly rotates, whereby there is at least one position of the rotor assembly when a blade is in contact with each of the first and second opposing surfaces; and

controlling the speed of rotation of the rotor assembly.

~~109. A barrage extending in a flowing body of water, the barrage comprising one or more conduits therethrough for allowing the passage of water through the barrage, the or each conduit being provided with a generator assembly comprising a rotor assembly;~~

~~the rotor assembly comprising a vertical hub rotatable about a vertical axis and a plurality of vertical blades extending radially from the hub.~~

~~110. A system for the generation of energy from the flow of water substantially as hereinbefore described having reference to any of the accompanying figures.~~

~~111. A system for the control of the water level upstream of the system substantially as hereinbefore described having reference to any of the accompanying figures.~~

~~112. A method for controlling the water level of a flowing body of water substantially as hereinbefore described having reference to any of the accompanying figures.~~

~~113. A barrage extending in a flowing body of water substantially as hereinbefore described having reference to any of the accompanying figures.~~