TROMBE WALL SYSTEMS

Trombe wall

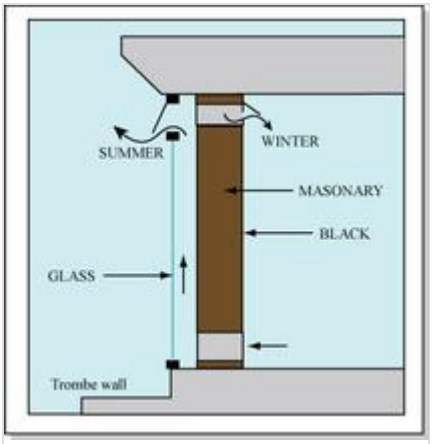

Figure 1: This an example of the classic Trombe wall which serves an important purpose during the summer and winter.

A Trombe wall is a south facing wall of a building which is thick and is usually painted black to absorb heat. If in the southern hemisphere of the world, this wall would be the north wall of the building because that is the winter sun side. A pane of glass or plastic glazing is installed on the exterior of the wall offset a few inches which creates an air space between the pane and wall. During the winter, this set up allows the wall to heat up during the day because the glass does not allow heat to escape easily. At night, the wall cools down and this results in heat being let off into the building.[1]
During the summer, this same wall can be used to cool the building. There is usually a vent at the top of the wall open to the outside and an overhang above the wall which blocks the higher summer sun. The vent allowing heat in the the house during the winter is closed and the summer vent is open. This creates a solar chimney which creates ventilation for cool the building.[2] Figure 1[3] is an example of a classic Trombe wall.

Improvements in sustainability

Trombe walls since the 1960's have been look on by governments and research facilities as a great alternative for fossil fuels in home heating. This heating also is practical in places where gas heating is not practical. In China for example, the National Natural Science Foundation of China and the National Technology Research and Development Program of China has granted funds to research for improved Trombe walls. This research looks at selecting certain thermo-insulation in building construction to increase the operating efficiency up to 33.85%.[4]

History and Development of the Trombe wall

This idea of a passive way of heating a building was first patented by Edward Sylvester Morse in 1881 with his design of a versatile vent system.[5]The Trombe wall is named after a French engineer name Félix Trombe who made this passive heating system popular in the 1960's. [6] Further interest emerged particularly in the US in the 1970's which was aided by researchers at Los Alamos National Laboratory in New Mexico.[7] Since the classic Tromble wall was made popular, different configurations have been developed to adapt the Trombe wall to various climates, purposes, and seasons.[8] Some of these different configurations include the zigzag, water, solar hybrid, composite, and fluidised Trombe walls.

Variations of the Trombe wall

The following are a few examples of available variations of the Trombe wall:

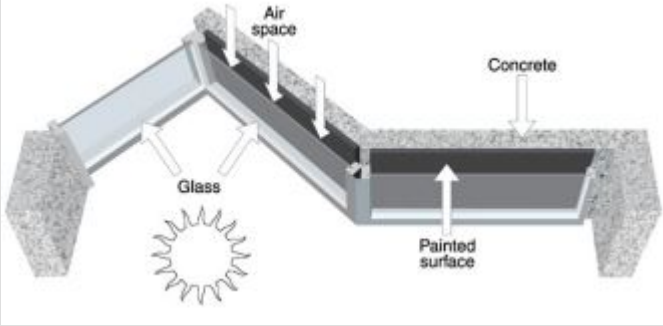

Figure 2: The zigzag Trombe wall is one of the many variations of the classic Trombe wall.

- The zigzag Trombe wall is designed to reduce excessive heat gain and glare on sunny days. The wall has three sections where two of the walls form a V-shaped wall and the third is a classic Trombe wall. The south east facing wall of the V provides immediate heat and light in the morning cold. Next to the V shape is a classic Trombe wall which stores heat for the night. This version of the Trombe wall is fairly new and further prototyping needs to be made to ensure this is a good alternative to the classic Trombe wall. This variation of the Trombe wall can be seen in Figure 2.[9]

- The water Trombe wall works like the classic Trombe wall, however, Instead of using masonry to capture heat, the water Trombe wall utilizes a container of water in the shape of a wall. Water works better in gaining indirect heat and reflects off less heat back out of the glass pane. This happens because the surface temperature of the water does not rise as high as the masonry. Containing liquids, however, is more difficult than containing solid materials. This is the main reason way the classic Trombe wall is chosen usually over the water Trombe wall.[10]

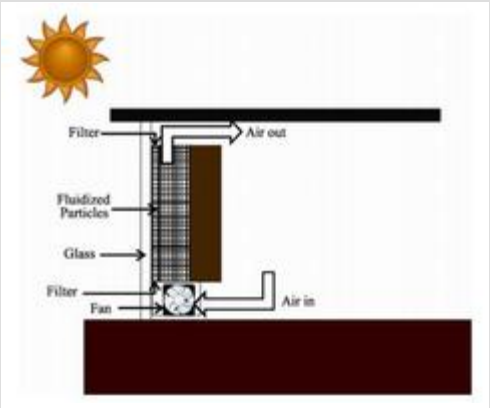

Figure 3: The fluidised Trombe wall is one variation of the classic Tromble wall which is far more efficient.

- The fluidised Trombe wall is like the classic Trombe wall, however, the gap between the Trombe wall and glass pane is filled with a low-density fluid which is highly absorbent. The air which is heated by the heated fluid is moved by a fan into the building. There are two filters at the top and bottom of the fluid which prevent fluidised particles from entering the room. Research has shown that the fluidised wall is far more efficient than the classic Trombe wall. This variation, however, is more expensive to construct. This variation of the Trombe wall can be seen in Figure 3.[11]

Examples of the Trombe wall in action

Figure 4: This efficient home is tucked away where the canyon country meets the mountains.

This beautiful home, seen in figure 4[12] , has two Trombe walls which are not even noticeable. After researching other renewable energy options, the owners of this home discovered that Tromble walls would economically be the best option in the long run. Tombe walls require little, if any, maintenance.

Figure 5: This home has added a two story addition which includes a Trombe wall.

This two story building is an addition to the original house. This addition, seen in figure 5[13] , is wider and taller than the original house so that the sun can more easily passively warm the building. This particular Trombe wall on the eastern side of the building's glass wall is made from adobe bricks which is easy to construct with. Not only is this house energy efficient, but it has a pleasing look to its architecture.

The use of Trombe walls can be easily applied to many construction applications when building homes and other buildings which need heat during the winter months. These walls will be constructed on the winter sun side. Some homes already in existence may have walls that can be converted into Trombe walls fairly easily. These solar passive walls can be easily constructed to not even be noticeable.

Recent research contributed

Trombe walls are an excellent alternative to fossil energy for home heating. Fossil fuels are limited and prices are rising so there is no surprise why more and more research has been given to developing the Trombe wall system. Different configurations of the Trombe wall have been developed in the search for even more efficient heating methods. These different configurations of the classic Trombe wall have been made into prototypes by universities and research facilities to test their efficiency and practicality. Research needs to be done in many areas including social and cultural aspects of constructing homes with the Trombe walls. This would look into what would discourage people from designing a home with this system. Trombe walls will most likely be seen more often included in sustainable home construction in the coming years as it is more and more recognized as an truly efficient passive solar system.

Source : http://letu-cefs.wikispaces.com/Trombe+Wall+Systems