CLAIMS

1. A pipe member equipped with heat insulation core pipeline, auxiliary heat conduction structure and U-shaped pipeline, which is installed within the thermal storage body (500) composed of natural thermal storage body, such as shallow surface of the earth, or pool, lake, river, ocean, or artificial objects in solid, or gaseous, or liquid state, and is constructed through that the piping segments of fluid inlet terminal and/or outlet terminal of the U-type core piping and loop piping are directly made of thermal insulating material, or thermal insulating structure is installed between the inlet terminal and the outlet terminal, so as to prevent thermal energy loss because of the thermal conduction between adjacent piping segments of inlet terminal and outlet terminal on the same side when thermal conductive fluid with temperature difference passing through, and the exterior of the thermal insulating device (400) is further installed with an auxiliary thermal conductive structure (110) made of thermal conductive material; and it mainly consists of:

--U-type piping (100): made of U-type tubular body for the thermal conductive fluid (111) passing through, wherein the U-type piping (100) is composed of a piping structure and installed in the thermal storage body (500); the U-type piping (100) has the first fluid inlet and outlet terminal (101) and the second fluid inlet and outlet terminal (102), the piping segment (1011) close to the first fluid inlet and outlet terminal (101) is installed the thermal insulating device (400);

--Thermal insulating device (400): related to a thermal insulating structure constituted by the followings with thermal insulating effects, such as solid, flexible body, or foam, or enveloped colloid, gas, or liquid, or vacuum structure, for being provided to envelope the piping segment (1011) of the first fluid inlet and outlet terminal (101) of the U-type piping (100), or the piping segment (1011) of the first fluid inlet and outlet terminal (101) is directly composed of thermal insulating material or sleeved with thermal insulating material;

--Auxiliary thermal conductive structure (110): composed of thermal conductive material and installed at the exterior of the thermal insulating device (400);

2. A pipe member equipped with heat insulation core pipeline, auxiliary heat conduction structure and U-shaped pipeline as claimed in claim 1, the exterior of the thermal insulating device (400) of the thermal insulating piping segment of the U-type piping (100) is further installed with an auxiliary thermal conductive structure (110) made of thermal conductive material and the exterior is enveloped by the columnar thermal conductive body (300), and it mainly consists of:

--U-type piping (100): made of U-type tubular body for the thermal conductive fluid (111) passing through, wherein the U-type piping (100) is composed of a piping structure and installed in the columnar thermal conductive body (300) composed of solid state or colloidal object; the U-type piping (100) has the first fluid inlet and outlet terminal (101) and the second fluid inlet and outlet terminal (102), and the piping segment (1011) close to the first fluid inlet and outlet terminal (101) is installed the thermal insulating device (400);

--Thermal insulating device (400): related to a thermal insulating structure constituted by the followings with thermal insulating effects, such as solid, flexible body, or foam, or enveloped colloid, gas, or liquid, or vacuum structure, for being provided to envelope the piping segment (1011) of the first fluid inlet and outlet terminal (101) of the U-type piping (100), or the piping segment (1011) of the first fluid inlet and outlet terminal (101) is directly composed of thermal insulating material or sleeved with thermal insulating material;

--Auxiliary thermal conductive structure (110): composed of thermal conductive material and installed at the exterior of the thermal insulating device (400);

The structure includes one or more than one of the following structural states:

2) Columnar structure enveloped by columnar thermal conductive body (300): being provided with the columnar thermal conductive body (300) made of thermal conductive material and having various geometric cross section shapes such as round, oval, square, rectangular, or star-like shapes, being served to envelope the U-type piping (100), the periphery of the piping segment (1011) of the first fluid inlet and outlet terminal (101) is installed with the thermal insulating device (400), and the exterior of the thermal insulating device (400) further is installed with the auxiliary thermal conductive structure (110) made of thermal conductive structure, thereby preventing the thermal insulating device (400) from generating thermal resistance in the columnar thermal conductive body (300), so as to configure the columnar structure enveloped by columnar thermal conductive body (300);

3) Columnar structure utilizing columnar thermal conductive body (300) having piping therein as the structure member: directly made of the columnar thermal conductive body (300), and formed in the structural state having piping therein, and having the piping segment (1011) installed at the first fluid inlet and outlet terminal (101) of the U-type piping (100), the thermal insulating device (400) is installed between the piping segment (1011) and the thermal conductive body structure, and the exterior of the thermal insulating device (400) is further installed with the auxiliary thermal conductive structure (110) made of thermal conductive material for preventing the thermal insulating device (400) from generating thermal resistance in the columnar thermal conductive body (300), so as to configure the columnar structure utilizing columnar thermal conductive body (300) having piping therein as the structure member.

CLAIMS

1. A U-shaped pipe heat exchanger for installation in a natural thermal storage body (500), the U-shaped pipe heat exchanger comprising:

a pipe bent in a U-shape so that the pipe forms a first piping segment and a second piping segment, and the U-shaped pipe is disposed for carrying a thermal conductive fluid (111);

a thermal insulating material (400) disposed around the first piping segment or second piping segment to reduce thermal energy loss between the first piping segment and second piping segments;

a thermal conductive material (110) disposed around the thermal insulating material (400), so as to reduce thermal resistance in the natural thermal storage body surrounding the thermal insulating material (400).

2. The U-shaped pipe heat exchanger according to claim 1, wherein the thermal insulating material is formed by any one of the following selection: solid insulating material; flexible or foam insulating material; colloidal, gas or liquid insulating material; and vacuum structure.

3. The U-shaped pipe heat exchanger according to claim 1 or 2, further comprising a columnar thermal conductive body (300) to envelope the U-shaped pipe.

4. The U-shaped pipe heat exchanger according to claim 3, wherein the columnar thermal conductive body (300) has a various geometric cross-sectional shape, such as round, oval, square, rectangular and star-like.

5. The U-shaped pipe heat exchanger according to any one of claims 1-4, wherein a free end of the first piping segment serves as a fluid inlet and outlet terminal.

6. The U-shaped pipe heat exchanger according to any one of claims 1-4, wherein a free end of the second piping segment serves as a fluid inlet and outlet terminal.

7. The U-shaped pipe heat exchanger according to any one of the preceding claims, wherein the natural thermal storage body includes a shallow part of the earth or a shallow part of a pool, lake, river or ocean, and the natural thermal storage body may exist in a solid, liquid or gas state.