

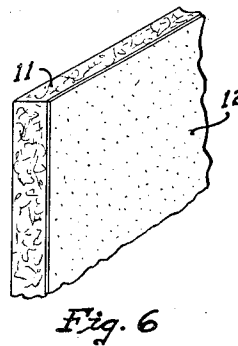
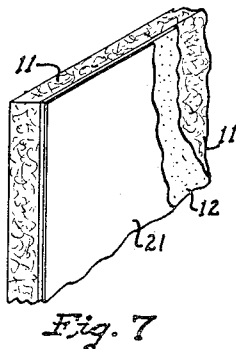
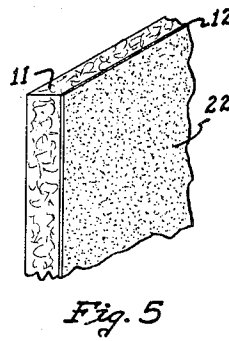
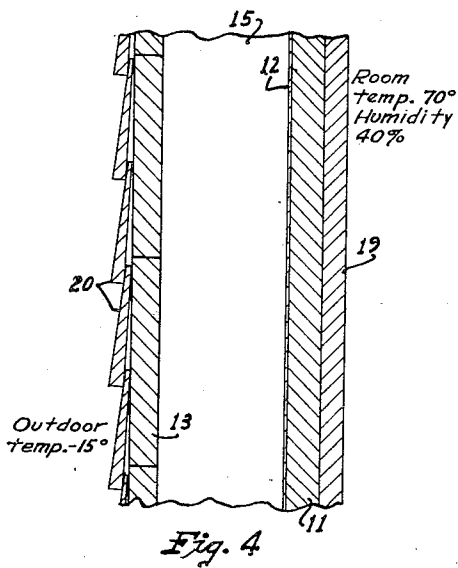
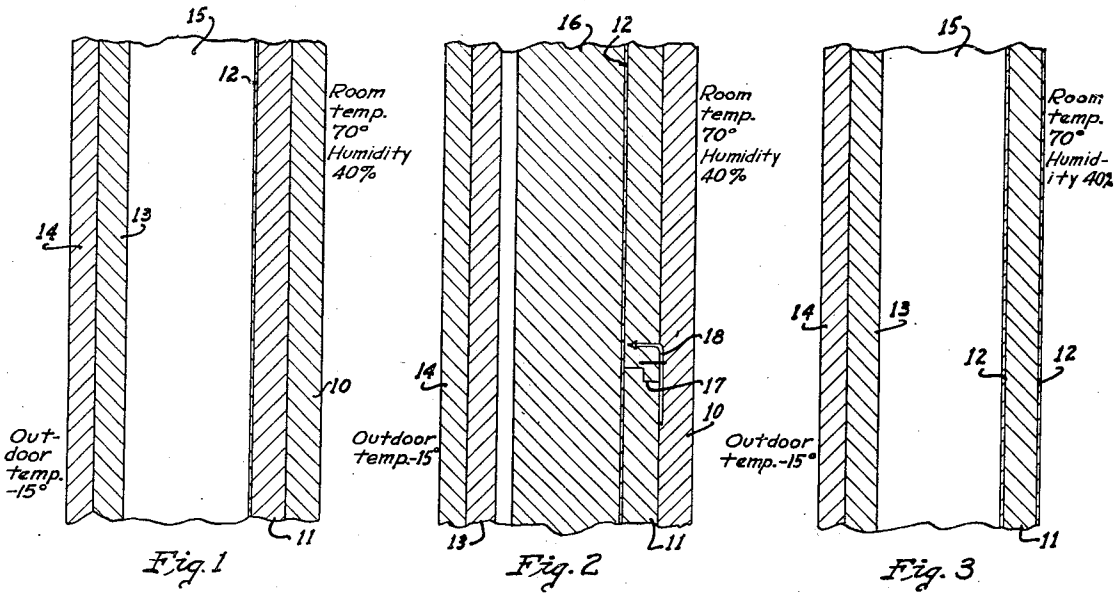
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WALL

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2,324,971

WALL

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2 Claims. (Cl. 20—4)

This invention relates to walls which are located where there is a temperature differential between opposite sides thereof and in which wall insulation is provided for retarding the transmission of heat through the walls. The invention has special reference to winter insulation of buildings wherein a warm, more or less humid atmosphere normally exists on one side and where a freezing temperature may occur on the cold side.

