The disclosure relates to a waste heat utilizing system for a container data center. The waste heat utilizing system includes a first heat exchanger received in and absorbing heat from the container data center, a water inlet pipe communicated with the first heat exchanger for supplying water to the first heat exchanger to exchange heat, a second pipe communicated with the first heat exchanger for removing heated water from the first heat exchanger, a second heat exchanger connected to the second pipe for dissipating heat of the heated water removed from the first heat exchanger, and a heat utilizing device receiving the second heat exchanger therein for absorbing the heat dissipated by the second heat exchanger. A third pipe is dipped into water container and connected to an outlet of the second heat exchanger, and water is flowed back to the water container via the third pipe.
CONTAINER DATA CENTER AND WASTE HEAT UTILIZING SYSTEM THEREFOR

BACKGROUND

[0001] 1. Technical Field
[0002] The present disclosure relates to thermal cycling systems, and particularly to a waste heat utilizing system for a container data center.
[0003] 2. Description of Related Art
[0004] With increasing demands for heavy duty usage of online web applications, the need for container data centers has increased rapidly. The container data center is a plurality of centralized computing facilities that include many servers, often arranged on a plurality of server racks or shelves. In their working state, the servers generate a lot of heat in the container data center. To assure that the container data center works in a normal or acceptable state, the heat must be efficiently dissipated. In general, a plurality of heat sinks or fans are disposed in the container data center to directly dissipate the heat to ambient air out of the container data center, thereby failing to make full use of the heat generated.

[0005] What is needed, therefore, is a waste heat utilizing system for a container data center which can overcome the above problem.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] Many aspects of the disclosure can be better understood with reference to a following drawing. The components in the drawing are not necessarily drawn to scale, the emphasis instead being placed upon clearly illustrating the principles of the disclosure. Moreover, in the drawing, like reference numerals designate corresponding parts throughout the view.

[0007] The drawing is a schematic view of a waste heat utilizing system for a container data center in accordance with an embodiment of the disclosure.

DETAILED DESCRIPTION

[0008] Referring to the drawing, a waste heat utilizing system for a container data center 10 in accordance with an embodiment of the disclosure is illustrated. The waste heat utilizing system includes a first heat exchanger 20, a first pipe 30, a second pipe 40, a second heat exchanger 50, a heat utilizing device 60, and a third pipe 80.

[0009] The container data center 10 includes a container 11 and a plurality of servers (not shown) disposed in the container 11. The first heat exchanger 20 is disposed in the container 11 for absorbing the heat generated by the servers. The first pipe 30 has an end inserted into the container 11 and is connected to an inlet of the first heat exchanger 20, and has an opposite end dipped into a water container 70. The second pipe 40 has an end inserted into the container 11 and is connected to an outlet of the first heat exchanger 20, and has an opposite end connected to an inlet of the second heat exchanger 50. The third pipe 80 has an end connected to an outlet of the second heat exchanger 50, and has an opposite end dipped into the water container 70. The second heat exchanger 50 is received in the heat utilizing device 60. A pump 31 is connected to the first pipe 30, for pumping water from the water container 70 to the first heat exchanger 20 through the first pipe 30. The second heat exchanger 50 includes a heat conducting pipe 51 and a plurality of fins 53 extending from the heat conducting pipe 51. The heat conducting pipe 51 is folded one or more times to form a plurality of tube ends comprising U-shaped bending configuration. The fins 53 are spaced from each other. The second and third pipes 40, 80 are communicated with the heat conducting pipe 51, respectively. The first pipe 30 is a water inlet pipe, and the second pipe 40 and the third pipe 80 are water outlet pipes.

