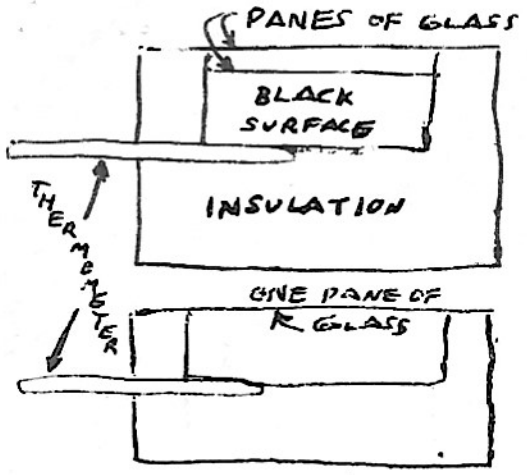
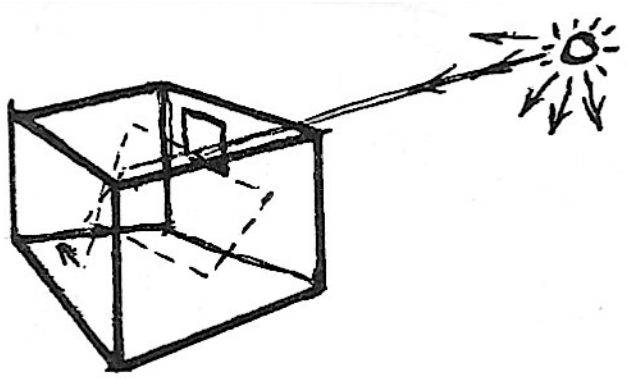


FIGS. 1-A AND 1-B

If two such collectors are put in a static test - facing the sun side by side in the same orientation, the double glass collector will reach a higher temperature than the single pane. This is because the two layers of glass provide a better front insulation than one layer of glass. However, if you expose the two collectors at the same time you will notice that at first the single pane collector will be warmer than the double pane. And, only later, at higher temperatures will the double pane pass the single pane. The single pane is at first warmer because it admits more sunlight than the double pane, since the second pane reflects about 10% of the sunlight that passes through the first pane.

Why is a window or a skylight such a good heat collector? It is very difficult for a ray of light after it has come through a window to find its way by reflection back out the window.



Of course, if the entire side of the room is glass then the geometry of the room is like that of a collector as in Fig. 1, and if part of a ray reflects from the first surface then it will likely escape back through the glass. A room in which you wish to collect heat need not be painted dark colors in order to act as a very efficient absorber for the sunshine entering through relatively small windows. A succession of reflections where ½ of the light is lost each time soon absorbs almost all of the light.

The other method by which heat can escape directly out the front is by direct losses through the glass. This effect is very slight in the case of a window since its own temperature is likely to be below room temperature.

IF YOU USE WINDOWS OR SKYLIGHTS FOR HEAT COLLECTION WHERE WILL YOU PUT ALL THE HEAT???

Fifty square feet of south facing window in a 200 sq. ft. room made of frame and stucco with a wood floor will soon become intolerably hot. On a sunny day, the window may be admitting 10,000 BTUs/hr. and this flood of heat will soon warm up the walls, the floors and the furniture to an uncomfortable level. A large south window for such a conventionally constructed room as the one described does not make much sense. It is difficult to keep the room in a comfortable range because it changes temperature so quickly. If, instead, the room has a brick or slab floor and adobe or brick walls, its temperature is slow to change. A 200 sq. ft. concrete slab warmed 10 degrees Fahrenheit to a depth of 4" holds about 18,660 BTUs.

$$\left(\frac{140\ \text{lbs.}}{\text{ft}^3}\right)\left(\frac{1}{3}\text{ft}\right)\left(\frac{1}{5}\frac{\text{BTUs}}{\text{lb-F}^\circ}\right)(10^\circ\text{F})$$

$$(200\ \text{ft}^2) = 18{,}660\ \text{BTUs}$$

And, if the walls are also masonry or adobe, they will have a similar capacity to hold heat. If the room is 10' x 20' and the walls are 10' high, after subtracting the 50 sq. ft. of south window, there are 500 sq. ft. of wall. If each square foot can store about 100 BTUs with a temperature rise of 10 degrees F. (as the floor) we find that we do have the capacity to store the energy coming through the south window by warming the walls and floor.

It is obvious that this scheme of utilizing solar energy coming through windows depends on a temperature swing between morning and evening. The larger the mass within the house, the smaller the temperature swing required to absorb incoming heat.

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Next issue - more on houses and solar heating - how do you insulate windows at night.