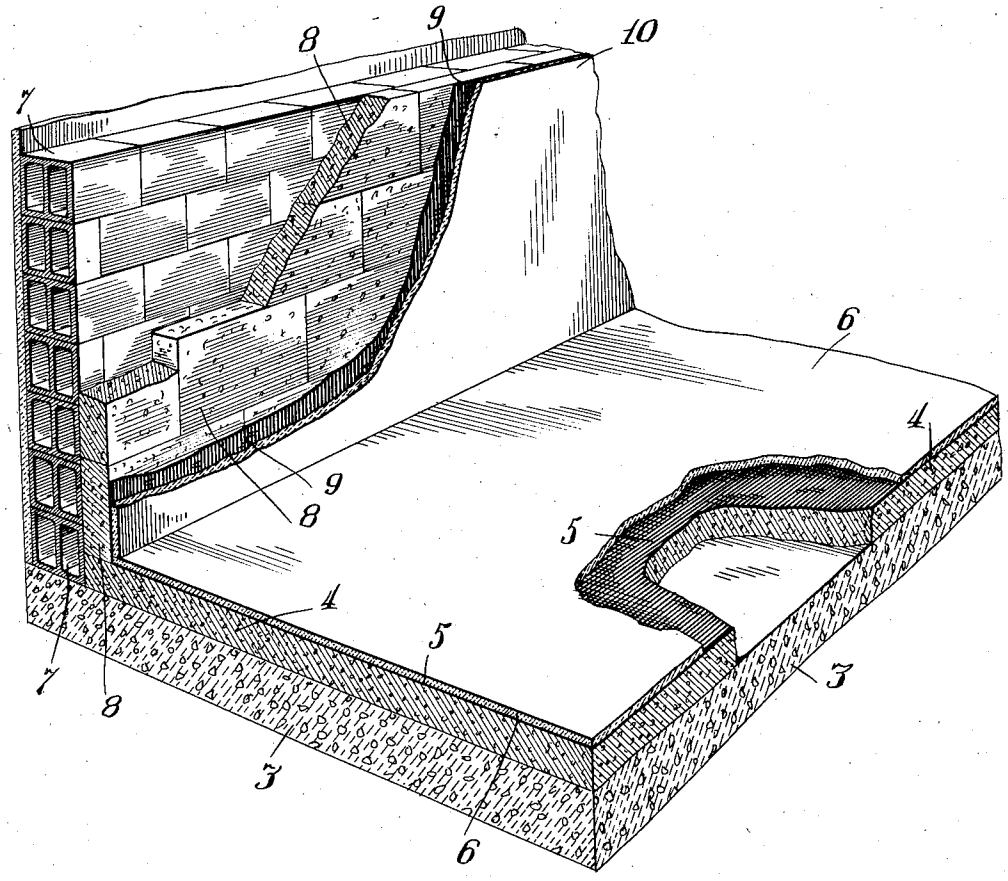
June 5, 1928. 1,671,995

W. K. NELSON

COMPOSITION CONSTRUCTION

Filed Oct. 1, 1927



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Patented June 5, 1928. 1,671,995

UNITED STATES PATENT OFFICE.

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COMPOSITION CONSTRUCTION.

Application filed October 1, 1927. Serial No. 223,294.

My invention relates to a composition construction for floors, roofs, walls or other structures wherein a coating of a cementitious material such as Portland cement, concrete, terrazzo or other composition is applied over a body of porous filling or insulating material such as cinder-concrete or cast cellular gypsum; and, it also relates to a novel and improved method of installing such constructions. My invention relates particularly to a construction wherein the cementitious coating is applied over a body of cast cellular gypsum insulating material of the type described in my Patent No. 1,641,641 issued September 6, 1927.

In constructions such as are commonly employed in modern buildings in the floors, roofs, walls, etc., a concrete deck or other supporting or protecting means is provided which is usually from three to eight inches in thickness. A body of porous filling or insulating material from two to eight inches in thickness is applied over or placed against the concrete deck or other supporting or protecting means. A topping or coating of cementitious material from one-half to two inches in thickness is applied over the filling or insulating material and then the cementitious material is trowelled down to provide a hard dense wearing or finished surface. A blanket of wet sawdust is usually applied over the cement and is permitted to remain for a period of seven to ten days to insure proper setting of the cement.

