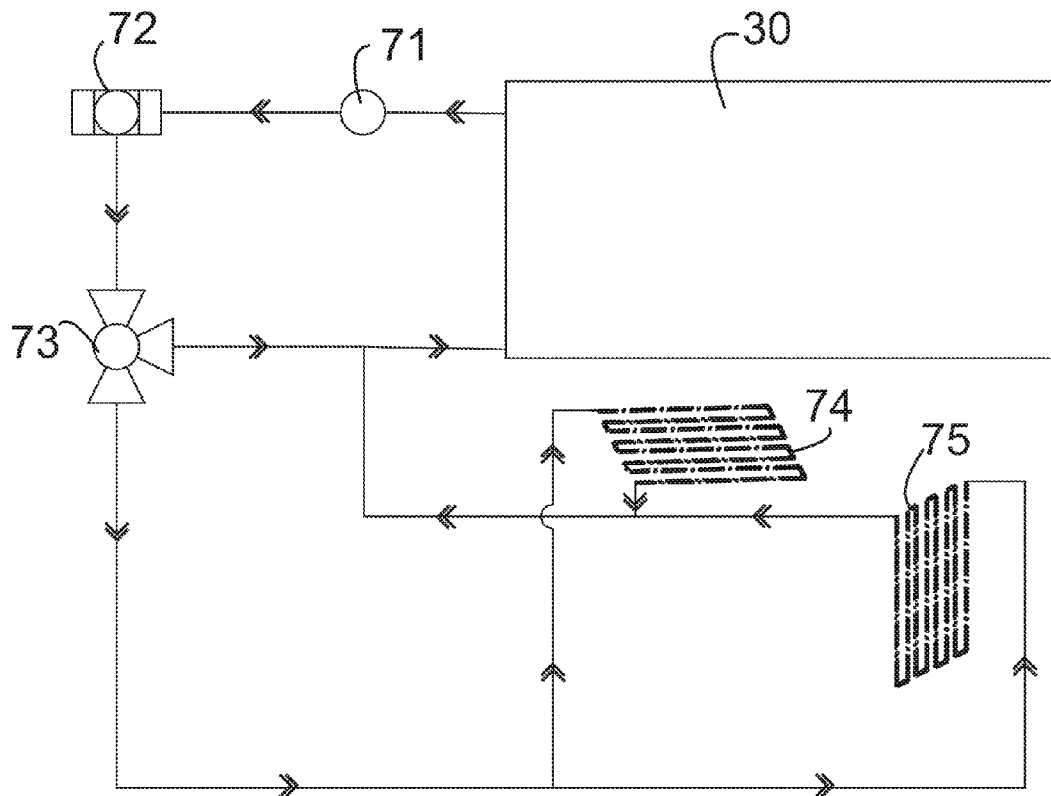




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(19) **United States**(12) **Patent Application Publication**
Gornik(10) **Pub. No.: US 2016/0146508 A1**(43) **Pub. Date: May 26, 2016**(54) **SOLAR HEATING SYSTEM FOR SWIMMING POOLS**(71) Applicant: **Steve Gornik**, Uxbridge (CA)(72) Inventor: **Steve Gornik**, Uxbridge (CA)(21) Appl. No.: **14/550,592**(22) Filed: **Nov. 21, 2014****Publication Classification**(51) **Int. Cl.**
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CPC **F24J 2/423** (2013.01); **E04H 4/129** (2013.01)(57) **ABSTRACT**

A solar heating system implemented inside a concrete slab around a swimming pool, wherein said system absorbs solar thermal energy and heats the water of the swimming pool, wherein said system comprising of a plurality of areas around the swimming pool; a plurality of solar thermal collector being embedded inside said areas; a plurality of height adjustment means to keep said solar thermal collector in a specific height; a separator means to separate said solar thermal collector from the ground and acts as a holder of said solar thermal collectors; an insulation sheet being placed under said separator means; a plurality of trenches being designed between said areas to use as a space to connect said solar thermal collector; concrete being poured into said area to cover said solar thermal collectors; and a pump being used to circulate the water of said swimming pool to a plurality of filters and said solar thermal collectors.



