CLAIMS

1. A heat-dissipating structure with internally recycling heat transfer fluid, comprising:

an embedded support tube (101) and at least one inner tube (103) installed within the support tube (101), the support tube (101) having an inner diameter that is larger than an outer diameter of the at least one inner tube (103), a space between the inner diameter of the support tube (101) and the outer diameter of the at least one inner tube (103) forming an exterior fluid path,

wherein the support tube (101) is made of a thermally conductive or thermally insulating material and has a circular or non-circular cross-section,

wherein a distal end of the at least one inner tube (103) is arranged to enable the heat transfer fluid to flow between the exterior fluid path and an interior fluid path within the at least one inner tube (103) and thereby provide a fluid circulation path for circulation of the recycling heat transfer fluid, and

wherein the support tube (101) and the at least one inner tube (103) include respective front tube ports in communication with a fluid passage in an electric energy application device assembly (108) supported by the support tube (101) and/or a heat dissipater (104) of the electric energy device assembly (108); and

at least one fluid pump (105) installed in the exterior or interior fluid paths of the at least one inner tube (103) to control a flow direction of the heat transfer fluid in the fluid circulation path,

wherein the fluid passage in the electric energy application device assembly (108) supported by the support tube (101), and/or the fluid passage of a heat

dissipater (104) of the electric energy application device assembly (108), has at least one of the following configurations:

(a) an interior of the electric energy application device assembly (108) includes at least one heat transfer fluid path (1081) that extends through or past the electric energy application device assembly (108) from said front tube port of the at least one inner tube (103) to the front tube port of the support tube (101),

(b) the heat dissipater (104) includes at least one heat transfer fluid path (1041) that extends through or past the heat dissipater structure from said front tube port of the at least one inner tube (103) to the front tube port of the support tube (101),

(c) the at least one heat transfer fluid path of the electric energy application device assembly (108) is connected to the at least one heat transfer fluid path (1041) of the heat dissipater, and the respective at least one heat transfer fluid paths (1081, 1041) of the electric energy application device (108) and heat dissipater (104) are connected to the respective front tube ports of the at least one inner tube (103) and support tube (101),

(d) the electric energy application device assembly (108) includes at least two internal heat transfer fluid paths (1081), or a U-shaped or L-shaped internal fluid path, connected through external tubes to form a fluid inlet port and a fluid outlet port respectively connected to the front tube ports of the at least one inner tube (103) and support tube (101),

(e) an exterior of the electric energy application device (108) is enclosed within a sealed housing, thereby forming a space between the electric energy application device (108) and the sealed housing to allow fluid to pass, said

space being in communication with the front tube ports of the at least one inner tube (103) and the support tube (101) through at least one fluid inlet/outlet port,

(f) a sealed space allowing passage of the heat transfer fluid is formed between the electric energy application device assembly (108), the heat dissipater (104), and a housing of the electric energy application assembly (108) and the heat dissipater, said sealed space being in communication with the front tube ports of the at least one inner tube (103) and the support tube (101) through at least one fluid inlet/outlet port, and

(g) a sealed space allowing passage of the heat transfer fluid is jointly formed by a matched housing and an exterior of the electric energy application device assembly (108) and/or the heat dissipater (104), and the electric energy application device assembly (108) and/or the heat dissipater (104) includes at least one heat transfer fluid path, one end of which is formed with a heat transfer fluid connection port connected to the front tube port of the at least one inner tube (103) and a second end of which is formed with a heat transfer fluid connection port in communication with the sealed space, the sealed space being in communication with the front port of the support tube (101) via a heat transfer fluid connection port of the sealed housing,

wherein the support tube (101) is divided into an upper tube body, a middle tube body, and a lower tube body,

wherein the electric energy application device assembly (108) is installed on the upper tube body,

wherein the middle tube body provides support and passage of thermal energy, wherein the lower tube body is installed in a natural thermal energy body (100), and

wherein the at least one inner tube (103) only extends through upper and

middle portions of the support tube (101), and not into a lower portion of the support tube (101) that extends into the natural thermal energy body (100).

2. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 1, wherein the electric energy application device assembly (108) includes at least one of an illumination device, a photovoltaic or photoelectric generator device, a wind or liquid powered generator, a transformer, and electrical motor.

3. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 2, wherein the electric energy application device assembly (108) further includes at least one of a peripheral device, a control circuit device, an overload protection device, and a temperature protection device.

4. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 2, wherein the electric energy application device assembly (108) includes an illumination device (109) comprising at least one of a gaseous lamp and a solid state LED or OLED.

5. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 4, wherein the electric energy application device assembly (108) further includes a transparent member (1061) and at least one of a display screen, a billboard, and a signal or warning sign operated through the light output by the illumination device (109).

6. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 4, further comprising an electric controlling device (112) for controlling an input voltage, input current, and working temperature of the illumination device (109), and to control operation timing of the at least one fluid pump (105).

7. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 4, further comprising a temperature protecting device (102) including at least one of an electromechanical thermally actuated switch; a fuse; and a solid-state temperature detecting unit or temperature switch for terminating or partially terminating operation of the illumination device or supply of electricity, or to control the at least one fluid pump (105), in response to a temperature abnormality.

8. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 1, wherein the natural thermal energy body is one of an external gaseous, solid, and liquid environment.

9. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 1, wherein the natural thermal energy body is one of a shallow soil layer and a liquid body.

10. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 1, further comprising at least one additional said fluid pump (105) arranged in series with the at least one fluid pump (105).

11. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 1, wherein a flow direction of the heat transfer fluid is arranged to be switched or periodically changed.

12. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 1, wherein the heat dissipater (104) includes at least one heat transfer fluid path (1041) that extends through or past the heat dissipater structure from said front tube port of the at least one inner tube (103) to the front tube port of the support tube (101).

13. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 1, wherein an exterior of the electric energy application device (108) is enclosed within a sealed housing, thereby forming a space between the electric energy application device (108) and the sealed housing to allow fluid to pass, said space being in communication with the front tube ports of the at least one inner tube (103) and the support tube (101) through at least one fluid inlet/outlet port.

14. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 1, wherein a sealed space allowing passage of the heat transfer fluid is formed between the electric energy application device assembly (108), the heat dissipater (104), and a housing of the electric energy application assembly (108) and the heat dissipater (104), said sealed space being in communication with the front tube ports of the at least one inner tube (103) and

the support tube (101) through at least one fluid inlet/outlet port.

15. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 1, wherein a sealed space allowing passage of the heat transfer fluid is jointly formed by a matched housing and an exterior of the electric energy application device assembly (108) and/or the heat dissipater, and the electric energy application device assembly (108) and/or the heat dissipater (104) includes at least one heat transfer fluid path, one end of which is formed with a heat transfer fluid connection port connected to the front tube port of the at least one inner tube (103) and a second end of which is formed with a heat transfer fluid connection port in communication with the sealed space, the sealed space being in communication with the front port of the support tube (101) via a heat transfer fluid connection port of the sealed housing.

16. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 1, wherein the support tube (101) is installed with heat transfer fins (2001) that extend from an exterior of the support tube (101).

17. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 1, wherein the at least one inner tube (103) is made of a rigid material.

18. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 17, wherein the at least one inner tube (103) is made of metal.

19. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 1, wherein the at least one inner tube (103) is made of a deformable or flexible material.

20. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 1, wherein the at least one inner tube (103) is made of a thermally insulating material.

21. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 1, wherein the at least one inner tube (103) is made of a thermally conductive material and an interior or exterior of the at least one inner tube (103) is provided with an insulating material.

22. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 1, wherein the at least one inner tube (103) is made of a thermally conductive material.

23. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 1, wherein the at least one inner tube (103) and the support tube (101) are concentric.

24. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 2, wherein the electric energy application device assembly (108) is a photovoltaic device (110) for converting light into electrical energy.

25. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 24, further comprising an electric controlling device (112) for controlling an output voltage, current, and working temperature of the illumination device, and to control operation timing of the at least one fluid pump (105).

26. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 24, further comprising a temperature protecting device (102) including at least one of an electromechanical thermally actuated switch; a fuse; and a solid-state temperature detecting unit or temperature switch for terminating or partially terminating operation of the illumination device or supply of electricity, or to control the at least one fluid pump (105), in response to a temperature abnormality.

27. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 2, wherein the at least one electric energy application device assembly (108) is a wind power generating device (111) including turbine blades and a generator (222).

28. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 27, further comprising an electric controlling device (112) for controlling an output voltage, current, and working temperature of the wind power generating device (111), and to control operation timing of the at least one fluid pump (105).

29. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 27, further comprising a temperature protecting device (102) including at least one of an electromechanical thermally actuated switch; a fuse; and a solid-state temperature detecting unit or temperature switch for terminating or partially terminating operation of the illumination device or supply of electricity, or to control the at least one fluid pump (105), in response to a temperature abnormality.

30. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 2, wherein the at least one electric energy application device assembly (108) includes a transformer (444).

31. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 30, wherein the transformer (444) is installed on the support tube (101) through a transformer support rack (445).

32. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 30, further comprising an electric controlling device (112) for controlling an output voltage, current, and working temperature of the transformer (444), and to control operation timing of the at least one fluid pump (105).

33. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 30, further comprising a temperature protecting device (102) including at least one of an electromechanical thermally actuated switch; a fuse;

and a solid-state temperature detecting unit or temperature switch for terminating or partially terminating operation of the illumination device or supply of electricity, or to control the at least one fluid pump (105), in response to a temperature abnormality.

34. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 2, wherein the at least one electric energy application device assembly (108) includes an AC or DC electric motor (333).

35. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 34, further comprising an electric controlling device (112) for controlling an input voltage, current, and working temperature of the motor (333), and to control operation timing of the at least one fluid pump (105).

36. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 34, further comprising a temperature protecting device (102) including at least one of an electromechanical thermally actuated switch; a fuse; and a solid-state temperature detecting unit or temperature switch for terminating or partially terminating operation of the illumination device or supply of electricity, or to control the at least one fluid pump (105), in response to a temperature abnormality.

37. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 1, wherein the interior of the electric energy application device assembly (108) includes said at least one heat transfer fluid path (1081) that

extends through or past the electric energy application device assembly (108) from said front tube port of the at least one inner tube (103) to the front tube port of the support tube (101).

38. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 37, wherein said heat dissipater (104) includes two said heat transfer fluid paths (1041) connected at distal ends by a U-shaped connecting tube (1042).

39. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 1, wherein the at least one heat transfer fluid path (1081) of the electric energy application device assembly (108) is connected to the at least one heat transfer fluid path (1041) of the heat dissipater (104), and the respective at least one heat transfer fluid paths (1081,1041) of the electric energy application device (108) and heat dissipater (104) are connected to the respective front tube ports of the at least one inner tube (103) and support tube (101).

40. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 1, wherein the electric energy application device assembly (108) includes at least two internal heat transfer fluid paths (1081), or a U-shaped or L-shaped internal fluid path, connected through external tubes to form a fluid inlet port and a fluid outlet port respectively connected to the front tube ports of the at least one inner tube (103) and support tube (101).

41. A heat-dissipating structure with internally recycling heat transfer fluid as

claimed in claim 1, further comprising at least one second said electric energy application device assembly (108).

42. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 1, wherein the at least one inner tube (103) and support tube (101) are parallel and eccentrically arranged.

43. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 1, wherein the at least one inner tube (103) includes two parallel inner tubes (103).

44. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 1, wherein the at least one inner tube (103) is coaxial with the support tube (101), and further comprising a spiral flow guiding structure (2003) extending between the at least one inner tube (103) and the support tube (101).

45. A heat-dissipating structure with internally recycling heat transfer fluid, comprising:

a U-shaped embedded support tube including two separate support tube posts (201,202 or 301,302) and a bent portion (200) that connects fluid passages in the two support tube posts and forms a fluid circulation path for circulation of the recycling heat transfer fluid,

wherein a lower portion of the U-shaped embedded support tube extends into a natural thermal energy body (100) and is embedded in a columnar heat transfer covering member (2002) installed in the natural thermal energy body (100), the heat

transfer fluid exchanging thermal energy with the natural thermal energy body (100) through the support tube posts (201,202 or 301,302), the bent portion (200), and the columnar heat transfer covering member (2002), and

wherein the support tube posts (201,202 or 301,302) are spaced apart and include respective front tube ports in communication with a fluid passage in an electric energy application device assembly (108) supported by the separate and spaced apart support tube posts, and/or a fluid passage of a heat dissipater (104) of the electric energy application device assembly (108) to allow the heat transfer fluid to flow past, exchange thermal energy with, and return from the electric energy application device assembly (108) and/or a heat dissipater (104) to a respective one of the front tube ports; and

at least one fluid pump (105) installed in the fluid circulation path to control a flow direction of the heat transfer fluid in the fluid circulation path, and

wherein the heat transfer fluid pumped by the at least one fluid pump (105) passes through the support tube posts (201,202 or 301,302) and the bent portion (200) of the U-shaped embedded support tube to transfer heat from the electric energy application device assembly (108) and/or heat dissipater (104) to the natural thermal energy body (100).

46. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 45, wherein the support tube posts (201,202 or 301,302) and the bent portion (200) of the U-shaped embedded support tube are made of a rigid material.

47. A heat-dissipating structure with internally recycling heat transfer fluid as

claimed in claim 45, wherein the support tube posts (201,202 or 301,302) and the bent portion (200) of the U-shaped embedded support tube are made of a deformable or flexible material.

48. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 45, wherein the support tube posts (201,202 or 301,302) and/or the bent portion (200) of the U-shaped embedded support tube are installed with heat transfer fins (2001) that extend from an exterior and/or an interior of the support tube posts and/or the bent portion (200) of the U-shaped embedded support tube.

49. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 45, wherein the support tube posts (201,202) are respectively connected to a fluid passage (1081) through the electric energy application device assembly (108) and space between the electric energy application device assembly (108) and a sealed housing (106).

50. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 45, wherein the support tube posts (301,302) are respectively connected to ends of a fluid passage (1081) through the electric energy application device assembly (108).

51. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 45, wherein the support tube posts (301,302) are respectively connected to at least one heat transfer fluid path (1041) that extends through or

past the heat dissipater (104).

52. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 45, wherein the electric energy application device assembly (108) includes at least one of an illumination device that utilizes electric energy converted into photo energy, a photovoltaic or photoelectric generator device, a wind or liquid powered generator, a transformer, and electrical motor.

53. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 52, wherein the electric energy application device assembly (108) further includes at least one of a peripheral device, a control circuit device, an overload protection device, and a temperature protection device of the electric energy application device.

54. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 45, wherein the electric energy application device assembly (108) includes an illumination device (109) that utilizes electric energy converted into photo energy and that comprises at least one of a gaseous lamp and a solid state LED or OLED.

55. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 54, wherein the electric energy application device assembly (108) further includes a transparent member (1061) and at least one of a display screen, a billboard, and a signal or warning sign operated through the light output by the illumination device (109).

56. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 54, further comprising an electric controlling device (112) for controlling an input voltage, input current, and working temperature of the illumination device (109), and to control operation timing of the at least one fluid pump (105).

57. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 54, further comprising a temperature protecting device (102) including at least one of an electromechanical thermally actuated switch; a fuse; and a solid-state temperature detecting unit or temperature switch for terminating or partially terminating operation of the illumination device or supply of electricity, or to control the at least one fluid pump (105), in response to a temperature abnormality.

58. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 45, wherein the electric energy application device assembly (108) is a photovoltaic device (110) for converting light into electrical energy.

59. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 58, further comprising an electric controlling device (112) for controlling an output voltage, current, and working temperature of the photovoltaic device (110), and to control operation timing of the at least one fluid pump (105).

60. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 45, wherein the at least one electric energy application device assembly (108) is a wind power generating device (111) including turbine blades and a generator (222).

61. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 60, further comprising an electric controlling device (112) for controlling an output voltage, current, and working temperature of the wind power generating device (111), and to control operation timing of the at least one fluid pump (105).

62. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 45, wherein the at least one electric energy application device assembly (108) includes a transformer (444).

63. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 62, wherein the transformer (444) is installed on a transformer support rack (445).

64. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 62, further comprising an electric controlling device (112) for controlling an output voltage, current, and working temperature of the transformer (444), and to control operation timing of the at least one fluid pump (105).

65. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 45, wherein the at least one electric energy application device assembly (108) includes an AC or DC electric motor (333).

66. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 65, further comprising an electric controlling device (112) for controlling an input voltage, current, and working temperature of the motor (333), and to control operation timing of the at least one fluid pump (105).

67. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 45, wherein the natural thermal energy body is one of an external gaseous, solid, and liquid environment.

68. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 45, wherein the natural thermal energy body is one of a soil layer and a liquid body.

69. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 45, further comprising at least one additional fluid pump (105) arranged in series with the at least one fluid pump (105).

70. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 45, wherein a flow direction of the heat transfer fluid is arranged to be switched or periodically changed.

71. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 45, further comprising at least one second said electric energy application device assembly (108).

72. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 45, wherein the heat dissipater (104) is arranged to be installed with the electric energy application device assembly (108) and an interior of the heat dissipater (104) forms a space allowing the heat transfer fluid to flow freely.

73. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 45, further comprising a locked-on heat dissipation ring (800) made of a thermally conductive material and installed on an outer side of the heat dissipater (104).

74. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 45, further comprising a sleeved-on heat dissipation ring (900) made of a thermally conductive material and installed on an outer side of the heat dissipater (104).

75. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 45, wherein the support tube posts (201,202 or 301,302) and the bent portion (200) of the U-shaped embedded support tube are made of a thermally conductive material.

76. A heat-dissipating structure with internally recycling heat transfer fluid as

claimed in claim 45, wherein the support tube posts (201,202 or 301,302) and the bent portion (200) of the U-shaped embedded support tube are made of a thermally conductive material and an interior or exterior of the support tube posts (201,202 or 301,302) is provided with an insulating material.

77. A heat-dissipating structure with internally recycling heat transfer fluid as claimed in claim 45, wherein the support tube posts (201,202 or 301,302) are made of a thermally insulating material and the bent portion (200) of the U-shaped embedded support tube is made of a thermally conductive material.