Great difficulty is experienced with such a construction in obtaining a lasting wearing surface, free of cracks, curlings, or other imperfections, on the cementitious coating or topping. If the filling or insulating material is fairly wet when the coating or topping of cementitious material is applied thereover, the under surface of the cementitious layer will remain in a fairly wet condition for an extended period of time while the exposed upper or outer surface thereof is subjected to fast drying after the blanket of sawdust has been removed. Under such conditions the drier upper or outer surface of the cementitious layer undergoes considerable contraction while the relatively moist under surface thereof does not similarly contract, and will even expand under certain conditions. Such unequal contracting forces, or contracting and expansive forces, present in the respective upper and lower portions of the cementitious layer, frequently cause a serious break-down in the structure. If the filling or insulating material is fairly well dried before the coating or topping of cementitious material is applied thereover, difficulty in retaining a sufficient amount of moisture in the cementitious layer for its proper setting and satisfactory bonding to the filling and insulating material, is encountered. The dry porous filling or insulating material quickly absorbs the water from the wet cementitious material which leaves the latter in a pasty, crumbly or weakened condition. If more water be added repeatedly to the cementitious material in an effort to obtain better trowelling and setting conditions, the process of absorption continues until the filling or insulating material thereunder reaches the saturation point in which case the conditions become similar to those of an originally wet filling or insulating material hereinbefore mentioned.

One of the objects of my invention is to provide a construction in which the coating or topping of cementitious material will set normally and properly, be bonded intimately to the filling or insulating material underneath and have a smooth, level wearing or finished surface in which no imperfections in the course of time will develop due to any residual moisture that may be present in the filling or insulating material.

A further object of my invention is to provide a novel method of installing a composition construction of the type mentioned wherein the passage of moisture from the porous filling or insulating material to the coating or topping of cementitious material or vice versa is controlled by the employment between the two materials of a film of such a nature and of such a thickness that proper trowelling conditions on the surface of the cementitious material will be provided, that only a small but a sufficient amount of moisture, carrying some of the cementitious material in solution or suspension, will penetrate the filling or insulating material sufficiently to insure the formation of a permanent bond between the two materials and that substantially uniform moisture conditions will be maintained throughout the cementitious material after setting thereof

thereby effectively preventing the development of forces injurious to or destructive of the structure.

The objects of my invention can be readily accomplished by spraying, or otherwise applying, a thin film of a suitable water-repelling agent, or hardening and water-repelling agent, on the dried or set up surface of the body of filling or insulating material before the coating or topping of cementitious material is applied thereover. The agent employed may comprise asphalt pitch, a suitable wax, such as paraffine wax, and a fluid, preferably a solvent of the aromatic series, such as xylol.

The preferred means by which I have produced my improved constructions are disclosed in the drawing and are hereinafter specifically described. That which I believe to be new and desire to cover by Letters Patent is set forth in the claims.

The figure of the drawing is a perspective view of fragmentary portions of a floor and a wall, each constructed in accordance with the principles of my invention.

The floor illustrated in the accompanying drawing comprises a deck 3, a body of filling or insulating material 4 installed over said deck, a film 5 of a suitable agent applied over the top surface of the body 4, and a coating or topping 6 of a suitable cementitious material.

The wall shown in the drawing comprises a protective tier or layer of hollow tile 7 laid in mortar, a tier or layer of cast porous mineral insulating blocks 8 laid in mortar or pitch against or adjacent the inner surface of the tile, a film 9 of a suitable agent applied over the inner surface of the blocks 8, and a coating or layer 10 of a suitable cementitious material.

The deck 3 may be made of any suitable supporting material. It will usually be from three to eight inches in thickness and be made of such material as concrete, brick, gypsum blocks or slabs, or planking. The protective tier or layer 7 of the wall may also be made of any suitable material and of any desired thickness, hollow tile being merely shown as an example of what may be used.

The filling or insulating bodies 4 and 8 may be of any suitable material or composition, for example, cinder-concrete or cast cellular mineral material. I prefer, however, to be employ cast cellular gypsum material of the type described in my aforesaid Patent No. 1,641,641. Each of the bodies 4 and 8 will ordinarily be from two to eight inches in thickness. The body 4 must withstand considerable weight and the composition therefor is preferably such that the dry cast material will weigh approximately twenty-four lbs. per cubic foot. The body 8 ordinarily will not be subjected to any severe strain and the composition therefor may be such that the dry cast material will weigh fifteen to eighteen lbs. per cubic foot. The bodies 4 and 8 may be cast in place or built up of pre-cast blocks or slabs. In the embodiments illustrated, the body 4 is shown as having been cast in place while the body 8 is shown as having been built up of pre-cast blocks, both bodies being made of composition material of the type described in my aforesaid patent.