[0010] When the waste heat utilizing system is operating in a working state, the pump 31 pumps cold water from the water container 70 to the first heat exchanger 20. The cold water flows through and absorbs the heat of the first heat exchanger 20, and thus becomes hot water. Accordingly, the first heat exchanger 20 is cooled to absorb the heat generated by the servers continuously. The hot water flows into the second heat exchanger 50 via the second pipe 40. Then the second conducting pipe 51 of the second heat exchanger 50 absorbs the heat from the hot water and dissipates the heat to the circumferential space in the heat utilizing device 60 via the fins 53, thus achieving heating for the heat utilizing device 60. Therefore, the waste heat generated by the servers can be used by the heat utilizing device 60. The heat utilizing device 60 can be a house or building. The hot water is transformed into cold water after releasing or transferring heat to the second heat exchanger 50, and flows back to the water container 70 via the third pipe 80 to thereby repeat the waste heat transfer process from the container data center 10 to the heat utilizing device 60.

[0011] In this embodiment, the water container 70 may be a well.

[0012] It is to be understood, however, that even though numerous characteristics and advantages of the present embodiments have been set forth in the foregoing description, together with details of the structures and functions of the embodiments, the disclosure is illustrative only, and changes may be made in detail, especially in matters of shape, size, and arrangement of parts within the principles of the invention to the full extent indicated by the broad general meaning of the terms in which the appended claims are expressed.

What is claimed is:

1. A waste heat utilizing system for a container data center comprising:
a first heat exchanger received in the container data center and absorbing heat from the container data center; a first pipe, the first pipe is a water inlet pipe communicated with the first heat exchanger for supplying water to the first heat exchanger to exchange heat with the first heat exchanger; a second pipe, the second pipe is a water outlet pipe communicated with the first heat exchanger for removing heated water from the first heat exchanger; a second heat exchanger connected to the second pipe for dissipating heat of the heated water removed from the first heat exchanger; a third pipe, the third pipe is a water outlet pipe communicated with an outlet of the second heat exchanger; and a heat utilizing device receiving the second heat exchanger therein for absorbing the heat dissipated by the second heat exchanger.

2. The waste heat utilizing system of claim 1, further comprising a water container communicated with the first pipe and the third pipe.

3. The waste heat utilizing system of claim 2, wherein the water container is a well.

4. The waste heat utilizing system of claim 1 further comprising a pump connected to the first pipe.
5. The waste heat utilizing system of claim 1, wherein the second heat exchanger comprises a heat conducting pipe and a plurality of spaced fins extending from the heat conducting pipe.

6. The waste heat utilizing system of claim 5, wherein the second pipe and third pipe are communicated with the heat conducting pipe, respectively.

7. A container data center comprising:
   a container for receiving a plurality of servers therein;
   a first heat exchanger received in the container for absorbing heat from the servers;
   a water container located outside of the container and containing water therein;
   a water inlet pipe having an end dipped into the water container and an opposite end connected to an inlet of the first heat exchanger;
   a second pipe, the second pipe is a water outlet pipe communicating with the first heat exchanger;
   a second heat exchanger connected to and communicated with the second pipe;
   a third pipe, the third pipe is a water outlet pipe having an end dipped into the water container and an opposite end connected to an outlet of the second heat exchanger; and
   a heat utilizing device receiving the second heat exchanger therein;
   wherein water in the water container flows into the first heat exchanger via the water inlet pipe and takes away heat absorbed by the first heat exchanger from the hot air in the container to the second heat exchanger, and the water dissipates the heat to the circumferential space in the heat utilizing device by exchanging heat with the second heat exchanger and flows back to the water container via the third pipe.

8. The waste heat utilizing system of claim 7, wherein the water container is a well.

9. The waste heat utilizing system of claim 7 further comprising a pump connected to the water inlet pipe for pumping water in the water container to the first heat exchanger.

10. The waste heat utilizing system of claim 7, wherein the second heat exchanger comprises a heat conducting pipe and a plurality of spaced fins extending from the heat conducting pipe.

11. The waste heat utilizing system of claim 10, wherein the second pipe and third pipe are communicated with the heat conducting pipe, respectively.