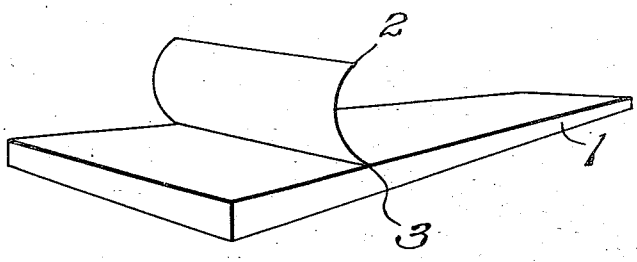
April 22, 1941. V. LEFEBURE 2,239,107

COMPOSITE BOARD

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Fig. 1.



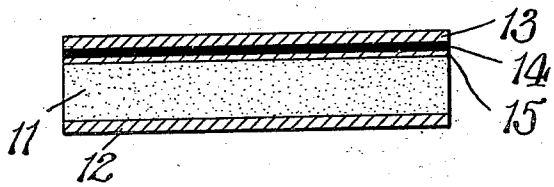


Fig. 2.

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COMPOSITE BOARD

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12 Claims. (Cl. 154—45.9)

This invention relates to composite board material comprising a layer of a water-setting plaster or cement which is allowed to set while in contact with relatively thin liners or coverings of fibrous material, e. g. pulp board. A typical composite board material of this kind known as plaster board or wall board, consists of a layer of calcium sulphate plaster, usually plaster of Paris, bonded on both sides to liners of pulp board. The layer of set plaster is referred to as the mineral core of the board.

In the manufacture of plaster board a wet plaster mix is poured on to a moving sheet of pulp board, suitable arrangements being made to prevent the mix overflowing at the edges of the sheet, and a second sheet of pulp board is fed under a roller on to the top of the wet mix, which forms a layer usually between ¼" and ½" thick, but which may be of any desired thickness, the useful limits being in general ½" and 2". The plaster quickly solidifies and bonds firmly with the pulp board coverings, the mix usually being modified to compel good and permanent adhesion with the pulp board. After drying, the plaster board has considerable strength as the pulp board coverings are bonded to the plaster and act as a reinforcement. For all practical purposes the plaster board behaves as an integral board.

When the plaster is fixed in position its strength is not so important as when it is is being carried and handled.

As the layers of pulp are on the outside of the plaster they are exposed when the plaster board is fixed in position. This means that it is not possible to take advantage of the appearance of the plaster.

This invention has as an object to provide a plaster board which will be strong enough to be handled and worked on without risk of breaking, but of which it is possible to take advantage of the appearance of the plaster. Further objects will appear hereinafter.

These objects are accomplished by the following invention. I have found that I can make a plaster board which satisfies the above objects if when making the board I provide a plane or zone of potential weakness, at or adjacent to one or both the principal surfaces of the mineral core and coextensive therewith, so that one or both the liners or layers of fibrous material can be stripped off when not required.

The resulting board has the advantage that one or both liners can be readily removed from the mineral core when it is desired to expose the surface of the mineral core, e. g. after the board has been fixed to a wall or ceiling. Thus a board is obtained which functions as a normal strong plaster board in handling and transport, and until final use when one or both liners is or are removed.

I prefer to use calcium sulphate plasters for forming the mineral core of the board, in particular plaster of Paris or anhydrite plaster, i. e. plaster the setting properties of which depend essentially upon the hydration of mineral anhydrite (anhydrous calcium sulphate) under the influence of small proportions of suitable accelerators such as alkali metal salts and certain metal sulphates. If desired, the mixes may contain gas or foam producing agents, thereby producing a board with a void or cellular mineral core, which has the advantage of lightness, combined with enhanced heat and sound insulating properties.