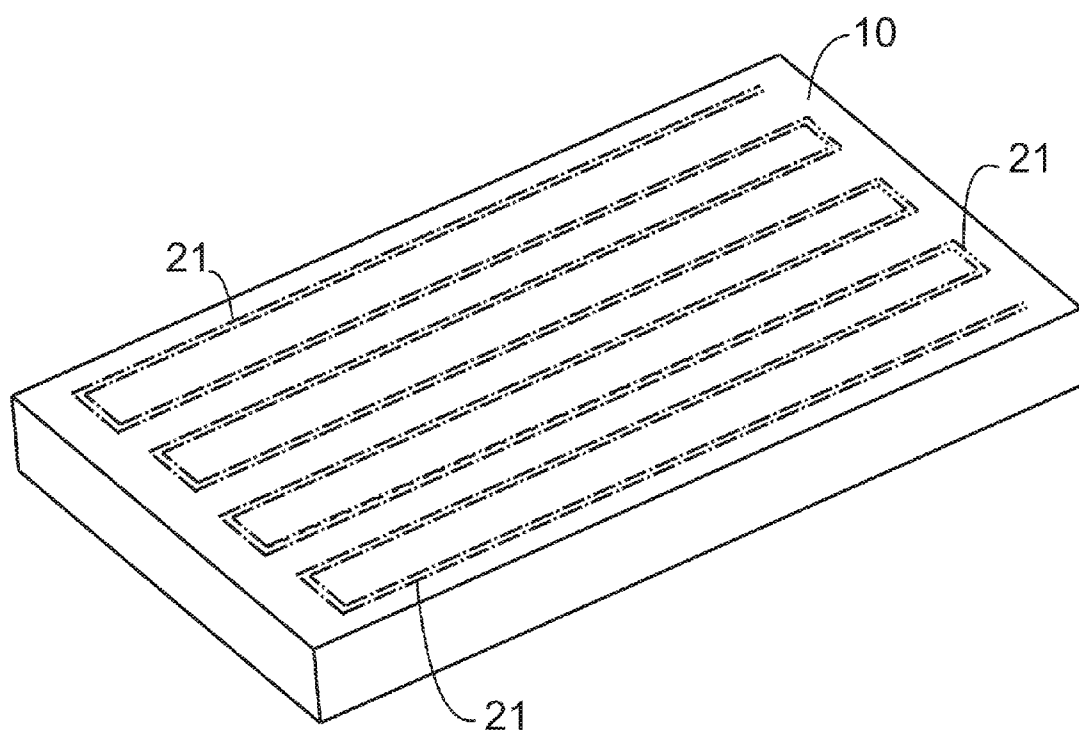


FIG. 1

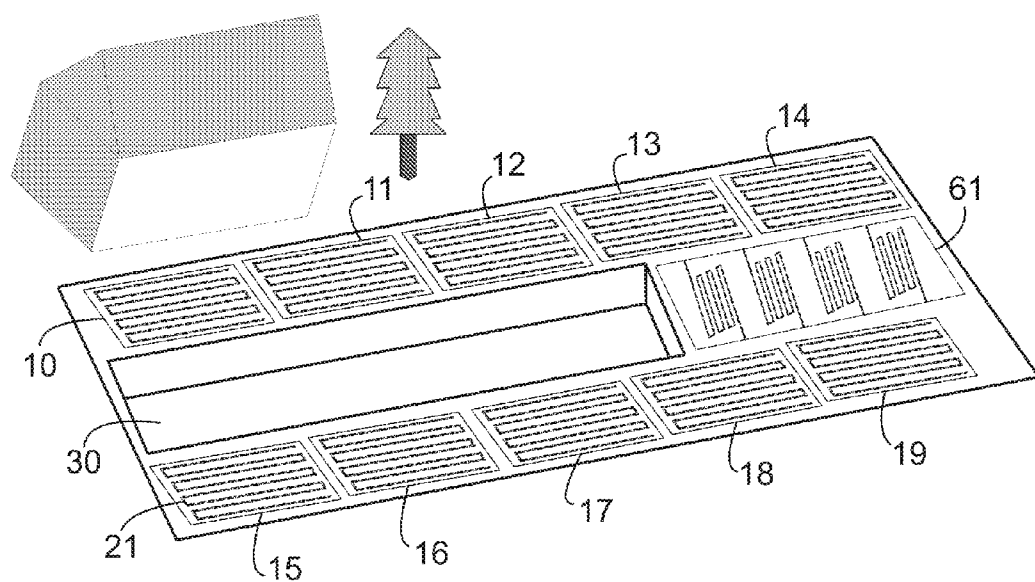


FIG. 2

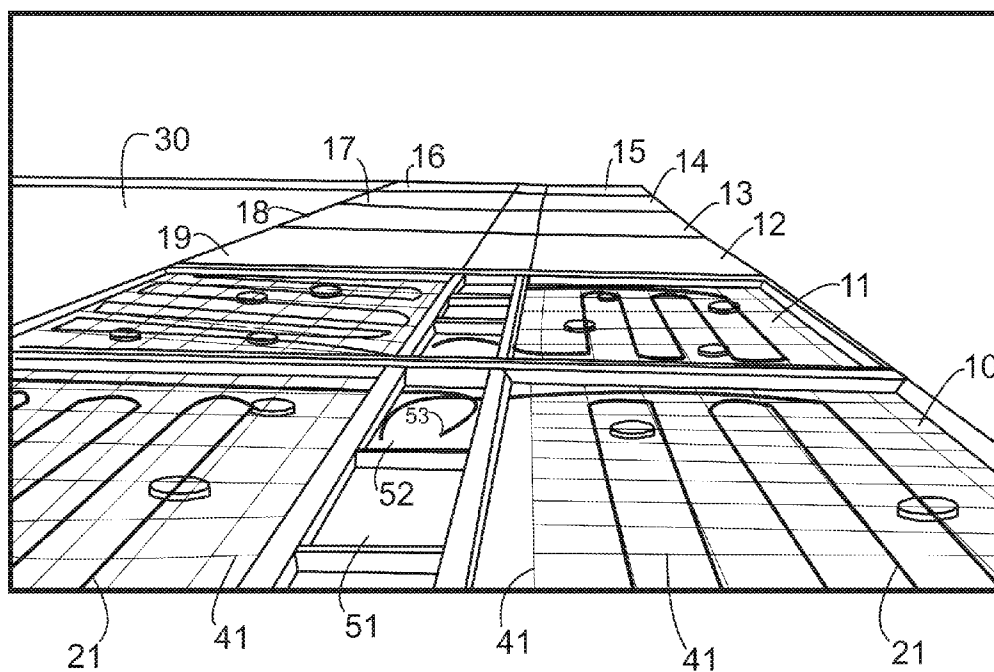


FIG. 3

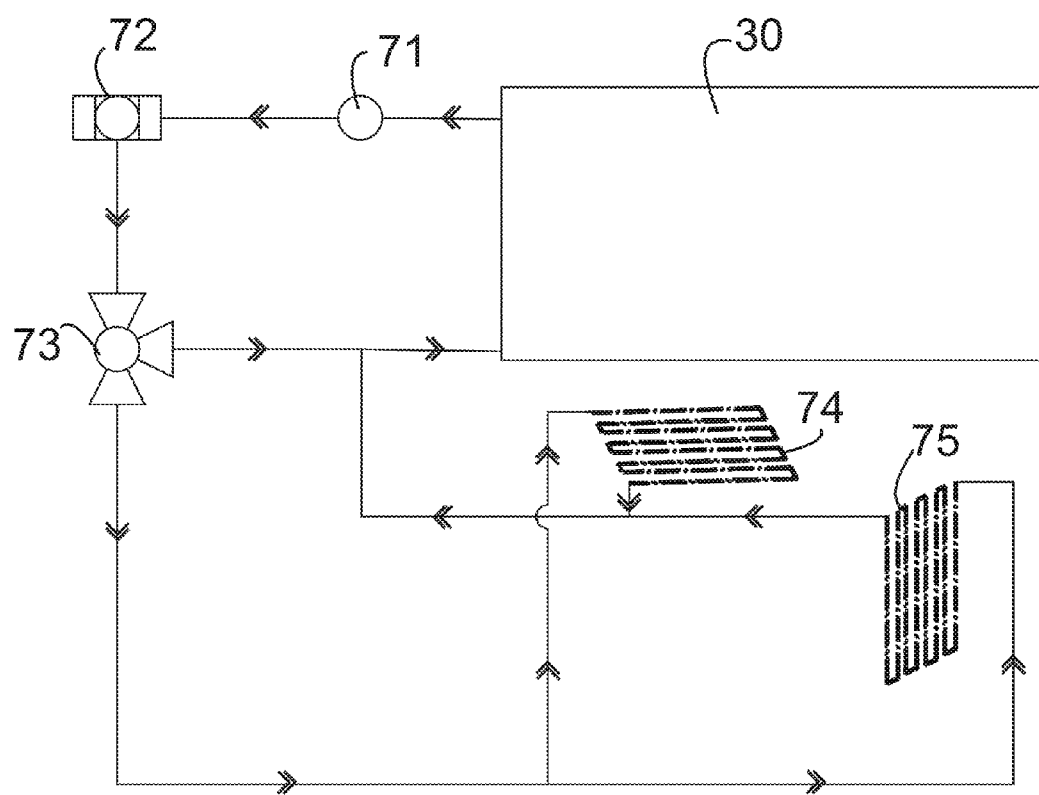


FIG. 4

SOLAR HEATING SYSTEM FOR SWIMMING POOLS

FIELD OF THE INVENTION

[0001] The present invention relates generally to solar heating systems and particularly to a solar heating system implemented within concrete decking around swimming pools which acts to heat the pool water while simultaneously cooling the deck.

BACKGROUND OF THE INVENTION

[0002] The global increase in energy consumption, limited reserves of fossil fuels, and environmental pollutions associated with them are the drivers for a drastic change from our fuel-based energy towards alternative and renewable sources such as solar, wind, and biomass. Solar energy in the form of heat is the most abundant renewable energy form. Although it is not yet clear what portion of our energy will eventually be supplied by solar power, it is well