

ECONOMICAL SOLAR WATER HEATER

THE AFFORDABLE WAY TO USE SOLAR ENERGY

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Abstract-

The present invention relates to a water heating system and more particularly to water heating system operated by the solar energy. More specifically relates to the cost effective

solar water heater having aluminum body integrated with natural circulation and hot water storage system. Its cost is only 12,000/-rs for 100 LPD.

Priorart-

Being known as clean and inexhaustible energy, there is a huge challenge for human to make use of solar energy, which could largely reduce the conventional energy consumption protecting environmental and reducing greenhouse effects, it has been great efforts for all the nations to make the most use of solar energy heating system for hot water and air-conditioning for our normal families and business. However, solar energy application is affected seasonally and by weathers, and it cannot guarantee satisfaction for all application requirements.

Numerous different solar water heaters have been proposed and are currently manufactured. For the most part, each of these has its own advantages and disadvantages; as its own cost of manufacture and in its thermal efficiency. Typically in the prior art, water is circulated during sunny hours from an insulated storage tank, through a solar heat collector on the roof of a building, and back to the same tank. Prior art circulation means include pumps and thermo siphons. Pumps are expensive, because their moving parts and seals must withstand elevated temperatures and thermal cycling for many years. Pumps can also be expensive to operate

because they consume electrical energy which costs three times as much as thermal energy from fuel combustion. Thermo siphon circulation is sometimes used instead of a pump, in which case the heavy storage tank must be inconveniently located higher than the solar heat collector.

Variations in the prior art also include closed loop solar water heating systems, which circulate a fixed quantity of a separate fluid through the solar collector, and a heat exchanger is used to transfer the heat to the water. Using a separate collector fluid offers advantages. The fluid can have a lower freezing temperature than water. There is no possibility of clogging narrow collector tubes with mineral precipitates from the water. It is acceptable to fabricate the collector from materials which might contaminate the water if exposed directly. The collector in a closed loop system may be operated unpressurized, which reduces mechanical stress and leakage potential. Drain-back freeze protection simply requires stopping the circulation pump since a separate collector fluid may flow down to a small vented tank.

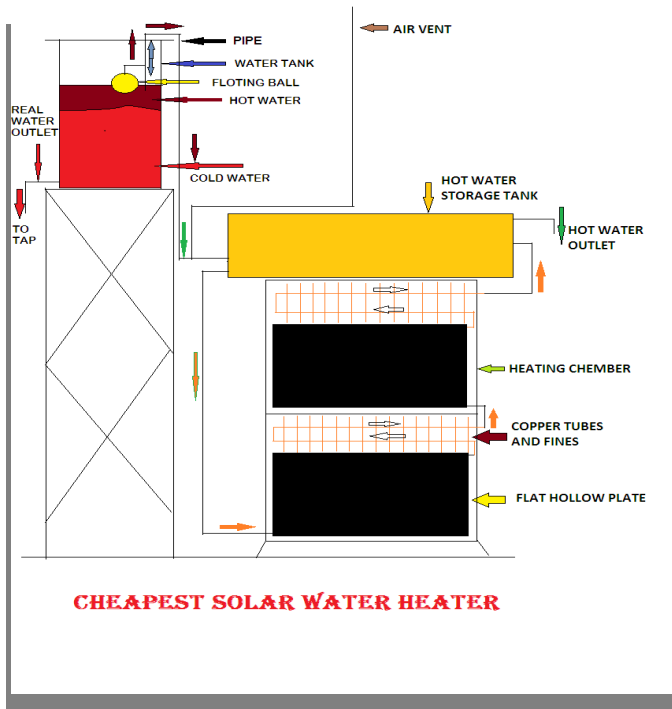
Objective:-

1. The primary objective of the present invention is to provide a cost effective solar water heater having aluminum body integrated with natural circulation and hot water storage system.
2. Other objective of the present invention resides on the fact of providing an improved solar water system having an outline different from the known types.
3. Another objective of the present invention is to provide an extraction system having floating ball and flexible

pipe in order to get upper layer warm water from the reservoir tank.

4. Another objective of the present invention is to a solar water system that is easy to install.
5. Another objective of the present invention is to provide a solar water heater using aluminum as a primary and the copper as the secondary conducting material.

Other objectives, features and advantages will become apparent from detail description and appended claims to those skilled in art.



Modified economical solar water heater

Detail description:-

The present invention relates to a system and methods for the solar water heater.