The mineral core may be of a decorative nature, e. g. it may consist of coloured, mottled or veined plaster, or of a plaster containing coloured aggregates, which can be abraded to give a terrazzo surface. The plaster mixes described and claimed in U. S. application Serial No. 60,542, which set without laitance, are especially suitable for use in carrying out the present invention, such mixes comprising an unset plaster constituent and a proportion of an already set plaster constituent, the set plaster constituent being less finely divided than the unset plaster constituent, the unset plaster constituent containing a pigment and the set plaster constituent being prepared from an initial plaster containing the same pigment. It is also possible to use an aggregate containing a different pigment in order to obtain varied terrazzo effects.

Reinforcements such as wire gauze or perforated pulp board or other suitable fibrous material may be included in the mineral core if desired, this generally being necessary in the case where the mineral core is comparatively thin and both liners or coverings are subsequently removed from the same. The reinforcement is advantageously placed near the surface of the core, and in some cases may be provided adjacent both surfaces. Thus flat sheets having a decorative effect on both sides may be obtained which can be used as partitions in buildings.

Various methods of manufacturing the composite board material of the invention are illustrated in the following examples to which however the invention is not limited.

Example 1

A composite board material is made by a continuous sheeting method in a similar manner to normal plaster board, but the top covering or liner of pulp board is omitted. When the plaster has set a top covering or liner of pulp board is applied by means of a water soluble or water softening adhesive, e. g. starch paste or casein. The composite material is then dried.

The resulting product is a plaster board of substantially normal strength which will withstand handling and transport without damage to the plaster core. When required, e. g. after erection as part of a structure, the pulp board covering or liner secured by the adhesive is moistened sufficiently to weaken the adhesive bond, after which it may be readily stripped off the plaster core. Hot water is preferably used in removing the covering, and if necessary gentle scraping or rubbing may be applied to clean the plaster surface.

Example 2

A composite board material is made by a continuous sheeting method in a similar manner to normal plaster board, with the modification that a water soluble or water softening adhesive such as starch is applied to the surface of one of the pulp board coverings or liners, preferably the top covering, which is to come into contact with the plaster. Alternatively, the adhesive may be applied, e. g. by spraying, to the wet plaster prior to the application of the top covering.

The final product is similar to that obtained in Example 1 and may be treated in the same way to remove the pulp board covering adjacent to the adhesive.

Example 3

A composite board material is made as described in Examples 1 or 2, except that one or both of the pulp board coverings or liners is or are replaced by a covering or coverings consisting of two or more fibrous layers united by a water soluble or water softening adhesive.

Example 4

A composite board material is made by a continuous sheeting method in a similar manner to normal plaster board, one or both of the liners or coverings consisting of two or more fibrous layers united by a water soluble or water softening adhesive, such as starch. The layer to be placed next to the plaster is of less thickness than the outer layer, e. g. it may be made of thin paper.

When the surface of the final product is moistened, the water penetrates to the adhesive bond between the relatively thin fibrous layer and the superposed layer or layers, and the latter may be stripped off, leaving the plaster core with a thin fibrous covering which can easily be removed by washing and rubbing. This method has the advantage of protecting the surface of the plaster core from disfigurement due to rough stripping treatment, and is especially applicable where the core is of a decorative nature.

Example 5

A composite board material is made by a continuous sheeting method in a similar manner to normal plaster board, one or both of the liners or coverings being composite fibrous liners or boards consisting of two or more plies, such liners being of the type commonly made on a cylinder paper-making machine or on a Duplex machine, it being arranged in the paper making process that a plane or zone of potential weakness exists between the two plies selected as suitable. The outer ply will preferably be the thicker one and the zone of weakness will be close to the core. Such composite liners may be made by methods well known in the art, such as by arranging that the two plies are drier than normal when united, by introducing a thin layer of inert material such as loading between the two plies before uniting and so reducing the strength of the bond between them, by compacting the surface of the two plies by means of special felts or press rolls before uniting, so as to prevent interlocking of fibres of adjacent surfaces. The resultant composite board can be safely handled and the outer protective ply or plies may be readily stripped to leave a thin coating of paper which may easily be removed by wetting and by abrasion.