known that its potential can far exceed the total energy demand of the globe. This potential together with the need for green energy sources has provided a unique opportunity for solar energy to grow at a rate that is not imaginable for many other industries. Despite the high potential and well established technology, solar energy is not a main contributor to today's energy basket.

[0003] Implementation of solar energy in residential and commercial buildings is a major challenge for builders and designers. Designers struggle to provide the benefits of solar technology without disturbing the visual appeal of the project. For many consumers, the appearance and extra space occupied by solar equipment outweighs the benefits of using a green energy source. There is a need to incorporate solar energy equipment within building materials to maintain the desired and expected appearances to maximize the amount of green energy being used by the consumer.

[0004] Incorporating solar technology into the building materials surrounding a pool offers an attractive and environmentally friendly solution to heating swimming pool water with the added benefit of increasing comfort and safety of the user by cooling the concrete decking that surrounds the pool.

SUMMARY OF THE INVENTION

[0005] This is a cheap and effective way to heat the water of a swimming pool while reducing potential carbon footprint.

[0006] Another objective of the present invention is to cool the concrete decking around a swimming pool. Doing this will increase the comfort standing around a swimming pool in bare feet and prevent the possibility of burns due to the hot concrete.

[0007] One of the embodiments of the present invention is to heat the water of the swimming pool with solar energy without installing a solar collector on a roof or around the swimming pool. Solar thermal collectors of the present invention are embedded inside the concrete in a pre-casting design for the concrete slabs around the swimming pool.

