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METHOD OF PLASTERING WALL SURFACES AND JOINT SEALING COMPOUND USED THEREIN

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This invention relates to a joint compound and method, and more particularly, to a material useful in filling in the edge spaces between gypsum panels.

Gypsum panels are widely employed in developing interior surfaces of rooms, i.e., walls, ceilings, soffets, etc. These panels are nailed to the framing studs or joists and conventionally are of considerable size, i.e., 4′ x 8′. Where these panels abut, it is necessary to employ a filling compound or cement, so as to provide a smooth interior surface. A number of problems have characterized the previously used joint compounds. One special vexatious problem is that of "edge cracking." In this, there is a visible line of demarcation between the compound and the panel, which "photographs" through the overlying paint or plaster. Also, where plaster is used, previously employed joint compounds have not provided the requisite anchor or key to integrate the plaster with the underlying compound. Still further, previously employed compounds have not been uniformly applicable by widely employed automatic tools. Still further, the previously employed joint compounds were unable to be maintained in a wet stage for any substantial period without deterioration.

It is, therefore, an object of this invention to provide a compound and method which avoids the shortcomings characteristic of the prior art. More specifically, it is an object of the invention to provide a joint compound and the method of installing the same as part of a plastering operation that results in an extremely sturdy joint between adjacent gypsum panels. Other objects and advantages of the invention may be seen in the details hereinafter given.

I have found that a specific formulation involving a filler, binder and adjuvant provides the advantages lacking in the previously employed compounds. The optimum formulation is set forth below.

FORMULATION

	Percent
Calcium carbonate	84
Mica	7
Asbestos	4
Talc	1
Total filler	96
Polyvinyl acetate	2¼
Polyvinyl alcohol	¾
Total binder	3
Methyl cellulose	0.6
Potassium tripolyphosphate	0.3
Sodium acetate	0.1
Total adjuvant	1
	100

The above formulation is useful both in conventional "drywall" and in thin coat plaster finishing. In drywall the exposed surfaces of the gypsum panels (the gypsum core being sandwiched between paper liner) are exposed for decorating covered with paint. Such panels usually have square edges and the joints between panels are finished by applying a perforated tape and a joint compound. In the thin coat plaster, the gypsum panels may

have tapered edges and have applied thereto a thickness of about 1/16″ of a relatively hard plaster such as that disclosed in the application of Hansen and McNulty, Ser. No. 370,661, filed May 27, 1964, now U.S. Patent 3,198,858. The procedure of application advantageously follows the U.S. patent to Hobson, 3,035,940, issued May 22, 1962.

An example of the latter procedure is set down below.

EXAMPLE

Initially, a wall surface, including ceilings, was installed using gypsum wallboard having high suction paper similar to that used in gypsum lath. The board was made in 4′ widths and 8′ lengths with the long edges of the board tapered to form a channel to permit ready application of tape and joint compound to reinforce and conceal the joint. In this example, the taping paper and four taping coats were installed using conventional Ames taping tools. After all of the joints, angles and nail heads were treated, a thin coat of high strength gypsum plaster was spray applied over the entire surface. When this coat had set, a second coat was applied and when set, the loose particles of sand were merely scraped off to provide a suitable surface for decoration.

The joint compound was made up in a quantity of 2500½ lbs. as follows (dry basis): 2100 lbs. No. 3 Whiting calcium carbonate obtained from Thomson Weinman & Co., 180 lbs. Mineralite M–260 mica from Mineralite Sales Corp., 98 lbs. of #7RF–10 asbestos from Carey-Canadian Mines Ltd. and 25 lbs. of Mistron Monomix Talc from Sierra Talc Co., were mixed to provide the filler. 57 lbs. Gelva Powder 702 (polyvinyl acetate) from Shawinigan Resin Corp., and 19 lbs. #20–30 BP (polyvinyl alcohol) from Shawinigan were mixed to provide the binder. The adjuvant included 14 lbs. of #4000 HG–65 Methocel obtained from Dow Chemical Co., and 5¾ lbs. potassium tripolyphosphate from Kraft Chemical and 1¾ lbs. anhydrous sodium acetate was obtained from Kraft Chemical Co. The abovementioned dry ingredients making up the filler, binder and adjuvant were suitably blended and mixed with water to the consistency normally used in Ames taping tools. This compound and the tape were installed in conventional manner and within one day the joints were dry and finished, so as to permit the abovementioned plaster spraying.

