Feb. 5, 1957 P. D. RASMUSSEN 2,780,090

INSULATING STRUCTURE

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Fig. 1.

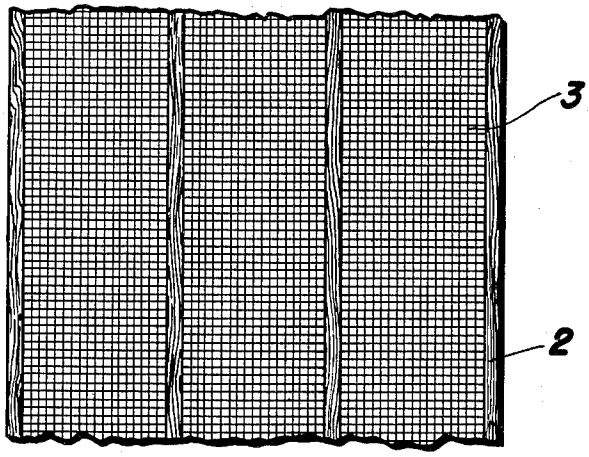
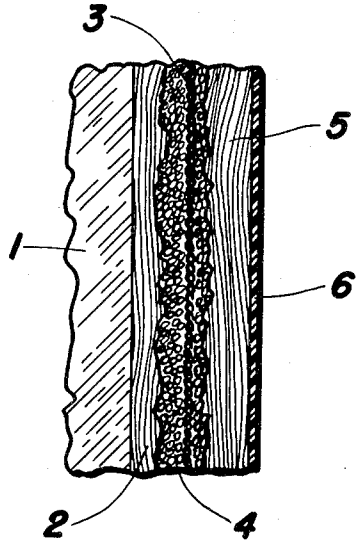



Fig. 2.




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Fig. 3.

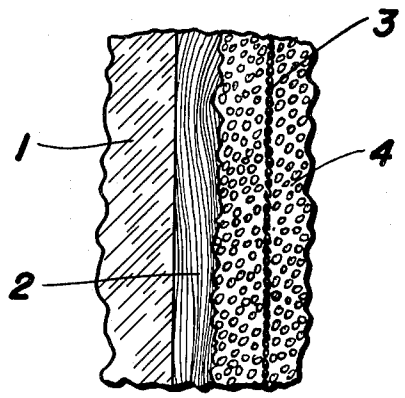
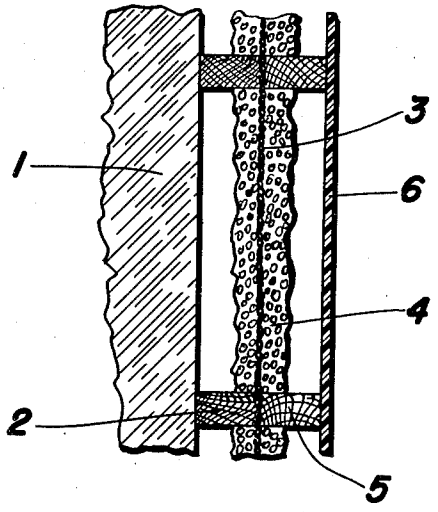



Fig. 4.




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2,780,090

# INSULATING STRUCTURE

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Application September 18, 1952, Serial No. 310,254

2 Claims. (Cl. 72—17)

This invention relates to building insulation, and more particularly to methods for preparing wall insulation.

Heretofore it has been a common practice to use wire gauze to hold in place solid plaster, in which case such wire gauze is applied to the wall, and plaster superimposed.

It has also been known to attach various kinds of bulky and foaming materials to walls. The use of foamed silicates has been disclosed in U. S. Patents 2,152,917 and 2,216,251, and in the co-pending application Serial No. 190,054 filed October 13, 1950, now U. S. Patent 2,664,405. Foamed concrete likewise is well known in the art.

However, the application of such foamed materials to the wall in a non-foamed state so as to make them foam in place on the wall has not been possible heretofore. The reason for this is that at one stage in the foaming cycle there is a marked viscosity drop, and that as the bubbles form the foaming material sags under the influence of gravity to such a degree that even application to the wall by spraying or troweling has not been successful. Furthermore if so applied the coating will tend to crack due to the uneven drying, which leads to contraction of the surface layer.