It has been found in climates experiencing freezing weather that vapor in heated houses migrates into the walls and as it acquires a lower temperature from the outside, the vapor may condense depositing water. Theoretically condensation of vapor occurs at the dew point, and in the event the temperature is freezing, ice may form in the walls. At warmer temperatures the accumulated ice will melt. This usually results in injury and decay to wood frames and other structural parts and such injury may be observed after a number of years of this action. Siding and sheathing in particular deteriorate, and such action appears to be hastened by conventional structures, which retard the passage of vapor and tend to prevent evaporation of water which accumulates. It has been found by experience that the migration of vapor into a normal wall under many conditions is far too rapid to prevent condensation within the wall.

There has been much speculation about the theory relating to the migration of vapor through materials, and the application of the theory to building construction. The direction of vapor travel is determined by the moisture equilibrium conditions for the two sides of the material and not the absolute vapor pressure difference. It may be said that in most practical cases where the vapor pressures are different on the two sides of a building wall, a vapor pressure gradient will be established through the wall, and the vapor will travel in the direction of vapor pressure drop.

It is an object and purpose of vapor barriers to provide means which will either bar the migration of vapor into walls or so retard the migration of vapor that condensation within the walls will not occur.

It is an object of this invention to provide a wall construction in which the warm side is of such construction as will prevent or retard to a great extent, the migration of vapor into the wall from the warm side and to a construction of the cold side, so that any vapor migration

into the wall from the warm side will escape from the wall before condensation occurs.

Other objects of the invention are the independent or combined provisions of a heat insulated wall and heat insulating material in which the cold side of the wall is substantially not less than eight times more vapor-pervious than the warm side of the wall.

Other and additional objects and advantages of the invention will appear from the following explanation of the invention made in connection with the accompanying drawing in which:

Figure 1 is a diagrammatic representation of a wall of the open stud space type.

Figure 2 is a diagrammatic representation of a wall of the insulated stud space type.

Figure 3 is a diagrammatic representation of a wall of the so-called dry wall type.

Figure 4 is a sectional view of a wall of the type shown in Figure 1.

Figures 5, 6, and 7 are views of fiber board having vapor barriers on one face thereof.

For successful construction attention must be given to vapor barriers. In cold climates it is especially important to provide a vapor barrier to prevent or retard vapor from the interior of the house migrating through the inner wall panel and condensing within the stud space. Vapor barriers should be applied on the warm side of the wall (the inner panel). In a construction where plaster is to be used the vapor barrier generally should be applied on the rear face of the plaster base. In a construction employing so-called "dry wall" the vapor barrier may be on either face of the inner panel, preferably on the room side of the inner panel.

Referring to Figures 1, 2, 3 and 4, it is assumed that such walls are employed in a house wherein the room or inside temperature is about 70° F., and a relative humidity of about 40%, and the outside temperature is about -15° F. The inside air will contain about 3.86 grains per cubic foot of water as vapor. As air cools its capacity for holding moisture decreases. For example, at -15° F. one cubic foot of air can hold only about .218 grain. As the air from the warm room migrates into the wall and cools there may be condensation and a deposition of water.

In Figures 1, 2 and 3 the numeral 10 represents plaster and 11 represents a plaster receiving base. The plaster receiving base may be and preferably is fiber board although plaster board and similar material can be employed. Associated with the plaster base is vapor barrier 12. Various forms of vapor barriers may be used

so long as they retard the passage of vapor to about .5 gram or less per square foot in 24 hours when the interior temperature is about 70° F. at 40% humidity and the outdoor temperature is about -15° F. below.

Numeral 13 represents a sheathing of such composition and formation that vapor will migrate therethrough at a rate of at least 8 times faster than through the vapor barrier. A sheathing that will permit vapor to pass at least 5 grams per square foot in 24 hours under conditions above indicated will give a successful wall construction.

A sheathing that will produce these results is a vegetable fiber board having a density of from about 16 to 25 pounds per cubic foot. Generally the sheathing should be about $\frac{23}{32}$ " in thickness, but generally it may be said that sheathing should have a thickness of about $\frac{1}{2}$ " to $1\frac{1}{2}$ ".