I find that to achieve the advantageous integration of the joint cement with the gypsum panels, the characteristic of the filler should follow that of the optimum formulation set forth above, particularly relative to mica and asbestos. This is helpful not only in the plastering procedure set forth in the above example, but, also in the dry wall operation where crackless joints are mandatory. For the asbestos, I find the fiber should be of such a length (dry) as to have slightly under 50% retained on a 35 mesh Tyler sieve. The actual distribution of fibers was as given in Table I below:

Table I

Mesh size:	Percentage retained
14	Trace
28	2.0
35	40.0
100	35.0
200	1.5
Pan	16.5

The bulk density of the asbestos fibers was about 10.5 lbs. per cubic foot and the wet volume (settling rate for fibers of a given weight and a given quantity of water) was two hours for 10 grams in 500 cc. of water and four hours for 50 grams in 2000 cc. of water.

The absorbability of the asbestos was determined in a number of ways to characterize the optimum formulation.

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According to the McMichael test, described in ASTM D–115 52T, the dial reading was 33 for oil absorption. For water absorption, the water retained in the fiber after a given drainage time was about 50% higher than in comparable finest grade short fiber asbestos products. This was further confirmed using altair with a F.E.P. viscometer indicating the asbestos is effective to decrease fluidity of the vehicle employed.

As to the mica, the chemical analysis and physical characteristics were those set down in Table II.

Table II

Loss on ignition	3.20
SiO_2	79.10
Al_2O_3	18.15
K_2O	3.64
CaO	1.08
MgO	.41
TiO_2	.25
P_2O_5	.05
Fe_2O_3	--
Moisture	--
Specific gravity	2.7
Hardness	2.5–3.0
pH	6.3
Through 325 mesh	90%
Oil absorption (spatula method)	29–31 (40–70=normal)

Relative to the binders, the polyvinyl acetate had an average particle size of 15 microns with a maximum of about 60 microns, with 20 parts of the polyvinyl acetate added to 100 parts of emulsion, the Brookfield viscosity at 25° C. was 2335 cps. The polyvinyl alcohol had a viscosity of 4–6 centipoises at 20° C. in a 4% aqueous solution. The polyvinyl alcohol was hydrolyzed to about 87–89% and had an average meticulate weight of about 10,000.

Relative to the adjuvant, the methyl cellulose served the function of a thickener and advantageously the methyl cellulose was a hydroxypropyl-substituted cellulose. The phosphate served as a dispersing agent while the sodium acetate served as a plasticizer for the polyvinyl alcohol. However, since water actually does the plasticizing, the great hygroscopicity of the sodium acetate imparts softness to the polyvinyl alcohol.

Among the advantages provided by the illustrative joint compound, I find that it gives an excellent bond to the overlying thin coat plaster. It is used advantageously in Ames taping tools and does not "photograph" through the thin coat plaster. Its working characteristic is fully equivalent to that of the best available joint compounds and can be applied in either a dry powder form or ready-to-use form. The joint compound is coverable with conventional wall and ceiling paints with no evidence of discoloration.

While in the foregoing specification, a detailed description of the invention has been set down for the purpose of illustration, many variations in the details herein given may be made by those skilled in the art without departing from the spirit and scope of the invention.

I claim:

1. A joint compound for filling the edge spaces between gypsum panels consisting essentially of about 96% filler, about 3% binder, and about 1% adjuvant,

said filler being about 84% calcium carbonate, about 7% mica, about 4% asbestos, and about 1% talc, said mica having a particle size of the order of 325 mesh, said asbestos having a fiber length such as that slightly under 50% is retained on 35 mesh, and a relatively high oil absorbability,

said binder being about 2¼% polyvinyl acetate and about ¾% polyvinyl alcohol,

said adjuvant being about 0.6% of a methyl cellulose thickener, about 0.3% of a polyphosphate dispersing agent, and about 0.1% of an acetate plasticizer.

2. A method of plastering wall surfaces comprising installing gypsum panels in edge abutting relation to provide a wall surface, sealing the joints defined by abutting edges with a compound consisting essentially of about 96% filler, about 3% binder, and about 1% adjuvant,

said filler being about 84% calcium carbonate, about 7% mica, about 4% asbestos, and about 1% talc, said mica having a particle size of the order of 325 mesh, said asbestos having a fiber length such as that slightly under 50% is retained on 35 mesh, and a relatively high oil absorbability,

said binder being about 2¼% polyvinyl acetate and about ¾% polyvinyl alcohol,

said adjuvant being about 0.6% of a methyl cellulose thickener, about 0.3% of a polyphosphate dispersing agent, and about 0.1% of an acetate plasticizer, and

spraying plaster over said panels and joints to a plaster thickness of the order of about 1/16".

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