CLAIMS

1. An apparatus for extracting energy from a flow of water, the apparatus comprising:

a plurality of central cores, each supported at a first and second end, each core rotatable about a substantially vertical axis;

at least one blade member extending from each of the central cores for engaging with the flow of water to cause rotation of the central cores, the at least one blade member defining a ram surface and a lift surface; and

at least one primary flow director positioned at a leading end of the apparatus for directing incoming water flow toward a predetermined region along each of the at least one blade members,

wherein the plurality of cores is positioned behind the at least one primary flow director, and

wherein the at least one blade member further comprises:

an inner portion proximate the central core from which the at least one blade member extends;

a central portion beginning at a distal end of the inner portion; and

an outer portion beginning at a distal end of the central portion and terminating in a sharp tip,

wherein the central portion is curved to induce lift to a lift surface side of the at least one blade member and wherein a curvature of the outer portion at the tip substantially corresponds to a curvature of a circular path travelled by the tip of the outer portion of the at least one blade member during rotation of the central cores.

2. The apparatus of claim 1 further comprising a secondary flow director positioned at each side of the apparatus for directing additional water flow toward the blade members.

~~3. The apparatus of claim 1 wherein the at least one extending blade member is substantially bodyless and terminates at a tip, wherein a curvature of the blade at its tip is substantially congruent with a curvature of the circular path travelled by the tip during rotation of the core.~~

3~~4~~. The apparatus of claim 1 comprised of two central cores, wherein rotation of each central core causes its corresponding blades to travel along a circular path defining a radius "R", and wherein the central cores are spaced apart such that the circular path travelled by the blades of one core and the circular path travelled by the blades of the other core are separated by a distance "X", whereby $R \leq X \leq 4R$.

4~~5~~. The apparatus of claim 1 wherein the at least one primary flow director is rotationally adjustable.

5~~6~~. The apparatus of claim 1 wherein the at least one primary flow director has a substantially V-shaped first end.

6~~7~~. The apparatus of claim 1 wherein the at least one primary flow director has a second end, the second end having a cross-section with a shape taken from the group comprised of: a square, a line, an arc, a diamond and an arrow.

7~~8~~. The apparatus of claim 1 wherein the at least one primary flow director is further comprised of pressure ~~regulators~~ regulating slots for relieving a pressure build-up behind the leading end of the at least one primary flow director.

8~~9~~. The apparatus of claim 1 further comprising at least one flow path for allowing fluid to escape the apparatus from behind the front flow director.

~~10. The apparatus of claim 1 comprised of at least four cores wherein the cores are in a substantially V-shaped configuration.~~

~~11. The apparatus of claim 1 further comprising a generator coupled to each of the central cores for capturing energy from the rotation of its corresponding central core.~~

~~12. The apparatus of claim 11 further comprising at least one buoyant structure for maintaining the plurality of generators substantially above water.~~

~~13. The apparatus of claim 1 further comprising a frame to support the apparatus and stability plates secured to the frame to maintain the apparatus in a forward, upright orientation with respect to the flow of water.~~

~~14. The apparatus of claim 11 further comprising a rear stabilizing fin secured to the frame, the stabilizing fin having a substantially planar paddle portion to mitigate unwanted yaw of the apparatus and to maintain a favourable orientation of the apparatus with respect to the flow of water.~~

~~15. The apparatus of claim 10 further comprised of a frustum-shaped tower secured to and projecting upwardly from the frame to facilitate access to the generators.~~

9~~16~~. The apparatus of claim 2 wherein at least one of the secondary flow directors are rotationally adjustable.

10~~17~~. The apparatus of claim 1 wherein the at least one primary flow director is rotationally adjustable about a pivot axis.

11~~18~~. The apparatus of claim ~~3~~1 wherein the at least one extending blade member rotates through a ram cycle and a non-ram cycle, the blade further comprised of at least one fluid flow-through mechanism to alleviate pressure against the blade member while ~~rotation~~ rotating through the non-ram cycle.