In Figure 2, the stud spaces 15 are in part at least filled with insulating material 16. It is preferred that a dead air space be provided in the stud space, this dead air space preferably is adjacent to the sheathing.

If a plaster receiving base is employed it is desirable to lock the joints between adjacent sheet or board forming the plaster base. The locking of such joint may be accomplished in various ways, but such an arrangement as disclosed in Figure 2 gives excellent results. The edges of the boards forming the plaster base are provided with an interlocking or over-lapping construction and secured to one of the abutting boards is lock 18 which extends across the joint and contacts the surface of the adjacent board.

In Figure 3 the warm side or inner panel is to be used without the addition of plaster. The vapor barrier may be used on either face but preferably on the room face side.

Heretofore, in many constructions the sheathing was seal coated or a coated building paper was employed between the sheathing and the finishing material. Such a construction prevents or tends to prevent the passage of vapor and moisture from the stud spaces. If it is desired to employ a paper between the sheathing and the finishing material, it should be of a porous construction such as does not act as a vapor barrier. Coated paper should not be used as it retards the escape of vapor and moisture from the stud space.

The best and desirable result is obtained by employing a fiber insulating inner panel with a vapor barrier associated therewith and an outer insulating sheathing which permits vapor to pass therethrough at a relatively fast rate. Many modifications may be used which give satisfactory results. For example, the inner panel may be plaster board having associated therewith a vapor barrier.

A vapor barrier may be provided with many materials and the following are the most economical to use and the most economical to apply.

A fiber board 11 is coated with an asphalt or other bituminous compound by spreading over one surface melted asphalt. If only one coat of asphalt is used care must be used to see that there are substantially no air or pin holes therein. Generally, one coat of asphalt as heretofore ap-

plied does not prevent vapor passage. If only asphalt is to be used as a vapor barrier, to insure a safe vapor barrier at least two coats of asphalt should be employed.

In Figure 7 is disclosed a very successful vapor barrier which consists of a coating of asphalt 12 and a sheet of kraft paper 21. To produce this kind of vapor barrier the base material 11, such as for example fiber board, is coated with hot asphalt and when the asphalt becomes tacky the kraft sheet is applied and then the composite body passed through a hot calendering process. The calendering insures that substantially all of the small holes in the asphalt will be closed.

In Figure 5 is disclosed another form of vapor barrier that is highly efficient. The base material such as fiber board is coated with asphalt or other bituminous compound and metallic granules are preferably applied while the compound is in a soft state. The whole is then preferably rolled to evenly imbed the granules in the surface of the body layer. It has been found that the substance commercially known as bronzing powder may be used and the material preferably used is aluminum bronze powder which imparts a silver-like appearance. The grade of aluminum powder known as "fine" is well adapted for the purpose, although coarser grades may be used, and as little as 3 pounds of it is sufficient to coat one surface of a thousand square feet, although a greater quantity is preferred.

In Figure 4 the plaster base 11 is coated with plaster 19 or other interior finishing material. Associated with the plaster base 11 is vapor barrier 12. Breathing sheathing 13 forms a part of the cold side of the wall and secured thereto is finishing material 20.

What I claim is:

1. A wall construction comprising inner fiber board panels having an asphalt coating and a sheet of paper over the coating on one face of each panel, said coated panels having a vapor porosity of about 0.004 to 0.5 gram per square foot in 24 hours when indoor temperature is about 70° F. at 40% humidity and the outdoor temperature is about -15° F., studding supporting the panels, fiber board sheathing of about 16 to 25 pounds density per cubic foot and a vapor porosity of about at least 5 grams per square foot in 24 hours under conditions indicated, and siding material secured over said sheathing.

2. A wall construction comprising an inner fiber board panel having an asphalt coating and a sheet of paper over the coating on one face of each panel, means for locking the joint between adjacent panels, said coated panels having a vapor porosity of about 0.004 to 0.5 gram per square in 24 hours when indoor temperature is about 70° F. at 40% humidity and the outdoor temperature is about -15° F., studding supporting the panels, fiber board sheathing of about 16 to 25 pounds density per cubic foot and a vapor porosity of about at least 5 grams per square foot in 24 hours under conditions indicated, and siding material secured over said sheathing.

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