HEAT ACCUMULATOR

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The invention relates to the field of heat engineering, particularly to the collection and storage of thermal energy. It can be used as a thermal accumulator when the heat source is unstable. Often it is unknown the amount of heat, that is required for storage and use. For instance, for solar heaters. Mainly, the solar heater consists of two parts: from the collector and the tank. Warm water, heated by the Sun, is transferred from the collector to the tank and then consumed.

Obviously, larger collector requires bigger tank. But there is a problem, particularly: in all special cases, the thermal energy received by the specific collector is different. It depends on the near ground solar radiation, which is impacted by the weather. Therefore, the amount of heat, received by the collector is fluctuated. The difference between the minimum and maximum values can be 10 or more times.

If we calculate the tank for a minimum (i.e. a small volume tank), then we will lose heat energy, while the collector can get more. But if we calculate the tank for a maximum (i.e. a large volume tank), then in the case, when the collector receives the minimum energy, the water is not heated up to the desired temperature.

Our goal is to equip the solar heater with such a tank, which will allow to store in the tank, a small volume of water, heated to the desired temperature, during the obtaining minimum heat energy from the collector. Also, the same tank should store all the energy received from the collector, in the case of a maximum.

This goal is achieved due to built- in each other tanks, which are coaxial cylinders of different diameters and interact with each to other as follows: The bottom (lower part) of each internal tank is connected to the top of the next outer tank.

In the invention, the law of nature is used, in particular, temperature increment causes the decrease of specific weight and the liquid (water in our case) tries to hold the upper part of the tank.

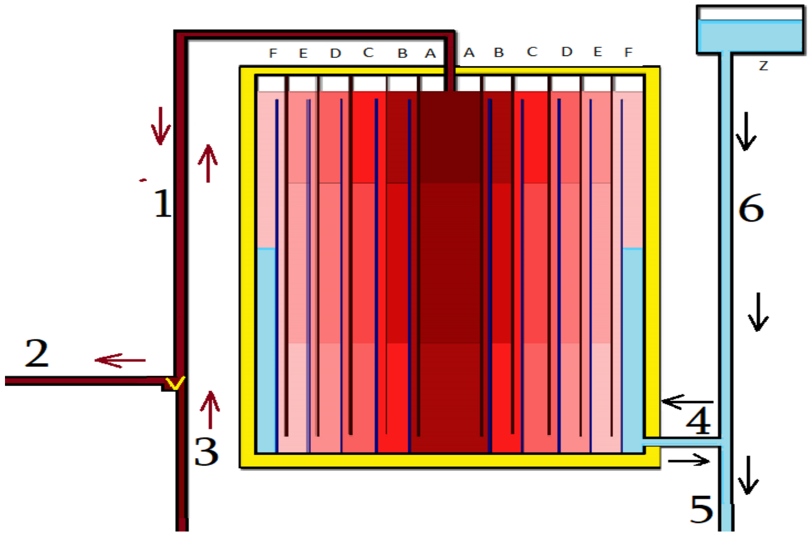

Figure 1. Schematic drawing of a thermal accumulator, consisting of coaxial cylinders

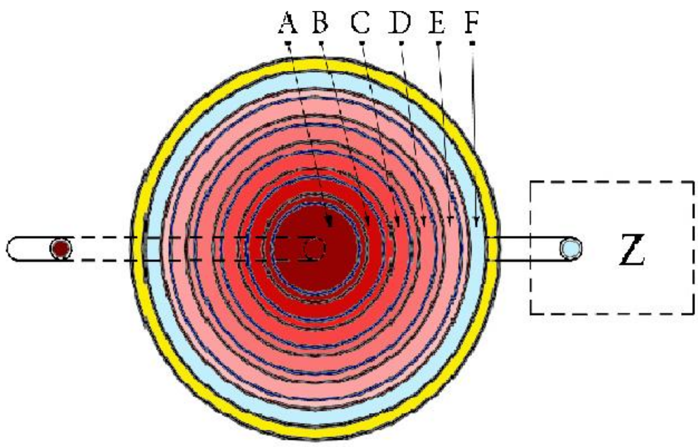

Figure 2 - is a top view

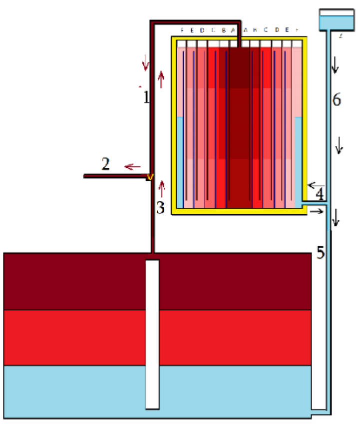

Figure 3. Schematic drawing of a thermal accumulator, with a collector

According to Figure 1, warm water from the collector (3) passes through the pipe (1) and connects to the tank (A). In its turn, the water from the bottom of the tank **A** enters to the upper part of the tank **B** etc.

Water passes through the open areas of (**A,B,C,D,E,F**) the tanks and through the pipes (4, 5) returns to the heater. Warm water tries to occupy the top layer of the tank, so when the tank **A** is fully heated, then warm water will begin to flow from the tank **A** into the tank **B**.

As more heat is transferred by the collector, as much tanks are heated up sequentially from the center.

During the warm water use, a pipe (2) is opening and a pipe (3) is closing.

In this case, the water from the reservoir **(Z)** by the pipes (6) and (4) transmits into the tank (F), passes through open circuits to the tank (**A**) from which by the pipes (1) and (2) passes for the use.

It should be noted that the water level in the tanks (**A,B,C, D, E, F**) is the same (since the vertical walls of the cylinders have holes at the very top position).

At the same time, the air layer experiences the pressure created by the difference between the water level in the tanks (**A,B,C, D, E, F**) and reservoir **(Z).**

The thickness of the air layer depends on the level of the open end of the pipe (1), which is located in the tank (A).

Since the amount of water in the tanks (A, B, C, D, E, F) is constant, the system can be considered as a heat accumulator, and water as a heat carrier. The function of the reservoir is carried out by the tank (Z).

It is known that in liquids, heat is transmitted in three ways: by the evaporation, heat radiation and convection, i.e. by the liquid circulation.

The advantages of such a heat accumulator are evident relatively with a widely used simple tank. During the heat radiation, the offered heat accumulator is much more efficient, since each external tank itself protects the inner tank from heat losses.

Taking into account the convection, the presented model is so much effective, how more tanks are used there.

The presented thermal accumulator can be used in all cases when the energy source is unstable.

In the same time:

1.It is compact and can be used both as stationary and as portable system;

2. In case of its volume and the tanks number increasing it can be used for the stabilization of the building internal temperature in continental climatic zones with a high temperature gradient;

3. It can be used both in systems with gravity circulation and in pumping ones.

The vertical walls of the tanks do not require high strength, since they have an equal load on both sides.

In identical conditions, such an accumulator retains heat for a more time than an ordinary tank of the same capacity, and the price of a heat accumulator can only be 1.5 times greater.

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