It is therefore an object of this invention to make possible extremely rapid application to walls of a material which foams and greatly increases in volume after application, yet in such a fashion that this does not sag or crack but will present a uniform surface. Further objects will become apparent as the following detailed description proceeds.

In accordance with my invention, I suspend at a slight distance from the wall and parallel therewith a layer of metal or plastic screen, apply (for example by spraying) or trowel into this screen the composition to be applied in substantially a non-foamed state so that it will foam while suspended on the screen, and in both directions thereof, leaving in most places at least some air space between the foamed material and the wall.

The applicability of the invention is illustrated, by the figures and the following detailed description in which it is my intent to illustrate the invention without limiting its scope and in which:

Figure 1 is a front elevation of a wall treated in accordance with this invention;

Figure 2 is a vertical cross sectional view of a portion of a wall according to the invention;

Figure 3 is a vertical cross sectional view of the embodiment of Figure 1 but at a different stage of the process; and

Figure 4 a horizontal cross sectional view of the embodiment of Figure 2.

The wall 1 is usually of a material which is a relatively inferior heat insulator, such as concrete, cinder block or the like, although the invention can be applied to any wall material. Onto this wall material, preferably at regular intervals, are placed furring strips usually of wood, metal or plastic, which are attached to the wall and protrude a distance therefrom. The distance of protrusion may depend on the depth of insulation desired and is usually from ½ to 7 inches. To these furring strips is nailed a screen material 3 so as to cover the wall with a screen layer parallel therewith. The mesh size is preferably a quarter inch of half an inch, but may be much smaller or much larger depending upon the nature of the application. As small as 1/16 of an inch meshes have been employed and as large as 1½ inch meshes can likewise be used in some instances. I now prepare a composition to be applied, the conditions for this composition being that it must be substantially foamable but non-foamed when applied, and should foam after application, either through a reaction which is self-propagating and self-initiating, or by a reaction which is released by heating, for example, with infrared lamps or the like. In any event this material is applied and pressed through this screen with a trowel, or a sloping board which can be moved along the furring strips like a "doctor blade" forcing the composition through the meshes of this screen. Figure 2 shows this composition so applied in its non-foamed state 4. Upon application this material begins to foam and in a given time, usually from ten minutes to half an hour, will have attained its final thickness, having foamed principally inwardly but also to some extent outwardly of the screen, as shown in Figure 3, forming a layer of material having a cellular structure. That portion of said layer which extends inwardly necessarily bears the reticular markings of the screen extending from the inner surface through the structure to the screen.



The layer protruding outside of this screen also usually shows reticular markings and can be smoothed down, for example, by a trowel or a float, inasmuch as it will remain soft for usually about an hour after application and is then easily workable. I prefer, however to allow it to harden and to apply subsequently a moisture resisting protective surface coating, for example, by spraying, or by draping a moisture-proof wall paper or plastic film along the outside of the sheet. A preferred application is to attach additional furring strips 5 to the furring strip 2 and to nail or otherwise attach a layer of decorative plastic film 6, such as polyvinyl print or polyvinyl chloride, polyethylene or the like, to furring strips 5.

It is thus seen that the invention comprises the concept of using a screen wall parallel to the principal wall, positioned at some distance therefrom, an insulating layer foamed in place, which is substantially suspended on the said screen and is substantially separated from the main wall by an air space, thus being substantially suspended from the said gauze at least while the foaming process takes place, though contact may later be established with the main wall, support for the insulating layer is provided by the metal screen and usually an air space will remain between the wall and the foamed material.