[0008] The concrete slabs around the swimming pool have solar thermal collectors embedded within which receive radiant energy from the sun and transfer the heat to the water flowing inside hoses embodied in the concrete panel which then raises the temperature of the water passed through the collector and cools the surface of the concrete slabs.

[0009] By increasing the collection area, the amount of heat transferred to the water and the efficiency of the heat collec-

tion are increased. The concrete slabs act as radiant energy absorbers for the collectors embedded within.

[0010] By building the thermal collectors into the concrete slabs around the pool the system is protected from mechanical damage and tampering.

[0011] The material of the hose used as the heat collector needs to be strong enough to withstand any forces incurred upon it during installation such as the weight of the concrete while it is being poured.

[0012] The heating effect of radiant energy from the sun is greatest near the surface of the concrete which is why it also the desired area of surface cooling. The thermal collector (a specific water pipe) needs to be installed close to the surface of the absorber (concrete slabs) to maximize the heating capabilities of the system by exposing the collectors to the hottest part of the concrete slabs which has the added effect of allowing the most heat to be pulled from surface of the deck. During installation the collector needs to be set at a predetermined height throughout using a support system to achieve the desired results. Wire mesh is used to evenly support the collector piping.

[0013] The water of the swimming pool flows through the pool pump and the filter as a normal pool, and then is controlled by valves to regulate the amount of water to be heated. The water to be heated flows through piping embedded in the concrete slab around the pool. As it flows through the slab, it pulls the heat away from the concrete before returning to the pool.

[0014] Just like any swimming pool, the water is taken in from a pool with a pump then pushed through a filter. After the filter, a 3 way valve is used to divert some of the water. Depending on the size of the area being installed and the existing landscape, it may be required to break up the area into zones. Doing this will help maximize the output by being able to turn off or reduce flow in a section that has no sun at the time with valves. Zones are done by installing a header after the 3 way valve and teeing off to each area. This is needed to help balance the flow. It is also the best place to install valves to shut off a zone because of a lack of sun in that area or even repairs. Each zone is then broken up again by teeing off to separate pads of concrete. This is done by installing another header to give an even flow to each pad to help maximize output while making the surface a more consistent temperature. After that the water flows back to the main pipe that directs the water back to the pool to complete the system.

[0015] This is a cheap and effective way to heat the water of a swimming pool while reducing potential carbon footprint.

[0016] Another objective of the present invention is to cool the concrete decking around a swimming pool. Doing this will increase the comfort standing around a swimming pool in bare feet and prevent the possibility of burns due to the hot concrete.

[0017] One of the objectives of the present invention is to provide a solar heating collector few inches under the ground to get more sun irradiant energy. For doing that, a wire mesh is used to keep the solar heating collector in a specific height.

[0018] A solar heating system implemented inside a concrete block around a swimming pool, wherein said system absorbs solar thermal energy and heat the water of the swimming pool, wherein said system comprising of a plurality of areas around the swimming pool; a plurality of solar thermal collector being embedded inside said areas; a plurality of height adjustment means to keep said solar thermal collector in a specific height; a separator means to separate said solar

thermal collector from the ground and acts as a holder of said solar thermal collectors; an insulation sheet being placed under said separator means; a plurality of trenches being designed between said areas to use as a space to connect said solar thermal collector; a concrete being poured into said area to cover said solar thermal collectors; and a pump being used to circulate the water of said swimming pool to a plurality of filters and said solar thermal collectors.

[0019] Other objects, features, and advantages of the present invention will be readily appreciated from the following description. The description makes reference to the accompanying drawings, which are provided for illustration of the preferred embodiment. However, such embodiments do not represent the full scope of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] Embodiments herein will hereinafter be described in conjunction with the appended drawings provided to illustrate and not to limit the scope of the claims, wherein like designations denote like elements, and in which:

[0021] FIG. 1 shows a concrete slab which solar thermal collectors are embedded inside;

[0022] FIG. 2 shows a swimming pool and a plurality of concrete slabs with solar thermal collectors embedded inside the slabs;

[0023] FIG. 3 shows a swimming pool and a plurality of concrete slabs with solar thermal collectors; and

[0024] FIG. 4 shows a schematic diagram for the flow of the water inside the solar thermal collectors and some components.

