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PRODUCTION OF MARBLED CEMENTITIOUS FLOORS

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My invention relates to a process of preparing and laying floors of cementitious materials, such as magnesite composition or oxychloride cement flooring, with the object of obtaining, in the finished floor, a marbled effect, one wherein one or several colors or shades run irregularly but distinctly through the ground color, to give a sharply veined effect.

Oxychloride floors have been made for many years, and the process for making and laying them is well-known in the trade, but always heretofore, with one exception, they have been of solid colors. The user sometimes desired to avoid the monotony of a large expanse of solid color, as by a marbled or veined effect, but, with the exception mentioned, there has been no way known to accomplish such a result.

A brief outline of the typical method of laying such a floor will indicate why it has appeared impossible, with such a method, to obtain a marbled effect. Such a floor is laid in two applications; the first application is a bottom or scratch coat consisting of magnesite (magnesium oxide), saw dust, and concrete sand, mixed dry, and then mixed with a water solution of magnesium chloride, as a binder, of proper consistency. This bottom coat is spread and left overnight to set. Over this is spread the top or finish coat, and it is with this that the present invention is concerned. Such a finish coat consists of various filler aggregates (such as wood flour or saw dust, asbestos fibre, rock dust, talc) mixed dry with the magnesite, and then thoroughly mixed, by hoeing or a like operation, with a proper quantity of magnesium chloride solution (of 22 Baumé, preferably), until the proper consistency (rather like liquid mud) is attained. It is screened to eliminate lumps, and then is poured. It is immediately spread with a darby—a long wooden trowel—to an even thickness; immediately, and while the finish coat is still very liquid, workmen on knee boards (the support of which is the under coat) go over the floor with trowels to "straighten up" or smooth over the "mud." After the finish coat has set enough that it will not be deformed by men on flat boards, it is gone over with trowels to close up all pores, and to furnish a true and level floor. Again they are left to further set, and when quite hard the workman on flat boards again goes over the floor to "hard trowel" and scrape its surface. Other than smoothing with steel wool, waxing, and polishing, all of which is usually done the next day, the final step is the "ragging," which is in effect scrubbing the floor with a circular motion, with a rag dampened with the chloride solution, or with water. The precise sequence of operations, or the exact nature thereof, may vary somewhat, but the process is substantially as described.

It can well be believed, from the above outline of a typical floor-laying operation, that any veining or marbling of the surface coat, if any way were known to obtain the effect initially, would scarcely fail to become jumbled and indistinct from the various operations, and indeed this has been found to be the case. The fibres of asbestos, or of wood, in the filler, have been pulled out and across the still plastic surface, and this has accentuated the smearing resulting from the troweling, scraping and ragging operations, per se. It has been considered, therefore, that a true marbled or veined effect, wherein the veins stood out distinctly against the ground color, was impossible of achievement by the normal process of laying and finishing the floor in situ, or at a cost anywhere within the range of solid color oxychloride floors.

It has been possible to obtain such a marbled effect, in oxychloride floors, by a process known in the trade as the "jelly-roll" process, which is the one exception noted above, but this has never been considered entirely practicable commercially, and has never been used extensively, since it practically doubles the cost of such floors. Briefly, by that process a mix is made up, so stiff that a bucketful will slump but slightly; colors are distributed throughout it in veins; and slices are removed and laid or spread on the scratch coat; and then by repeated floating and scraping operations the slices are amalgamated into the floor, and its surface is finished by sanding. The mix is too stiff to be poured in situ, as in the normal solid color process, and because of the large amount of labor and skill required in the mixing, laying, and finishing of floors by the "jelly-roll" process, it has never been generally used, notwithstanding the recognized beauty and desirability of marbled floors.

I have discovered how such floors can be poured in situ to give an attractive and desirable marbled effect, yet by a process which is commercially practicable, in that it adds practically nothing extra for materials and adds but slightly to the labor cost of laying such floors, whereby such marbled floors can be laid at a cost only slightly in excess of the colored floors or plain floors of the same oxychloride materials, and by operations so similar to those now used that the

workman needs learn but little new, and must change his accustomed routine but slightly.

With these objects in mind, and others as will appear hereafter, my invention comprises the novel process and the novel final product, as hereinafter described and as will be more particularly defined by the claims which terminate this specification, wherein my invention is described as illustrated in a representative process.

Such oxychloride cement floors are normally made by mixing filling material and magnesite (magnesium oxide) in the dry state, and adding thereto an aqueous solution of magnesium chloride, to produce a thin batter which pours readily. The materials used in the present process, the resulting batter or mix, and the operations of mixing, pouring and finishing, differ but slightly if at all from those known and currently used. Commonly the dry mixture contains wood flour or particles, asbestos fibre, talc, rock or silica dust, and calcined magnesite (magnesium oxide); other ingredients may be barium carbonate and lithopone; color pigments are used as or when required. These are mixed together in known or desired proportions, and to the whole is added the dissolved magnesium chloride.