~~19. A blade for use with an energy-generating turbine, the turbine having a central rotating member, the blade having a ram surface and a lift surface, the blade comprising:~~

~~an inner portion proximate the central rotating member;~~

~~a central portion beginning at a distal end of the inner portion; and,~~

~~an outer portion beginning at a distal end of the central portion and terminating in a sharp tip;~~

~~wherein the central portion is curved to induced lift to the non-ram side of the blade; and~~

~~wherein a curvature of the outer portion at the tip substantially corresponds to a curvature of a circular path travelled by the tip of the blade during rotation of the central rotating member.~~

12~~20~~. A method to extract energy from a flow of water, comprising the steps of:

deploying an apparatus into a water mass, the apparatus comprising:

a plurality of central cores, each supported at a first and second end, each core rotatable about a substantially vertical axis;

at least one blade member extending from each of the central cores for engaging with the flow of water to cause rotation of the central cores, the at least one blade member defining a ram surface and a lift surface; and~~,~~

at least one primary flow director positioned at a leading end of the apparatus for directing incoming water flow toward a predetermined region along each of the at least one blade members,

wherein the plurality of cores is positioned behind the at least one primary flow director~~;~~,

wherein the at least one blade member further comprises:

an inner portion proximate the central core from which the at least one blade member extends;

a central portion beginning at a distal end of the inner portion; and

an outer portion beginning at a distal end of the central portion and terminating in a sharp tip,

wherein the central portion is curved to induce lift to a lift surface side of the at least one blade member and wherein a curvature of the outer portion at the tip substantially corresponds to a curvature of a circular path travelled by the tip of the outer portion of the at least one blade member during rotation of the central cores;

operating the apparatus to generate energy from the flow of the water; and

transmitting the energy to power an electrical device.

13~~21~~. The apparatus of claim 1 wherein the at least one primary flow director comprises at least one lip at a trailing end thereof, the at least one lip for enhancing a release of flow adhesion from the primary flow director.

14~~22~~. The apparatus of claim 1 wherein the plurality of central cores comprise two central cores, wherein the substantially vertical axes of the two central cores are separated by a distance "Y", wherein the primary flow director is defined by a lateral overall width "Z", and wherein the distance "Y" is greater than the lateral width "Z".

15~~23~~. The apparatus of claim 1 further comprising an enclosure plate at each longitudinal extremity of the at least one blade member, the enclosure plates for assisting in prevention of fluid escaping from the longitudinal extremities of the apparatus.

16~~24~~. An apparatus for extracting energy from a flow of water, the apparatus comprising:

a plurality of central cores, each supported at a first and second end, each core rotatable about a substantially vertical axis;

at least one blade member extending from each of the central cores for engaging with the flow of water to cause rotation of the central cores; and

at least one primary flow director positioned at a leading end of the apparatus for directing incoming water flow toward a predetermined region along each of the at least one blade members,

wherein the plurality of cores is positioned behind the at least one primary flow director, and

wherein the at least one extending blade member is substantially bodyless and terminates at a tip, wherein a curvature of the blade at its tip is substantially congruent with a curvature of the circular path travelled by the tip during rotation of the core.

17~~25~~. The apparatus of claim 16 wherein the at least one primary flow director is rotationally adjustable.

18~~26~~. The apparatus of claim 16 wherein the at least one primary flow director is further comprised of pressure regulating slots for relieving a pressure build-up behind the leading end of the at least one primary flow director.

19~~27~~. The apparatus of claim 16 further comprising at least one flow path for allowing fluid to escape the apparatus from behind the front flow director.

20~~28~~. The apparatus of claim 16 wherein the at least one extending blade member rotates through a ram cycle and a non-ram cycle, the blade further comprised of at least one fluid flow-through mechanism to alleviate pressure against the blade member while rotating through the non-ram cycle.