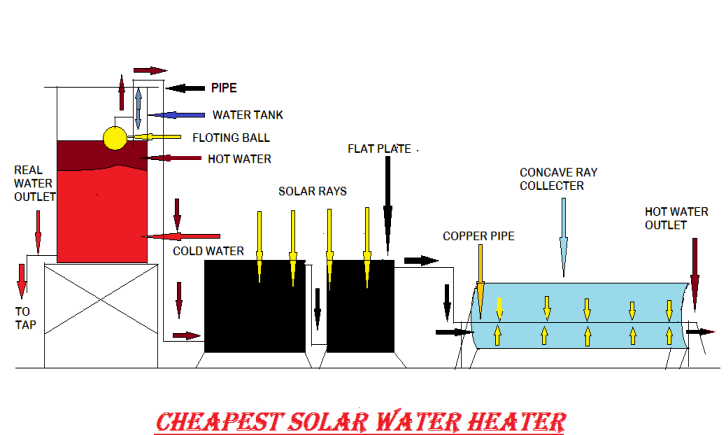
This is the invention over the existing solar water heater so as to utilize the hidden energy sources and reduce the prize so as to make it available for all. This is the step toward the development in solar sector.

As the names indicate the invention relates to the solar water heating process. In general, hot water in the tank floats at the top and the cold one at the bottom. This happens due to one of the property of the water known as density difference. At the

bottom there is real water outlet from where the water is supplied to tap. In order to get the hot water from the tank it is necessary to extract the upper layer of the water from the tank as the temperature of the water is already high in this layer.

For obtaining only the upper layer of hot water from the source tank there is a need of a special system. For this purpose we have constructed the extraction systems which contain the floating ball and flexible pipe. By using the simple mechanism it affects greatly to the cost and efficiency of solar water heater. Ball floats on hot water and pipe is attached to it.

Thus hot water from tank having temperature difference of 5-7°C as compare to the bottom layer of water in the source is obtained. The initial suction has to be performed and then the



Older model of economical solar water heater

water flows due to the gravity. As the water level goes up and down the ball and pipe will also move accordingly due to the floating ball. This is the innovative part of this system because this concept is not used in any solar water heater and one of the reasons to reduce the cost of the present solar water heater.

The hot water from the tank is provided in the aluminum hollow plate having thickness 1 inch. The thickness of aluminum foil is 3 mm. This Plate is coated with black color so that it can absorb 98% solar energy incident on it. The length and breadth of the aluminum plate is about 2×3 feet respectively in order to get more surface area and less water in it, so as to raise the temperature of the warm water extracted from the source tank with help of the solar energy. The inlet is provided at the bottom of the plate and the outlet at the top to get hottest water from the plate. This plate is placed inside the box having one side covered with toughened glass. Because of this glass the sun radiation is trapped inside the box and the solar water heater is able to provide the hot water even in cloudy and winter days. This plate works on the principle of more the surface area and lesser the quantity of water more will be the temperature of the water in less time. By the application of glass we are able to get hot water up to 75°C. This water is then taken into copper pipe of $\frac{1}{2}$ inch diameter. Here the superheating effect is given to the water which is taken from the aluminum plate. 6 feet pipe is use for heating purpose.

Again the water is taken into another aluminum flat plate having thickness $\frac{1}{2}$ inch of same surface area. Here it gets

again heated and again taken into next 6 feet copper pipe of $\frac{1}{2}$ inch diameter. Again the water is collected into another aluminum flat plate having thickness $\frac{1}{2}$ inch of same surface area. Here it gets heated and again taken into next 6 feet copper pipe of $\frac{1}{2}$ inch diameter.

The hottest water is taken to the thermal reservoir where it gets stored. The outlet of reservoir is given to the inlet of plate so that it can be a cyclic process. The outlet is also connected to the tap so that, if the consumer is willing to use the hot water in early morning also he can take the hot water from the heater. When the consumer takes the hot water from reservoir then the water in floating assembly will introduce in the reservoir so that the system should be full of water. In this way the cheapest solar water heater works.

Additional advantages and modification will readily occur to those skilled in art. Therefore, the invention in its broader aspect is not limited to specific details and representative embodiments shown and described herein. Accordingly various modifications may be made without departing from the spirit or scope of the general invention concept as defined by the appended claims and their equivalents.