Example 6

A composite board material is made by a continuous sheeting method in a similar manner to normal plaster board, one or both of the coverings or liners consisting of fibrous board which on account of heavy compacting and/or sizing or similar treatment gives a weak bond with the plaster.

The coverings can be stripped off the core when required, without the necessity for moistening them. This method is chiefly applicable to reinforced sheets or to sheets of ample thickness to withstand the stresses caused by the stripping of the coverings.

Example 7

A composite board material is made by a continuous sheeting method in a similar manner to normal plaster board, but the top covering or liner is only allowed to contact with the wet plastic when the latter is well advanced towards the initial set. The resulting bond between the top covering and the core is comparatively weak, so that the covering can easily be stripped off when required.

Example 8

A composite board material is made by a continuous sheeting method in a similar manner to normal plaster board, one or both of the coverings or liners consisting of an absorbent fibrous board of fairly low mechanical strength.

The product is of sufficient strength to withstand handling and transport without damage to the plaster core, and the coverings can be removed by mild abrasive treatment, e. g. wire brushing, or by moistening followed by stripping.

Example 9

A composite board material is made by a continuous sheeting method in a similar manner to normal plaster board, one or both of the coverings or liners consisting of pulp board containing a high percentage of a water soluble or water softening filler.

When the surface of the product is treated with water the covering is so weakened that it may be readily removed by mild abrasive treatment.

Example 10

A composite board material is made by a continuous sheeting method in a similar manner to normal plaster board, both coverings or liners consisting of fibrous boards which give a weak bond with the plaster. If desired, good bond with one liner may be obtained by the improved

method employing a surface coating of a slurry composed of cementitious filler and liquid adhesive.

A composite board material or sheet of plaster board made in accordance with this invention is illustrated in the accompanying drawing in which

Fig. 1 is a perspective view of one form of the invention, and

Fig. 2 is a cross-sectional view of a modification.

Referring to Fig. 1, 1 is the mineral core and 2 is the liner or sheet of fibrous material shown partially stripped off, while at 3, between the core 1 and the fibrous material 2, there is a layer of water soluble or water softening adhesive.

In the modification illustrated in Fig. 2, 11 is the core and 12 is the back liner. A removable composite top liner is shown as consisting of a thick outer ply 13 united to the thinner ply 15 adjacent the core by means of the water soluble adhesive layer 14.

In the above examples the composite board materials are made by a continuous sheeting process in a similar manner to plaster board. This is generally preferred, as being continuous and more economical than ordinary moulding methods, but it will be understood that the latter may also be employed in producing the composite materials of the present invention. In certain cases, moulding methods may be more advantageous than the continuous sheeting method. It is also possible to form the mineral core by extrusion in cases where the setting is a gradual process, as with anhydrite plasters or Portland cement. In such cases mixes are preferably used which contain a minimum of water over the chemical requirements of the setting process—for example, anhydrite plaster may be mixed with 10–15 per cent. by weight of water instead of with about 25 per cent. which is the proportion generally used with such plaster for casting and moulding purposes.

It will be understood that the invention is not limited to composite materials in sheet form, but that various other shapes may be made which have the property that one or both coverings can be readily removed when desired. For example, a material suitable for cornices may be made in any of the ways described above, using coverings of curved or other appropriate cross section. Thus the material may be passed through rolls of the appropriate shape, means being provided after the rolls to hold and cut the moulded shape into the desired lengths.

The invention also includes composite board materials of the kind described having two or more distinct mineral cores. For example, a decorative core may be superposed on a plain core, with or without the interposition of a fibrous layer, which may if desired be perforated to allow the two cores to bond together directly over a portion of their area. A similar material may be made by attaching a composite board material made as described in any of the examples, during manufacture or as a separate operation, to another sheet such as a standard plaster board with or without its top covering.

