CLAIMS

We Claim:

1. An apparatus for heating a fluid using cavitation comprising:

a housing having an inlet for fluid to be heated and an outlet to discharge the heated fluid from the housing;

an external rotor adapted to be fixed on a motor shaft extending in a axial direction, the external rotor contained in the housing and adapted to rotate within the housing, the external rotor having a plurality of cavitation bores arranged in an outer surface thereof and the external rotor arranged within the housing to form a fluid heating zone between the outer surface of the external rotor and an inner surface of the housing that faces the outer surface of the external rotor, the inner surface of the housing extending in the axial direction and a housing circumferential direction,

wherein the inner surface of the housing facing the bore-containing outer surface of the external rotor has a plurality of first funnel zones extending along the inner surface of the housing and in the housing circumferential direction, the plurality of first funnel zones laterally spaced apart from each other in the axial direction, each first funnel zone terminating in a first discharge zone, each first funnel zone including a first ramp, each first discharge zone offset in the housing circumferential direction from an adjacent first discharge zone, fluid entering the housing being heated by interaction with the first funnel zones and first ramps, bores in the external rotor, and external rotor rotation.

2. The apparatus of claim 1, further comprising a stationary head, the stationary head mounted in the housing and having an outer surface which faces an inner surface of the external rotor, the inner surface of the external rotor extending in the axial direction and an external rotor circumferential direction, the outer surface of the stationary head and the inner surface of the external rotor forming a second fluid cavitation zone, the outer surface of the stationary head including a plurality of cavitation bores therein, the inner surface of the external rotor having plurality of second funnel zones extending along the inner surface of the external rotor and in the external rotor circumferential direction, the plurality of second funnel zones laterally spaced apart from each other in the axial direction, each second funnel zone terminating in a second discharge zone, each second funnel zone including a second ramp, each second discharge zone offset in the external rotor circumferential direction from an adjacent second discharge zone, fluid entering the second fluid cavitation zone being

heated by interaction with the second funnel zones and second ramps, bores in the rotor head, and external rotor rotation.

3. The apparatus of claim 1, wherein the cavitation apparatus has a horizontal longitudinal axis and each of the first discharge zones when viewed in a cross section transverse to the horizontal longitudinal axis is at a 6 o'clock position for heating fluid, and either 3 or 9 o'clock position for cooling of fluid.

4. The apparatus of claim 2, wherein the cavitation apparatus has a horizontal longitudinal axis and each of the first and second discharge zones when viewed in a cross section transverse to the horizontal longitudinal axis is at a 6 o'clock position for heating fluid, and either 3 or 9 o'clock position for cooling of fluid.

5. The apparatus of claim 1, wherein the first funnel zone at the first discharge zone on the inner surface of the housing has a face formed at a right angle with respect to the inner surface.

6. The apparatus of claim 2, wherein each of the first funnel zones at each of the first discharge zones on the inner surface of the housing has a face formed at a right angle with respect to the inner surface of the housing and each of the second funnel zones at each of the second discharge zones on the inner surface of the external rotor has a face formed at a right angle with respect to the inner surface of the external rotor.

7. A cavitation apparatus system comprising:

a) the apparatus of claim 1;

b) an incoming water tank in communication with the inlet to the housing,

c) a discharge water hammer tank in communication with the outlet of the housing,

d) a motor having a motor shaft, the external rotor mounted to the motor shaft,

e) a motor controller for controlling the speed of the motor;

f) temperature gauges to monitor incoming and outgoing fluid for the apparatus; and

g) a crossover pipe between an inlet to the incoming water tank and an outlet to the discharge water hammer tank.

8. The system of claim 7, wherein the external rotor is mounted to the motor shaft in a cantilevered configuration so that there are no internal bearings in the apparatus.

9. A method of thermally changing a fluid using cavitation comprising the steps:
   a) providing the apparatus of claim 1;
   b) introducing fluid into the inlet;
   c) rotating the external rotor to heat the fluid using a controlled speed in order to improve alignment of bubbles with cavitation bores, and
   d) discharging the thermally changed fluid from the outlet.

10. The method of claim 9, wherein the fluid is water.

11. A method of thermally changing a fluid using cavitation comprising the steps:
   a) providing the apparatus of claim 2;
   b) introducing fluid into the inlet;
   c) rotating the external rotor to heat the fluid using a controlled speed in order to improve alignment of bubbles with cavitation bores, and
   d) discharging the thermally changed fluid from the outlet.

12. The method of claim 11, wherein the fluid is water.

13. The method of claim 9, wherein the fluid is purified.

14. The method of claim 11, wherein the fluid is purified.

15. The apparatus of claim 5, wherein each of the first discharge zones when viewed in the cross section tranverse to the horizontal longitudinal axis is at either 3 or 9 o'clock position for cooling of fluid.

16. The apparatus of claim 6, wherein each of the first discharge zones when viewed in the cross section tranverse to the horizontal longitudinal axis is at either 3 or 9 o'clock position for cooling of fluid.

17. The apparatus of claim 6, wherein the fluid is water.