DETAILED DESCRIPTION OF THE DRAWINGS

[0025] As shown in FIG. 1, a concrete slab 10 has a plurality of solar thermal collectors 21 embedded inside the slab 10 to absorb the radiant energy from the sun and transfer the heat to the water flowing inside the solar thermal collector to raise the temperature of the water passed through the collectors 21.

[0026] By having a plurality of the concrete slabs 10-19 as shown in FIG. 2, the water inside the swimming pool 30 will pass through the concrete slabs 10-19 and the temperature of the water increases by flowing in solar thermal collectors 21.

[0027] Again as shown in FIG. 2, based on the shape and size of the swimming pool 30, the configuration of the solar thermal collectors 10-19 can vary. The shape of the solar thermal collectors 11-19 can be any geometric shape 61 made to fit around the swimming pool 30 to absorb the sun radiant energy for increasing the water temperature.

[0028] The solar thermal collectors 11-19 are connected to each other in a parallel circuit. There is a possibility to connect all solar thermal collectors 11-19 together or a portion of them based on the capacity of the swimming pool and the equipment needed to run the water inside the solar thermal collector from the swimming pool 30 to the collectors) 1-19 and again into the swimming pool 30.

[0029] One of the objectives of the present invention is to provide the solar thermal energy without adding more equipment for the swimming pool. The traditional equipment for the swimming pool such as pump, filter are used for the present invention.

[0030] FIG. 3 shows around area side of a swimming pool 30 which is prepared for the concrete pouring. As shown in FIG. 3, the area around the swimming pool 30 is divided into

smaller areas 10-19 that contain embedded solar thermal collectors 21 inside each small area 10-19.

[0031] The solar heating system is implemented inside a concrete slab around a swimming pool wherein a solar thermal collector being selected from the groups consisting of a plastic pipe, and/or a metallic pipe.

[0032] A plastic 1/2" pipe that conventionally used for radiant floor heating is placed onto a steel mesh is installed to help strengthen concrete and evenly support the pipe. The pipe is looped back and forth at 6" centers with the ends left long to be dealt with later.

[0033] The solar heating system is implemented inside a concrete slab around a swimming pool wherein a height adjustment means and a separator means being a plurality of wire mesh being connected to the area around the swimming pool in a specific height.

[0034] Again as shown in FIG. 3, the area around the pool was formed into small sections each section preferably being around 4'x8' to place the wire mesh 41 with the pipe 21 on it. Between each section a trench 51-52 for the pipes 21 to run is left. When finished the trench 51-52 will be covered with interlocking stone or other means to add to the look. This trench 51-52 will also allow the concrete pads to move with the frost in winter. The loose end 53 of the pipes 21 should be tied in later. A lip is formed with each section of concrete to support the interlocking stone. This is very important in order to allow the pipes to run in an air space and not in the ground. If the pipes were to be run in the ground they would lose the heat they pulled from the concrete.

[0035] After the area is formed, the wire mesh 41 with the pipes 21 in each space is placed and raised them up so the pipes 21 are between 1/2" and 1 1/2" below the surface of the concrete. An insulating Styrofoam or a sheet of plastic can be installed under areas to help prevent heat loss to the ground. The insulation does help but is unnecessary for most areas. Concrete can be poured and care taken to not damage the piping or knock it off the supports. The darker the concrete the hotter it gets and the hotter the pool will get, but it can also get too hot.

[0036] When the concrete is set, the forms can be removed and the separate pads can be hooked up. This is done by running a 3/4" pipe from the main header and teeing off to one side of the loop (in the concrete) (1-3/4" line feeding 6-10 sections to make 1 zone). After the 8' section the end is plugged, to act like another header to give an even flow between sections. Another 3/4" pipe is then installed in the same manor for the return pipe. The returns are then plumbed into the return to the pool.

