down about 1 meter (3') below the floor level. The window's strip provide ample daylighting which is essential in office buildings. The lower strip "sucks" the indoor air, circulates it around the U tube formed by the collector's absorbing plate, and back to the room.

b) The wall behind the collector's glazing is lightweight and insulated, and thus the collecting element in this system does not provide any thermal storage, besides the storage capacity of the structural mass within the building. However, as it was developed to heat office buildings, storage for nighttime use in this application is not needed.

The U tube of the collector prevents back flow at night by "trapping the cold air below the floor level.

3.5.2 The Barra-Constantini System - An Insulated Wall Collector and Concrete Ceiling Storage

In the Barra-Constantini system (Barra et al., 1987) the southern wall can be any conventional wall, e.g. concrete, bricks, stud wall, etc., but it has to be well insulated externally. A solar collecting element is placed in front of the wall,(e.g. a number of metal lath layers or a corrugated metal sheet), covered by glazing.

With an insulated wall adjacent to a living space, unwanted heat losses in winter, especially during nights and cloudy periods, and heat gains in summer, are minimized, especially in comparison to the concrete Thermal Storage walls.

This assembly forms a vertical air heating solar collector, which is architecturally integrated into the normal building's fabric. The verticality of the collector reduces, of course, its heating efficiency in winter but, on the other hand, reduces also the likelihood of overheating in summer.

The hot air emerging from the insulated collecting wall flows horizontally, within channels imbedded inside a concrete ceiling, and exits from these channels at the Northern part of the building. The air thus warms the Northern rooms first before flowing back through the building space, to the inlets at the lower part of the Southern collecting wall. This insures more even temperature distribution through the whole house.

Because of its high operating temperatures, higher than in other passive systems, the collector is subject to large heat losses. The rear of the collector is insulated in any case, forming the wall of the interior. It is advisable to detail the collector to minimize exposed unglazed portions, especially at the upper parts. Polystyrene insulation should not be used, as collector temperatures may well exceed its melting point. Infiltration losses can be eliminated by good heat resistent sealing, but allowance should be made for substantial thermal movements, especially around the glazing.

Windows in the southern collecting wall provide direct solar heating to the southern rooms, in addition to the radiant heating by the warm ceiling. The northern rooms are heated by the warm air exiting from the ceiling channels.