The films 5 and 9 may be of any suitable water-repelling material, or any suitable hardening and water-repelling material, adapted to form a suitable hydrostatic barrier between the respective coatings or toppings 6 and 10 and the bodies of filling or insulating material thereunder. The films 5 and 9 may be made from various ingredients such, for example, as any one or various combinations of those mentioned in the following group: pitch, paraffine wax, carnauba wax, or other similar waxes, gum copal, gum dammar, or other similar gums, aluminum stearate or other metallic soaps, cut or dissolved in a suitable fluid such, for example, as any one or various combinations of the fluids mentioned in the following group: benzine, kerosene or any other solvent or cutting material from the aliphatic series, or xylol, solvent naphtha or any other solvent or cutting material from the aromatic series. A suitable agent for producing the films may also be made from any one or any combination of the ingredients mentioned in the first group and/or any one or any combination of the ingredients mentioned in the second group in combination with an emulsifying substance such as a soap or gum forming an emulsion with water. A satisfactory and inexpensive film can be made from a solution compounded in the following proportions and comprising 2 lbs. asphalt pitch, 2 lbs. paraffine wax and 1 gallon xylol. The films may be applied to the dry or set up surfaces of the respective filling or insulating materials in any suitable manner as, for example, by spraying, by mopping or by brushing the solution thereonto.

The coatings or toppings 6 and 10 ordinarily will each be from one-half inch to two inches in thickness and they may be made of any suitable cementitious material such as Portland cement, concrete, terrazzo or other composition.

A floor, wall or other construction made in accordance with my invention effectively overcomes the difficulties hereinbefore mentioned in connection with similar constructions heretofore in use. The film which is interposed between the coating or topping and the body of filling or insulating mate-

rial thereunder serves as an effective hydrostatic barrier between the two materials and effectively controls the passage of moisture from the coating or topping to the filling or insulating material thereunder and from the filling or insulating material to the coating or topping thereover.

The thickness of the film of the water-repelling agent employed will depend upon such conditions as the moisture content and the degree of porosity of the body of filling or insulating material. The film should be thick enough to bar the passage of an excessive or objectionable amount of moisture from one material to the other while at the same time is should not be so thick as to prevent the passage of a small but sufficient amount of moisture carrying some of the cementitious material in solution or suspension to penetrate therethrough and into the porous filling or insulating material thereunder to such an extent as to insure the formation of an intimate and permanent bond between the two materials and to provide proper trowelling conditions on the surface of the cementitious material. It has been found that a relatively dry filling or insulating material will require a slightly heavier film than that required for a comparatively moist or wet filling or insulating material due to the greater suction or absorption capacity of the first mentioned material.

Should the body of filling or insulating material be fairly wet, the film of water-repelling agent applied thereover will prevent any excessive or objectionable amount of moisture from leaving the body of filling or insulating material and entering the coating or topping of cementitious material and the moisture conditions of the latter, therefore, will be maintained substantially uniform throughout, thereby effectively preventing the development therein of opposing conditions which would tend to injure or destroy the cementitious layer by causing the surface thereof to crack, curl up or have other imperfections. However, the porous wet filling or insulating material, has sufficient suction or absorption capacity to draw through the film some of the moisture from the cementitious material thereby insuring, as hereinbefore described, the desired bond between the two materials and also providing proper trowelling conditions on the surface of the cementitious material by withdrawing sufficient water therefrom to permit trowelling without undue delay.

When the body of filling or insulating material is fairly well dried, the film of water-repelling agent applied thereover serves to check the relatively high suction or absorption capacity of the dry material, and the cementitious coating or topping applied thereover is not deprived, therefore, of moisture essential to its proper setting; and, in such case, the film of water-repelling agent maintains substantially uniform and satisfactory moisture conditions throughout the cementitious layer with the resultant advantage of preventing the serious defects in its surface hereinbefore noted. However, sufficient moisture from the cementitious layer penetrates the film and into the porous filling or insulating material underneath to provide, as I have heretofore explained, the desired bond between the two materials. The film also insures sufficient moisture being retained in the cementitious material to maintain the material at the desired plasticity and stiffness for proper trowelling of the surface.

A film of water-repelling agent as hereinbefore described also tends to harden the surface of the filling or insulating material over which it is applied. If the filling or insulating material be of the cast cellular gypsum type such as is described in my aforesaid patent, poured on the job, I prefer to apply the film as soon as the material has set up sufficiently to permit operations without danger of breaking down the cellular formation. On such an insulating or filling material the film can be applied ordinarily within twenty to thirty minutes after the material has been poured in place and, when that is done, the film maintains the coated surface of the insulating material in a hardened state due in some cases to the hardening properties of the film material and in all cases by preventing the excess or free moisture in the filling or insulating material from passing in any substantial amount through the treated surface which would cause said surface to be weakened.

By the use of a film of a water-repelling agent such as that hereinbefore described, filling or insulating materials in a dry state may be employed. This is advantageous in many installations, particularly when pipes, conduits, cables, electric wires and the like are to be imbedded in the filling or insulating material and it is desired to keep moisture away from them. Such a film also permits the use of a filling or insulating material of somewhat lighter weight because such a material is strongest when dry and, since the film prevents any excessive or objectionable amount of moisture from entering the filling or insulating material, the strength of the latter is not impaired.