Thus a core may be placed upon a bottom covering by a continuous sheeting method or otherwise, a composite board material made as described in any of the examples and comprising a decorative core being then applied to the unset core. It is also possible to use the preformed composite board material as a base and to apply the additional core and covering thereover.

The composite board materials of the present invention may be used in various ways in the finishing of walls, ceilings, floors and the like. For certain purposes and where one of the coverings is to be retained, this covering may advantageously be waterproofed, e. g. by application of an aqueous emulsion of bitumen before, during or after the manufacture of the composite board material, or a covering may be used comprising an inner layer of bitumen or the like.

As many apparently widely different embodiments of this invention may be made without departing from the spirit and scope thereof, it is to be understood that I do not limit myself to the specific embodiments thereof, except as defined in the appended claims.

I claim:

1. A plaster composite comprising a mineral core having at least one layer of fibrous material of sufficient strength, bonded thereto with sufficient firmness, to impart sufficient strength to the composite to enable it to withstand breakage during normal transport and handling, the said fibrous layer being capable of separation from said mineral core whereby the surface of said mineral core is exposed.

2. A plaster composite comprising a mineral core having at least one layer of fibrous material of sufficient strength, bonded thereto by means of a water-soluble adhesive with sufficient firmness, to impart sufficient strength to the composite to enable it to withstand breakage during normal transport and handling.

3. A plaster composite comprising a mineral core having at least one layer of fibrous material of sufficient strength, bonded thereto with sufficient firmness, to impart sufficient strength to the composite to enable it to withstand breakage during normal transport and handling, which fibrous material comprises a sufficient number of water-softening fibres to render the tensile strength of the fibrous material when wet sufficiently low that it can be removed without damage to the mineral core.

4. A plaster composite comprising a mineral core having bonded thereto a layer of fibrous material which comprises a sufficient number of water-softening fibres to render the tensile strength of the fibrous material when wet sufficiently low that it can be removed without damage to the mineral core and having a second layer of fibrous material of sufficient strength, bonded thereto by means of a water-soluble adhesive with sufficient firmness, to impart sufficient strength to the composite to enable it to withstand breakage during normal transport and handling.

5. A composite board material comprising a layer of water-setting cementitious material having on both sides relatively thin liners of fibrous material of sufficient strength, bonded to said cementitious material with sufficient firmness, to impart sufficient strength to the board to enable it to withstand breakage during normal transport and handling, at least one of said liners consisting of at least two plies united by a water-softening adhesive, the fibrous material between said adhesive and the cementitious material being of less thickness than the outer remaining part of the liner, said outer part being capable of separation from the inner part of the liner by the application of water and the inner part of the liner being sufficiently thin to enable it to be readily removed from the surface of the cementitious material by abrasion.

6. A composite board material comprising a layer of water-setting cementitious material having on both sides relatively thin liners of fibrous material of sufficient strength, bonded to said cementitious material with sufficient firmness, to impart sufficient strength to the board to enable it to withstand breakage during normal transport and handling, at least one of said liners consisting of at least two plies united so as to have a plane of weakness, the fibrous material between said plane of weakness and the said layer of cementitious material being of less thickness than the outer remaining part of the liner, said outer part being capable of separation from the inner part of the liner and the inner part of the liner being sufficientiy thin to enable it to be readily removed from the surface of the cementitious material by abrasion.

7. A composite board material as set forth in claim 5, in which said cementitious material consists of a colored plaster.

8. A composite board material as set forth in claim 5, in which said cementitious material has a cellular structure extending throughout the layer of said material.

9. A composite board material as set forth in claim 5, in which said cementitious material contains colored aggregates which can be abraded, after removal of the liner, to give a terrazzo surface.

10. A composite board material as set forth in claim 6, in which said cementitious material consists of a colored plaster.

11. A composite board material as set forth in claim 6, in which said cementitious material has a cellular structure extending throughout the layer of said material.

12. A composite board material as set forth in claim 6, in which said cementitious material contains colored aggregates which can be abraded, after removal of the liner, to give a terrazzo surface.

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