I do not propose to alter the essential ingredients nor the manner of mixing them with each other, nor with the water, except that long fibres and unduly particles are eliminated. Indeed, it is one of the virtues of this invention that no such changes are required, and the invention may readily be carried out by one familiar with laying such floors, the change being almost entirely in the technique of mixing in the vein-producing colors, and to a lesser extent in the laying and finishing of the floor. Since, however, the value of the invention is only realized when the physical form or nature of certain of the ingredients is altered, to adapt the mixture to the necessary manipulations of the process, the invention is subsidiarily concerned with the mixture and with the form of certain ingredients.

The wood flour heretofore used has included appreciable quantities of large fibres. I eliminate all such large fibres and employ wood flour screened to ten mesh or smaller. Likewise I eliminate all fibrous asbestos, and use only asbestos dust. The talc used is a fine dust. The rock dust used is of two sizes, as is customary, but instead of using some 30 mesh and some 100 mesh dust, I use the 30 mesh but eliminate the 100 mesh, and use instead 200 mesh. I also use a larger ratio of 200 mesh to 30 mesh, and in the whole mixture use more of the rock dust and relatively less of the wood flour. The magnesium oxide, the magnesium chloride, and the pigments are used substantially as in prior practice. The ingredients differ from known ingredients chiefly in that fibrous forms are largely supplanted by finer dust-like forms, and the mixture differs from the normal mixture chiefly in that it is finer and smoother, and has no separable fibres or particles to mar its surface smoothness or appearance when it is troweled or scraped.

One new material is preferably added to the mixture; that is zinc stearate, which is used to maintain a uniform color and to give a smoother or "slicker" surface in the final finishing steps. Its use is optional, however. It is not chemically pure, and hence affords a base or ground color somewhat off white, which is usually desirable, and which gives a pleasant background for contrast with the veining colors, or it may itself be colored.

In carrying out the process the filling materials and the magnesite are mixed together, and are mixed with the magnesium chloride liquid binder, as before, to make a thin batter or thick liquid mixture that will pour readily. This we may designate the base mixture. If it is desired that the base color be other than the natural color of the mixture, the desired color pigment is mixed into the base mixture, or with the filling materials prior to their admixture with the binder. The colors or shades desired in the veining are mixed separately with a quantity of the base material, and when the workman is ready to pour the floor, a small quantity of each of the colors, which is to be employed for the veining, is dropped into a large container full of the base material.

Let us assume that the colors to be used in the veining are red, which is to predominate, and black. A small dipper of red, let us say a tablespoonful or two, is dropped into several gallons of the base material, and likewise a tablespoonful or two of black is dropped into the base material, but preferably the red and the black are dropped in at different points, and are initially kept separate. The workman then, with his hands and fingers, combs the colored veining liquid through the base material and thus somewhat streaks the red through or mixes it with the base material, since the red is to predominate in the veining. This does not alter the base color, as might be supposed, and as might occur if the color were mixed in earlier or more vigorously, or were permitted to stand. Instead, the red becomes streaked throughout the base material, but remains distinct therefrom. After mixing in the red the black is similarly mixed. The mixture is not violently stirred in this mixing step, but the colored material is moved or combed through the main body of the batter-like base material, to spread it in streaks or veins throughout the body of the liquid. It is immediately poured upon the floor, spreading it in the usual manner from the large container, and as it spreads upon the floor it approximately levels down, being of a pourable, substantially self-leveling consistency when poured, but there are still ripples and uneven spots. However, the veining appears, since the base material and the colors which have now been streaked through the base material pour out without material intermingling, and in the infinitely varied streaked relationship that they assumed in the container prior to pouring.

When the entire floor, or an appreciable area thereof, has been poured in this manner, the surface is lightly troweled, using knee boards, to expedite the self-leveling action of the batter; this is accomplished before the material has set to any appreciable degree of hardness, but is done lightly so that only the surface is disturbed. This levels up the ripples and the principal unevennesses of the floor, but is in no sense an attempt to product a finished surface. It is merely a leveling off process, with the material still in a quite liquid and very plastic mud-like form. Because the material is in this form the surface is smeared over and the colors in the surface intermingle to such an extent that it appears that the veining is completely destroyed; no distinct veining remains on the surface, but it appears smeared or smudged.

The destruction of the graining is, however, merely a surface effect, and after thus preliminarily troweling off the surface the flooring is

permitted to set until it will support the weight of a workman on flat boards laid upon its surface. It is not completely hard, and in this condition its surface is hard troweled, and scraped with the edge of a trowel, to remove the surface film in which graining has been destroyed, and to leave instead the grained appearance immediately beneath this surface film. This also levels off the floor, and leaves it comparatively smooth and flat. The zinc stearate, when used, is employed to maintain more uniform color throughout the floor and to assist in giving the floor a smoother appearing surface.

