

Solar Panel Mounting Arrangement for an Evaporative Air Conditioner

Technical Field

[0001] The present invention relates to evaporative air conditioners and more particularly to an arrangement for mounting a solar panel thereto.

Background of Invention

[0002] Evaporative coolers or evaporative air conditioners are well known in the art. Such coolers work by drawing warm air through one or more moistened pads. The warm air is cooled by evaporation as it passes through the moistened pads and then the cooled air is directed into the area to be cooled.

[0003] Evaporative cooler units typically have a very simple construction. For example, most units include a cabinet that has a base that acts as a water reservoir, four side panels and a top panel. In some instances, the cabinet is formed with four corner posts or columns and one side panel is located between adjacent corner columns. The inclusion of corner columns increases the stability of the cabinet and also allows for at least one of the side panels to be a sliding panel. The inclusion of at least one sliding panel is advantageous for easy servicing of the air conditioner.

[0004] A cooling pad is located against the inner face of each side panel. A pump is located within the cabinet to pump water from the reservoir up and onto the top edge of each cooling pad. A fan and fan motor are mounted within the cabinet and are arranged so that the fan draws air through apertures formed in the side panels and then through the pads. The cooled air is then pulled by the fan through an opening in the base of the cabinet into ducting that directs the cooled air into the room or zone to be cooled.

[0005] Evaporative cooler units need to be mounted in a location where there is good surrounding air flow and so that the cooled air can then be directed to flow into the room or zone to be cooled. This means that they are normally mounted on the roof of the building.

[0006] Various cabinet shapes have been developed over the years with a view to improving the visual appeal of the coolers. However, due to the operative needs of such coolers, the cabinets are generally box shaped with a top panel that extends generally horizontally.

[0007] One of the advantages of evaporative cooler units as compared to other forms of air-conditioning units is their relatively small power draw and thus low operational costs. However, as electricity prices increase and there is greater demand to reduce reliance on fossil fuel resources, any effort to adopt the use of renewable energy, such as solar energy, to run appliances is attractive to consumers.

[0008] It is now very common for homes to have an array of solar photovoltaic panels fitted on their roof as part of a solar power electricity generating system. The system provides a "green supply" of electricity for use in the home. Any unused "green supply" of electricity is typically feed back into the mains supply so as to effectively apply a credit to the householder's electricity account. This helps to reduce or perhaps even eliminate any payment for electricity drawn from the mains supply and also helps minimise damage to our environment due to reduced carbon dioxide emissions.

[0009] Not all homes can be fitted with such a solar power electricity generating system. For example, the homeowner may not be able to afford the installation expense, there may be insufficient appropriate roof space, the roof space available may not be properly orientated to ensure maximum efficiency of the panels, or there may be other limitations that prevent the homeowner from installing such a system.

[0010] The inventors of the present invention have recognised that it would be advantageous if evaporative air conditioners could be powered using solar power without the need for the householder to have a solar power electricity generating system installed to the roof of their home.

[0011] The discussion of the background to the invention herein is included to explain the context of the invention. This is not to be taken as an admission that any of the material referred to was published, known or part of the common general knowledge as at the priority date of this application.

Summary of Invention

[0012] The first aspect of the present invention provides an arrangement for mounting a solar panel above the cabinet of an evaporative cooler. Such an arrangement is advantageous because it enables the solar panel to be effectively located in a space that would otherwise be “used” by the cabinet of the evaporative cooler. Further, because the cabinet of the evaporative cooler is necessarily installed in a location where there is good surrounding air flow, it is unlikely that the top panel of the cabinet will be located in a shaded area. Accordingly, immediately on or spaced from the top panel of the cabinet of the evaporative cooler is likely to be an appropriate place to position a solar panel and to angle it so that the sun will be incident at the best angular orientation.

[0013] In accordance with one embodiment of the first aspect, the arrangement includes a solar panel support assembly. The support assembly includes a support rod with a first end arranged to extend through an upper panel of the cabinet of the evaporative cooler to establish a connection point for connecting a solar panel thereto and a second end arranged to transfer weight loading of the solar panel to a supporting structure, and wherein the second end of the rod is configured in use to prevent the solar panel from being moved generally away from the evaporative cooler following connection to the connection point.

[0014] The supporting structure may, for example, be a part of the evaporative cooler, a frame on which the evaporative cooler is positioned, or a beam or other structural element of the building on which the evaporative cooler is positioned.

