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Chapter 4

SERIALIZATION OF STEVE BAER'S BOOK ON SOLAR ENERGY CONTINUED:

TEMPERATURE FLUCTUATION

What is it like to live in houses where the temperature changes during the day? What is it like not to have a thermostat to control the temperature within a degree or so? It is only very recently that there have been thermostats for controlling the temperature in houses and today almost everyone alive in the USA has spent some time in buildings without automatic thermostats. I believe that it is perfectly satisfactory to have the temperature change during the course of each day from a high in the afternoon to a low in the morning and to have the temperature change from week to week according to how cloudy or sunny it is. The variations in temperature keep your blood circulating. What extremes of temperature? In a dry climate like Albuquerque I believe year lows and highs of 55 degrees F and 85 degrees are perfectly easy to live with inside a house. Especially if you have warm spots such as fire places or stoves to stand next to when it is chilly in the winter. But what is the advantage of having temperature variation within the house? There is no advantage in the sense that such a house places you at the lead in some kind of contest, rather, it is the advantage of not going to great lengths - as most present day heating and cooling systems do - to achieve something that you don't really need or enjoy so much. Now that all of us are plagued with the pollution resulting from the over abundance of devices we have purchased perhaps government or a church group should sponsor a series of "you don't need it commercials." Instead of the bright uniformed "service personnel" of the Lennox air conditioning company briskly delivering and installing the latest gadgets the commercials would show the expensive equipment misused..."oops, we must have screwed up - well it don't make a damn anyway, it was a piece of crap to begin with."

REPTILES NEED MAMMAL HOUSES

The reptile is at a disadvantage because he cannot regulate his body temperature, but, instead, equilibrates near to the temperature of his surroundings. If it is cold he cannot think or move fast. The regulatory function of the mammal was a great advantage since he could keep his body temperature constant. But what about houses and temperature? Is it the same kind of improvement when a thermostat and gas heating system are installed? If the temperature outside one's body, the temperature of the house, is regulated to one-half degree F. of what use is the sophisticated temperature regulating metabolism of the mammal? Obsession with temperature control seems more like Reptile Technology than mammal. The reptile needs it - the mammal does not. This leads to the general question of what view one should take of equipment manufactured to do for you what your body is equipped and prepared to do for itself. Certainly we are all grateful for the discovery of fire, but the thermostat- I don't know.

A person's body has already incorporated the muscles, organs, etc., to steer him through dangers and difficulties - then to cleverly make them unnecessary by an entire new level of design and invention - what is the result of this? The hand turning on the thermostat essentially fires the temperature regulating systems that differentiate mammals from reptiles.

But these systems are not removed from the body. Instead, they are simply unemployed - hanging around so to speak in one's body, talking to the brain, being fed by the heart and bloodstream.

For the utmost in design I can imagine Honeywell's surgical teams removing now unnecessary organs with the installation of their control systems. Perhaps the now unnecessary glands and organs could be sold to lizards on Venus.

In Albuquerque if each room of a properly designed house is given a skylight or south facing window equal in area to one fifth of the floor area very little heating will be necessary during sunny winter weather. What do I mean by "properly designed"? That is designing the walls, floor and their relationship to the south windows, skylights or clerestories so that they may absorb the heat without making the room uncomfortable.

FLOOR:

The floor should be brick, concrete slab, mud or tile on concrete. Such a floor provides a large heat reservoir for a room. The floor should not be covered with carpets since this insulates the room from its valuable heat battery. A few rugs make little difference. The floor should be insulated, not from the ground below it, for this adds to its capacity to store heat, but from the ground around it. This is most commonly done by placing rigid foam insulation to a depth of a couple of feet around the footings.

WALLS:

The inside walls should be of stone, adobe, brick, concrete or containers filled with water. The outside walls should be similarly constructed but with insulation on the outside of the masonry. DOW Chemical describes ways to do this with their board insulation in Form No. 172-580-71. Another simple way is to build a separate wall on the outside of the masonry wall.