It should be pointed out here that the principal reason for eliminating fibrous material and substituting finer materials in the aggregate, is to avoid any possibility, in this scraping step, of pulling out individual fibres and dragging them out across the still somewhat plastic floor, causing smearing and scoring of the surface, and leaving the surface porous in the interstices from which the fibres have been pulled. With fine mesh materials the surface is left smooth, and there is nothing to disturb the surface during the scraping operation.

After the scraping operation has been effected the floor is ragged, then left to harden completely, and is then finished. By this time it is sufficiently set that these operations do not mar its surface. A beautiful veining effect appears, in which the veining colors—red and black in the instance chosen—are intermingled in an irregular and altogether realistic appearing pattern, simulating marble. This effect is entirely through the finish coat, hence it does not disappear as the floor wears, but lasts as long as the floor itself.

It is preferred that the veining color or colors be added to the base material just prior to pouring the base material upon the floor, and that the material be handled or disturbed a minimum after veining or streaking and before pouring. In that way the most sharply defined veins may be produced. However, it may be preferred in some instances, or it may not be objectionable, to produce a somewhat less sharply defined veined appearance, possibly an appearance bordering on a cloud-like appearance, in which the veining or modifying colors do not appear sharply distinct from the base material, yet are distinguishable throughout it. Whenever such a condition obtains it is possible to mix the veining or modifying colors into the base material when the latter is in the mixing box, and then to streak the modifying colors through the base material by a few strokes of a mixing hoe. The material is then poured in place before it sets, yet may stand for a longer time after mixing than it would stand if the veining colors were poured into a smaller container and poured immediately upon the floor. This longer period of standing, and the additional handling before it reaches the floor and is poured, may permit some dissemination of the modifying colors throughout the base material, and may produce less distinct veins, yet still there will be a breaking up or modification of the solid base color, which in some instances may be all that is necessary. It is therefore within the broad scope of the invention, as defined in the claims hereafter, to mix the veining colors into the mixing box as a container, rather than into a smaller container.

What I claim as my invention is:

1. An oxychloride cement mixture for use in making a structure surface, including as an ingredient zinc stearate.

2. In the production of cementitious surfaces, those steps in the process of producing a marbled effect, which comprise streaking a small quantity of colored veining material throughout a relatively large quantity of cementitious base material of pourable, substantially self-leveling consistency, pouring the base material in such state upon its ultimate support, and after it has set to a fairly hard condition but before substantial completion of its setting action, performing the final major smoothing and surface removing operation on its exposed surface.

3. In the production of cementitious floors in situ, those steps in the process of producing a marbled effect, which comprise streaking a small quantity of colored veining liquid throughout a relatively large quantity of thick liquid, cementitious, base material of pourable, substantially self-leveling consistency, pouring the base material in such liquid state upon its ultimate floor support while the color streaks therein remain sharply defined, and, after it has set to a fairly hard condition but before substantial completion of its setting action, scraping a thin surface layer of the poured material from its entire exposed upper surface, as the final major smoothing and surface removing operation.

4. In the production of cementitious surfaces, those steps which comprise admixing cementitious material with sufficient water to produce a thick liquid mixture of pourable, substantially self-leveling consistency, thereafter streaking veining colors by combing action throughout a container of liquid mixture, then pouring the mixture in such liquid state from the container upon the ultimate support while the color streaks therein remain sharply defined, troweling the surface lightly while the material is still soft to true the substantially self-leveled surface of the mixture but to leave the color streaks immediately below the surface sharply defined, and, after it has set to a fairly hard condition but before substantial completion of its setting action, scraping a thin surface layer off the entire exposed surface, as the final major smoothing and surface removing operation, to expose the veining beneath the lightly troweled surface.

5. In the production of oxychloride cement floors in situ, those steps which comprise admixing material including calcined magnesite and magnesium chloride with sufficient water to produce a thick liquid mixture of pourable, substantially self-leveling consistency, thereafter streaking colored veining material by combing action throughout a container of the liquid mixture, pouring the mixture in such liquid state from the container upon the ultimate support, and, after it has set to a fairly hard condition but before substantial completion of its setting action, scraping the entire exposed surface, as the final major smoothing and surface removing operation.

6. In the production of oxychloride cement floors, those steps which comprise admixing filling material and calcined magnesite in a dry state, admixing therewith a magnesium chloride solution in sufficient water to produce a thick liquid mixture of pourable, substantially self-leveling consistency, thereafter streaking veining colors by combing action throughout a container of the liquid mixture, then pouring the mixture in such liquid state from the container upon the ultimate support while the color streaks

therein remain sharply defined, troweling the floor surface lightly while the material is still soft to true the substantially self-leveled surface of the mixture but to leave the color streaks immediately below the surface sharply defined, and, after it has set to a fairly hard condition, but before substantial completion of its setting action, scraping a thin surface layer of the poured material from its entire exposed upper surface, as the final major smoothing and surface removing operation, to expose the veining running throughout the floor beneath the lightly troweled surface.

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