The said foaming material can be a plastic, such as urea or melamine aldehyde plastics, protein aldehyde system, a resin comprising a foaming agent, as well as a polyester resin comprising a heat-activatable foaming agent which may be then heated to cause expansion, or it may be an inorganic material dependent for the foaming action on the reaction of a metal such as aluminum, zinc or iron, or magnesium with alkali or acid present in the binder material. Suitable compositions are, for example, 95 parts of sodium silicate and 5 parts of alumimum powder; or those given in U. S. Patent No. 2,152,917, or any of those cited in the following examples, all of which represent compositions adapted to the use in this invention. All parts in the examples are taken by weight. The compositions of Examples 1 to 11 will foam at room temperature, while compositions of Examples 12 and 13 require

the application of heat for foaming, for example by means of infra-red radiation:

*Examples*:

1. 35 parts (58%) of sodium silicate 48.0° Bé.
   25 parts (41.2%) of kaolin
   ½ part (0.8%) of aluminum powder
2. 35 parts (54%) of sodium silicate 50.25° Bé.
   25 parts (38.3%) of kaolin
   5 parts (7.7%) of aluminum powder
3. 35 parts (56.9%) of sodium silicate 50.25° Bé.
   25 parts (41%) of kaolin
   1¼ parts (2.1%) of aluminum powder
4. 23 parts (48%) of sodium silicate 50.25° Bé.
   25 parts (49.6%) of kaolin
   1¼ parts (2.4%) of aluminum powder
5. 50 parts (64.8%) of sodium silicate 50.0° Bé.
   25 parts (32%) of kaolin
   2½ parts (3.2%) of aluminum powder
6. 50 parts (32.5%) of bentonite
   100 parts (65%) of sodium silicate 50.0° Bé.
   4 parts (2.5%) of aluminum powder
7. 10 parts (12.2%) of perlite
   65 parts (84%) of sodium silicate 49.0° Bé.
   3 parts (3.8%) of aluminum powder
8. 20 parts (29.5%) of talc
   5 parts (7.5%) of bentonite
   40 parts (60%) of sodium silicate 45.0° Bé.
   2 parts (3%) of aluminum powder
9. 5 parts (15.5%) of vermiculite
   5 parts (15.5%) of bentonite
   20 parts (64.2%) of sodium silicate 50.25° Bé.
   1½ parts (4.8%) of aluminum powder
10. 10 parts (16%) of asbestos flour
    10 parts (16%) of bentonite
    1½ parts (2.4%) of aluminum powder
    40 parts (65.6%) of sodium silicate 50.25° Bé.
11. 50 parts (50%) of sodium silicate solid, alkali to silica ratio 1:2
    50 parts (50%) of aluminum powder, 400 mesh

The above composition was moistened with sufficient water to transform it to a dough, whereupon expansion took place and a foam was formed, as in the preceding compositions. Composition was promptly used as shown in the invention.

*Example 12*

60 parts of a castor oil modified glyceryl phthalate alkyd resin with acid number of 200 was mixed with 40 parts of xylol and 80 parts of kaolin. 10 parts of phenyl isocyanate and 2 parts of m-tolylene diisocyanate in an equal amount of xylol were quickly stirred into the fluid paste which was then spread on the metal lath.



The mass slowly foamed without the application of heat as the xylol evaporated.

*Example 13*

A plastisol was prepared by mixing 50 parts of powdered polyvinyl chloride, 50 parts dioctyl phthalate, 5 parts azo isobutyrodinitrile, 30 parts china clay and 2 parts of lead stearate. After being spread on the lath, heat was applied by infra-red lamps until the desired degree of foaming occurred.

It is thus seen that the invention is broad in scope and is not to be restricted excepting by the claims, in which it is my intention to cover all novelty in the invention as broadly as possible, in view of prior art.

Having thus disclosed my invention, I claim:

1. An insulating wall structure comprising a wall, spacing members parallel and attached thereto, a reticular screen attached to said spacing members and substantially parallel to said wall, a cellular substantially rigid insulating material supported on said reticular screen and extending both inwardly and outwardly therefrom having an outer surface characterized by being retiform, and a synthetic resin membrane supported by members extending at least into contact with said reticular screen, said membrane being spaced outwardly from said insulating material and substantially parallel to said reticular screen.

2. An insulating wall structure comprising a wall, spacing members parallel and attached thereto, a reticular screen attached to said spacing members and substantially parallel to said wall, a cellular substantially rigid insulating material supported on said reticular screen and extending both inwardly and outwardly therefrom having an outer surface characterized by being retiform, and an otherwise unsupported organic synthetic resin film supported by members extending at least into contact with said reticular screen, said film being spaced outwardly from said insulating material and substantially parallel to said reticular screen.

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