Many of the recently constructed adobe houses in Albuquerque have adobe for outside walls and stud walls on the inside. Adobe used this way makes very little sense thermally. The adobe has poor resistance to heat transfer and in this kind of adobe house the heat loss is great through the walls and the thermal storage is little better than in an ordinary house.

It is most important to have the walls that are exposed to direct sunlight be masonry or water since these are in the best position to absorb solar energy. But the flux of sunlight can be dispersed all through the room so that walls that never get direct sunlight nevertheless get the heat from the sun.

A general rule: the floor should be dark --the walls can be any color except the walls with little thermal mass that are exposed to the direct sun - these walls should be painted a light color in order to disperse the heat to other walls or to the floor where it can be absorbed over a greater surface area. The walls that the direct sun is dispersed to may also be light colored, since once the sunlight is inside the room it will be absorbed by the walls and floor regardless of their colors. The direct sun should not strike a dark surface of small thermal mass because it will soon get this surface hot, the hot surface will heat the air which will rise up to the skylight and loose heat to the outside. While this part of the room is hot, other parts are cold. It is true that if a dark wall becomes hot it will radiate its heat to the rest of the room even though no sunlight is reflected.

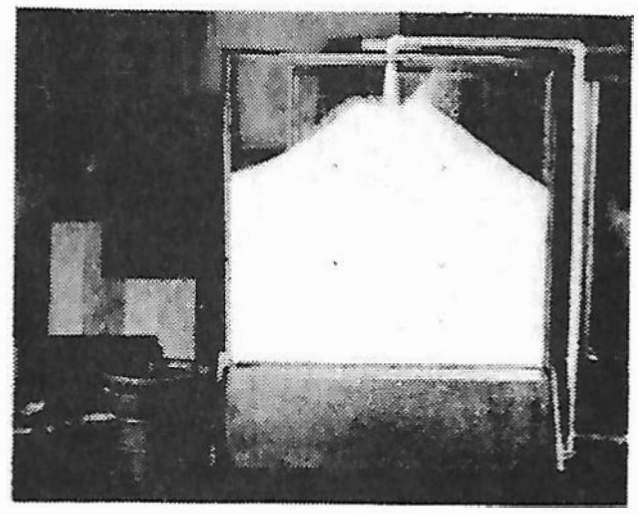
SOMETIMES THERMAL MASS IS A DISADVANTAGE

If you build a building as I have been describing with great thermal mass in the floor and walls then it will change temperature very slowly. What if you planned to use a building only during the daytime - it wouldn't make a great deal of sense to store heat in the walls or floor since these surfaces would insist on heating the building all night long when you didn't need it. The simple methods of solar tempering that I have been describing make sense for houses but not necessarily for shops, offices and schools.

HOW DO YOU INSULATE WINDOWS OR SKYLIGHTS AT NIGHT?

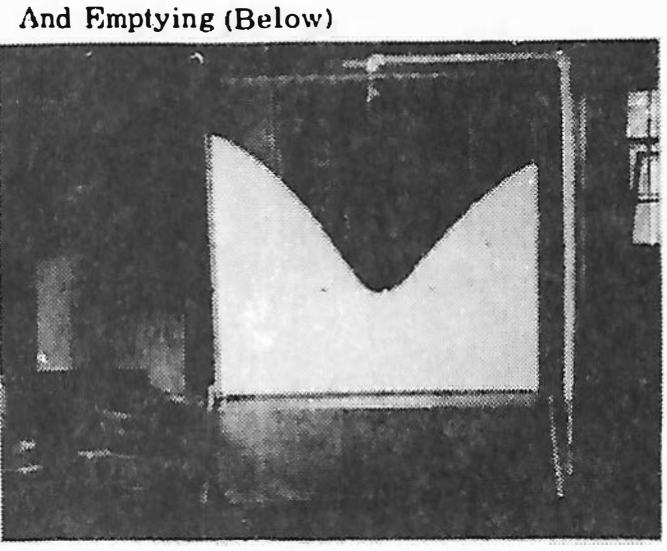
Curtains, blinds, insulated doors on the inside or outside - all these methods have been used in the past, but very little ingenuity has been applied to this very old problem. For some reason, generations of inventors, scientists and architects all living in houses of one kind or another have evidently never noticed the problem.