While I prefer to employ constructions like those disclosed in my drawing and as above described, I wish to have it understood that I do not desire to limit my invention to the particular constructions shown and described, nor to the particular materials described, nor to the method specifically described, except only in so far as the claims are so restricted by the state of the art, since it is evident that changes may be made

without departing from the spirit of the invention.

I claim:—

1. A composition construction for floors, roofs, walls and the like comprising a body of cast porous mineral material having on one of its surfaces a thin film-like coating of a water-repelling agent, and a layer of cementitious material on the coated surface of said porous material, said materials being in intimate bond with each other and forming a monolithic structure.

2. A composition construction for floors, roofs, walls and the like comprising a body of cast cellular gypsum material having on one of its surfaces a thin film-like coating of a water-repelling agent, and a layer of cementitious material on the coated surface of said gypsum material, said materials being in intimate bond with each other and forming a monolithic structure.

3. A composition construction for floors, roofs, walls and the like comprising a body of cast porous mineral material having on one of its surfaces a thin film-like coating of a hardening and water-repelling agent, and a layer of cementitious material on the coated surface of said porous material, said materials being in intimate bond with each other and forming a monolithic structure.

4. A composition construction for floors. roofs, walls and the like comprising a body of cast cellular gypsum material having on one of its surfaces a thin film-like coating of a hardening and water-repelling agent, and a layer of cementitious material on the coated surface of said gypsum material, said materials being in intimate bond with each other and forming a monolithic structure.

5. A composition construction for floors, roofs, walls and the like comprising a body of cast porous mineral material having on one of its surfaces a thin film-like coating of an agent comprising pitch, wax and a fluid, and a layer of cementitious material on the coated surface of said porous material, said materials being in intimate bond with each other and forming a monolithic structure.

6. A composition construction for floors, roofs, walls and the like comprising a body of cast porous mineral material having on one of its surfaces a thin film-like coating of an agent comprising pitch, wax and a solvent of the aromatic series, and a layer of cementitious material on the coated surface of said porous material, said materials being in intimate bond with each other and forming a monolithic structure.

7. A composition construction for floors, roofs, walls and the like comprising a body of cast cellular gypsum material having on one of its surfaces a thin film-like coating of a solution comprising asphalt pitch, paraffine wax and xylol, and a layer of cementitious material on the coated surface of said gypsum material, said materials being in intimate bond with each other and forming a monolithic structure.

8. A composition construction for floors, roofs, walls and the like comprising a body of cast cellular gypsum material having on one of its surfaces a thin film-like coating of a solution compounded in substantially the following proportions and comprising 2 lbs. asphalt pitch, 2 lbs. paraffine wax and 1 gallon xylol, and a layer of cementitious material on the coated surface of said gypsum material, said materials being in intimate bond with each other and forming a monolithic structure.

9. In the method of installing a monolithic composition construction for floors, roofs, walls and the like comprising a body of cast porous mineral material coated with a layer of cementitious material, the step of controlling the passage of moisture from one material to the other by interposing between the two materials a film of a water-repelling agent and of such thickness that proper trowelling conditions will be provided in the cementitious material, that only a small but sufficient amount of moisture carrying some of the cementitious material in solution or suspension will penetrate the porous material sufficiently to insure the formation of a permanent bond between the two materials and that substantially uniform moisture conditions will be maintained throughout the cementitious material after setting thereof.

10. In the method of installing a monolithic composition construction for floors, roofs, walls and the like comprising a body of cast cellular gypsum material coated with a layer of cementitious material, the step of controlling the passage of moisture from one material to the other by spraying the surface of the gypsum material next to the cementitious material with a film of a hardening and water-repelling agent and of such thickness that proper trowelling conditions will be provided in the cementitious material, that only a small but sufficient amount of moisture carrying some of the cemtentitious material in solution or suspension will penetrate the gypsum material sufficiently to insure the formation of a permanent bond between the two materials and that substantially uniform moisture conditions will be maintained throughout the cementitious material after setting thereof.

11. A composition construction for floors, roofs, walls and the like comprising a body of cast porous mineral material having on one of its surfaces a thin film-like coating of a water repelling agent, and a layer of cementitious material on the coated surface of said porous material and bonded thereto by penetration of said coating by a portion

of said cementitious material into a portion of said porous material.

12. A composition construction for floors, roofs, walls and the like comprising a body of cast cellular gypsum material having on one of its surfaces a thin film-like coating of a water repelling agent, and a layer of cementitious material on the coated surface of said gypsum material and bonded thereto by penetration of said coating by a portion of said cementitious material into a portion of said gypsum material.

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