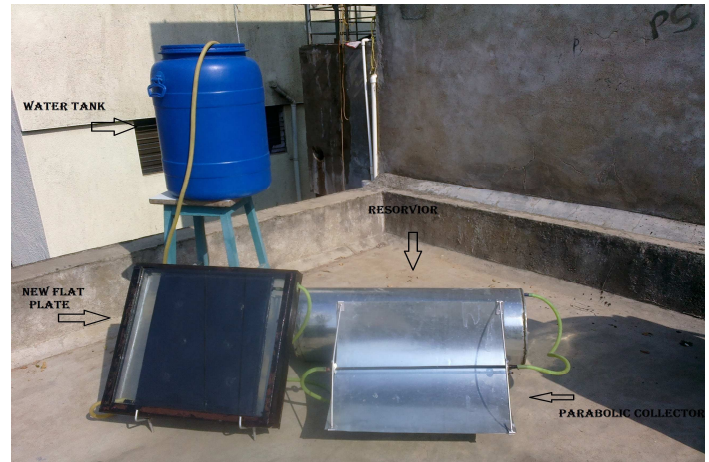
Technical specification: -

Total amount of water in system : - 110 litres.
Capacity of reservoir : - 100 litres.
Capacity of plate : - 9 litres.
Amount of water in other accessories: - 1 litre.
Material use in flat plate: - galvanized iron (G.I.) sheets of 0.5 mm thickness.
Diameter of pipe : - 0.5"
Maximum temperature output : - 65°C
Bathable hot water temperature: - 35-40°C

Experimentation done to establish the workability of project:-

We have done quite enough experiments on this project regarding the leakages, output temperature, in different climate conditions. We are working on this project since 3 years. Initially we have to face the leakage problems. Now they are eliminated. Then we have done experiments in

different climate conditions. The temperature will have gone up to 65°C in summer days and in cloudy days its temperature



is 50-65°C. To heat the water above 30°C need more calories as compared to heat the water up to 30°C. As we increase the temperature, the requirement of calories per degree Celsius also gets increased. Weather conditions are not in our hands so still it performs quite well. Recently we have completed the work on, how we can oscillate the parabolic collector with respect to the path of sun in a whole day so that the efficiency can increase. The sun rotates 18° in an hour. So we can trace the path of sun and increase the efficiency of this project.



Previous prototype

Prize estimation of project:-

Water tank	:-	0/- (Already exist)
Floating assembly	:-	200/-
Flat plate	:-	1200/-
Frames	:-	1000/-
Glass	:-	800/-
Parabolic sheet	:-	350/-

Advance prototype

Parabolic pipe	:-	450/-
Reservoir	:-	3000/-
Other accessories	:-	1000/-
Total	:-	8,000/-
Profit	:-	4,000/-
Market prize	:-	12,000/- (Without adding govt. Subsidy)(30%)

Advantages: -

- 1) It is compact.
- 2) Its prize is only 12,000/-rs for 100 LPD.
- 3) We can save 4000/- rs per annum by the installation of cheapest solar water heater. This can be refunded in 2+1/2years only.
- 4) No need of gas or electricity, so the load on fossil fuel is reduces.
- 5) Its durability is 10-12 years. So we will get 10 years the hot water without paying any kind of money.
- 6) Its main advantage - it is chip. So common people can afford it. Which is not possible in now a day.
- 7) The mentality of the people regarding solar equipment will change. As people think they are expensive.
- 8) We are getting naturally heated water ,so it is healthy for skin.
- 9) It can be useful in industries also which need hot water for various processes
- 10)It can also be useful for refrigeration and air conditioning in summer days.

Disadvantages: -

- 1) No night working as sun doesn't shine at night.
- 2) The disadvantages applied to the general solar water heater are also applied to it.

Comparative study:-

<u>Economical solar water heater</u>	<u>Market solar water heater</u>
Its prize is 12,000/-rs for 100 LPD	Its prize is 20,000/-rs for 100 LPD
Compact in size.	Take more space.
Max. temperature output is 65°C	Max. Temperature output is 80°C
Affordable for common people.	Unaffordable for common people.
Own water tank is acting as integral part of heating system.	Own water tank does not work as a integral part of heating system.
System rotates with respect to sun path.	System is steady.
POP and white cement is used for insulation purpose which is inexpensive one.	Foam is used for insulation purpose which is costly one.

Conclusion:-

By the application of simple physic technique we can get hot in cheapest way. These types of inventions are the need of today's life. This solar water heater is affordable to the common people so ultimately the use of solar energy will enhance which is main motto to develop the advance prototype.

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