THE BEADWALL



Photos Show The Beadwall Filling (Above)

And Emptying (Below)

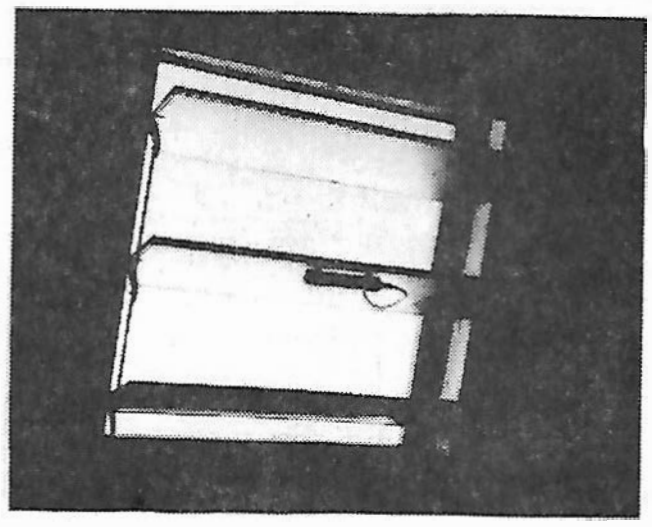


Here are two pictures of the "bead wall" (patent applied for) invented by Dave Harrison in a class last Fall at UNM. The pictures show the styrofoam beads in one case being blown into the cavity between two clear glazings and in the other being sucked out. The power for emptying and filling is provided by an ordinary vacuum cleaner. The insulating value can be made whatever one wished by increasing or decreasing the thickness of the space between the glass. The beads themselves are almost as effective per inch of thickness as the best commercial insulation.

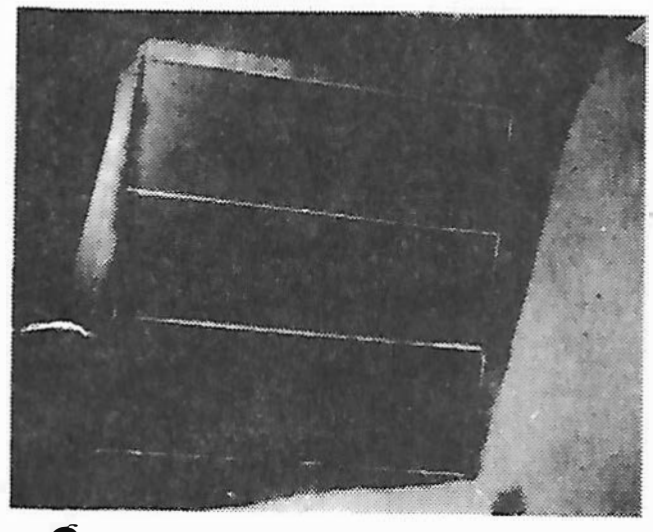
We are now constructing a 200 sq. ft. greenhouse glazed with the beadwall and using 55 gallon drums of water for heat storage.

THE SKYLID

The skylid is a set of insulated rotating louvers that fit below a skylight and open when the sun shines and close when the sun doesn't shine. The purpose of the skylid is to conserve heat. The skylid is opened and closed by freon flowing between two cannisters attached to the balanced louvers. The freon is driven by vapor pressure to the cooler of the two cans, the inside can in the day, the outside can at night. The weight of the freon either opens or closes the balanced louvers. A manual override consisting of a cord attached to the louvers allows you to close the insulated louvers during the summer to prevent over heating.



Photos Show The Skylid Open And Closed



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