[0015] In accordance with a preferred embodiment of the invention, the second end of the support rod is connected to a base plate that is configured for connection to the evaporative cooler. Typically, the second end of the support rod would be welded to the base plate and the base plate would be arranged to be connected to a base panel of the cooler. The base plate is preferably a planar member configured to disburse the weight loading of the solar panel to the base panel of the evaporative cooler. The connection between the base plate and base panel of the cooler is preferably achieved by at least one threaded fastener.

[0016] The connection between the base plate and the base panel is also preferably such so as to not damage the integrity of the water reservoir of the evaporative cooler.

[0017] The first end of the support rod is preferably threaded to enable a threaded connection between the solar panel and the support rod.

[0018] In one embodiment, the solar panel is connected to a pair of rails. Four solar panel support assemblies are provided so that four connection points are established. Each end of each rail is arranged to be connected to one of the four connection points. Other arrangements for establishing the connection between the solar panel and the respective connection point(s) are envisaged.

[0019] The present invention also provides in a second aspect an evaporative cooler fitted with a solar panel using an arrangement in accordance with the first aspect. In accordance with one embodiment of the second aspect, the arrangement includes at least one solar panel support assembly.

[0020] Preferably, the evaporative cooler is fitted with four solar panel support assemblies, each panel support assembly located adjacent a respective corner of the evaporative cooler.

Brief Description of Drawings

[0021] Embodiments of the invention will now be described, by way of example only, with reference to the accompanying drawings in which:

[0022] Figure 1 is an isometric view of an evaporative cooler above which is mounted a solar panel in accordance with an arrangement of an embodiment of the invention;

[0023] Figure 2 is a partially cut-away side view of an evaporative cooler above which is mounted a solar panel in accordance with an embodiment of the invention;

[0024] Figure 3 is a view showing the connection of a lower end of a solar panel support to the base of the evaporative cooler; and

[0025] Figure 4 is an enlarged view showing the connection of the solar panel to the top panel of the evaporative cooler via the solar panel support.

Detailed Description

[0026] Figure 1 illustrates an evaporative air conditioner or cooler 10 with a solar panel 20 located above the height of the top panel 12 of the cabinet of the cooler 10. The cabinet of the cooler 10 also includes four side panels, four corner posts 14 and a base or bottom panel 16.

[0027] The underside of the evaporative cooler 10 is shown sitting on a pallet 30. However, it will be appreciated that in use, the evaporative cooler 10 would be positioned on a roof of a building in accordance with standard installation practices for such coolers 10. It should also be appreciated that the present invention is not limited to use only with evaporative coolers of the particular shape or type shown in Figure 1.

[0028] Solar panel 20 is a “dedicated” solar panel meaning that it is provided specifically to establish a solar supply of electrical power for the evaporative cooler 10. Solar panel 20 is not part of any other solar power generation system that may be mounted on or otherwise associated with the house or building on which the cooler 10 is mounted.

[0029] The solar panel 20 is connected to the evaporative cooler 10 via four solar panel supports 40. The connection between the evaporative cooler 10, the panel supports 40 and the solar panel 20 is such as to ensure the security of the solar panel 20 in different wind conditions. On this point, it should be noted that evaporative coolers 10 are preferably installed on the roof of the building so that there is good surrounding air flow. One consequence of this is that the solar panel 20, which is located above the top panel 12 of the cabinet of the cooler 10, is quite exposed and may be subject to high wind loads which would tend to lift the solar panel 20 away from the cooler 10. Accordingly, it is very important to ensure the stability and integrity of the connection between the evaporative cooler 10 and the solar panel 20.

[0030] In accordance with the described embodiment, four solar panel supports 40, one at each corner of the cabinet of the evaporative cooler 10 are used to secure

the solar panel 20 above the cooler 10. More particularly, each solar panel support 40 is connected to the base panel 16 of the cooler 10 as will be explained below.

[0031] As best seen in Figure 3, each solar panel support 40 includes a base plate 42 and an elongate rod 44. The upper end of the elongate rod 44 is shown cut-off in Figure 3 but is should be understood to be of a length to extend right through the top panel 12 of the cooler 10.

[0032] The lower end of the elongate rod 44 is connected, preferably by welding, to the base plate 42. Base plate 42 is shown as adopting a triangular shaped configuration. This particular configuration has been chosen so that, as best shown in Figure 3, the base plate 42 can sit stably on an upper face of a part of the corner post 14 of the cabinet of the cooler 10. The corner post 14 of the cabinet is normally connected to an elevated part of the base panel 16 of the cabinet of the cooler 10 using at least two fasteners. The connection point is elevated so that the fasteners used to secure the corner post 14 to the base panel 16 do not risk the integrity of the part of the base panel 16 that establishes the water reservoir for the cooler 10.