[0037] The solar thermal collector embedded inside the concrete preferably has a serpentine configuration to increase the area of the solar thermal collectors inside the concrete slab and increase the time that the water passes through the collectors.

[0038] The present invention uses a specific pipe that has been used in concrete for over twenty years without problems. It can also handle the high amounts of chlorine in swimming pools.

[0039] FIG. 4 shows a schematic diagram for the flow of the water inside the solar thermal collectors and some components. The water of a swimming pool 30 is pumped with a pool pump 71 and regulated to a pool filter 72 and then by using a 3 way valve, some of the water navigates to the solar

thermal collector **74-75** which are embedded inside the concrete. The hot water then comes back into the swimming pool **30**.

[0040] One of the embodiments of the present invention is to have a temperature sensor to measure the slab temperature. If the temperature is more than a set value the sensor automatically navigates the hot water through the system.

[0041] The pipe acts as solar thermal collector preferably made from Cross-linked polyethylene which is available in the market under trademark name Wirsbo hePEX™.

[0042] Other embodiments of the present invention is to have the solar heating system implementing inside a concrete slab around a swimming pool wherein the concrete has a dark colour pigment to absorb more sun energy. The color pigments being selected from the groups of dark range colours to absorb the sun radiant energy with higher efficiency.

[0043] The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly, all suitable modifications and equivalents may be resorted to, falling within the scope of the invention.

[0044] With respect to the above description, it is to be realized that the optimum relationships for the parts of the invention in regard to size, shape, form, materials, function and manner of operation, assembly and use are deemed readily apparent and obvious to those skilled in the art, and all equivalent relationships to those illustrated in the drawings and described in the specification are intended to be encompassed by the present invention.

What is claimed is:

1. A solar heating system implemented inside a concrete slab around a swimming pool, wherein said system absorbs solar thermal energy and heats the water of the swimming pool, wherein said system comprising:

- a. a plurality of areas around the swimming pool;
- b. a plurality of solar thermal collector being embedded inside said areas;
- c. a plurality of height adjustment means to keep said solar thermal collector in a specific height;
- d. a separator means to separate said solar thermal collector from the ground and acts as a holder of said solar thermal collectors;

e. an insulation sheet being placed under said separator means;

f. a plurality of trenches being designed between said areas to use as a space to connect said solar thermal collector;

g. a concrete being poured into said area to cover said solar thermal collectors; and

h. a pump being used to circulate the water of said swimming pool to a plurality of filters and said solar thermal collectors.

2. The solar heating system implemented inside a concrete slab around a swimming pool of claim **1**, wherein said area having different geometrical shape.

3. The solar heating system implemented inside a concrete slab around a swimming pool of claim **1**, wherein said solar thermal collector being selected from the groups consisting of a plastic pipe, and a metallic pipe.

4. The solar heating system implemented inside a concrete slab around a swimming pool of claim **1**, wherein said height adjustment means being a plurality of wire mesh being connected to said area in a specific height.

5. The solar heating system implemented inside a concrete slab around a swimming pool of claim **1**, wherein said separator means being a plurality of wire mesh being connected to said area.

6. The solar heating system implemented inside a concrete slab around a swimming pool of claim **1**, wherein said concrete being having a dark colour pigment to absorb more sun energy.

7. The solar heating system implemented inside a concrete slab around a swimming pool of claim **1**, wherein the depth of solar thermal collector embedded inside said area being one to two inches.

8. The solar heating system implemented inside a concrete slab around a swimming pool of claim **1**, wherein said system further having a temperature sensor to measure the slab temperature.

9. The solar heating system implemented inside a concrete slab around a swimming pool of claim **1**, wherein said solar thermal collectors being embedded inside said area in serpentine configuration.

10. The solar heating system implemented inside a concrete slab around a swimming pool of claim **1**, wherein said solar thermal collectors being pipe made from cross-linked polyethylene under trademark name Wirsbo hePEX.

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