[0033] As shown in Figure 3, the base plate 42 is configured so that it can be attached to the bottom panel 16 of the cooler 10 through the upper part of the corner post 14 of the cabinet using at least two fasteners. Indeed, it is possible to use the same set of fasteners to secure both the base plate 42 of the solar support 40 and the adjacent corner post 14 to the base panel 16 as part of one installation step. To achieve this, the screw apertures 42A in the base plate 42 are arranged to align with the screw apertures formed in the corner post 14.

[0034] It will be appreciated by those skilled in the art that the shape of the base plate 42 may be adjusted to suit the shape of the cabinet of the cooler 10. Further, it will be appreciated that the base plate may not be located on a part of the corner post 14 of the cabinet. Instead, for example, it could be connected directly to the base panel 16. Further, it may be possible for the base plate 42 to be eliminated and for the lower end of the support rod 40 to be configured so as to transfer weight loading of the solar panel 20 to a supporting structure. For example, the lower end of the support rod 40 could be directly connected to a frame on which the evaporative cooler

10 is positioned, or a beam or other structural element of the building on which the evaporative cooler 10 is positioned.

[0035] The upper end of the elongate rod 44 is threaded and is arranged to extend through an aperture formed in the top panel 12 of the cabinet of the cooler 10. As best shown in Figure 4, a washer 46 and nut 48 are then located on the upper end of the elongate rod 44. Nut 48 is then rotated until it tightens against the upper face of the washer 46 which is located against the top panel 12 of the cabinet of the cooler 10. When the nut 48 is so tightened, the solar panel support 40 is fixed in position relative to the cooler 10 and is ready to enable attachment of the solar panel 20 thereto. As four solar panel supports 40 are connected to each cooler 10, one adjacent at each corner thereof, they establish four connection points to which the solar panel 20 can be connected.

[0036] The connection of the solar panel 20 to the connection points established by the solar panel supports 40 is achieved in the illustrated embodiment using a pair of rails 50. Each rail 50 is secured at either end to one of the connection points established by the solar panel supports 40. Each connection is achieved by way of an "L" foot 52 which is fastened to the upper end of the rod 44 using nuts and washers in a conventional manner. The other end of the "L" foot 52 is then secured to the rail 50 in a conventional manner. A clamp 54 is then used to clamp the solar panel 20 to each end of the rail 50. In this way, the solar panel 20 is secured at two points to each rail 50.

[0037] The weight loading of the solar panel 20 is transferred via the rod 44 of each solar panel support 40 to the base panel 16 of the cooler 10. The base panel 16 is in turn supported by connection to a structural member (e.g. a roof beam) of the building. Further, it will be appreciated that the solar panel 20 is in this manner "tied" to the base panel 10B of the cooler 10 and is in the same manner "tied" to the building. This secures the panel 20 from any wind loading that may try to otherwise lift or move the solar panel 20 generally away from the evaporative cooler 10. This connection arrangement ensures the stability and integrity of the connection between the evaporative cooler 10 and the solar panel 20.

[0038] The connection can be easily made by an installer without the need for any special tools, can be easily checked as part of normal maintenance operations of the cooler unit, and does not require any significant modifications to the design or construction of cooler units as currently available to consumers.

[0039] It will also be appreciated that the configuration of the solar supports 40 is such that the rails 50 can be angled during installation between two solar supports 40 (i.e. so that one end of the rail 50 is located at a greater height above the top panel 12 than the other end). This enables the installer to set the rails 50 at the most desirable angular orientation for the solar panel 20. This orientation will depend on the geographic location of the installation.

[0040] It will also be appreciated that embodiments of the present invention enable the installation of a solar panel effectively above an evaporative cooler so as to take advantage of roof space that would otherwise be used by the cooler's cabinet.

[0041] A single solar panel can be installed to provide an amount of electrical power to the evaporative cooler. Hence, the householder can take advantage of a "green supply" of electricity without the full cost of a typical solar power electricity generating system. Further, the ability to install the solar panel above the cabinet of the evaporative cooler may provide the householder with the only suitable location for a solar panel and would thus provide them with an installation site not otherwise available. It is also recognised that in some situations, for example in a strata or community property arrangement, a householder may not be permitted to install a traditional solar power electricity generating system on a roof but may be allowed to position a single solar panel in conjunction with an evaporative cooler.

[0042] The embodiments have been described by way of example only and modifications within the spirit and scope of the invention are envisaged.