

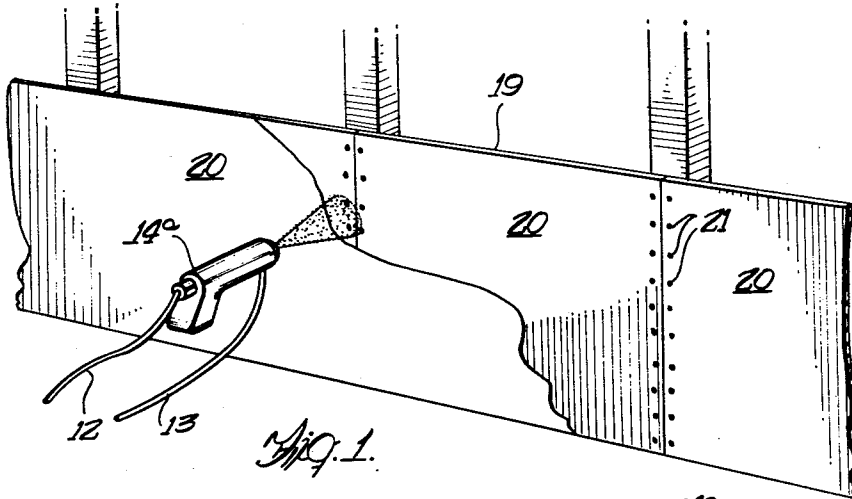
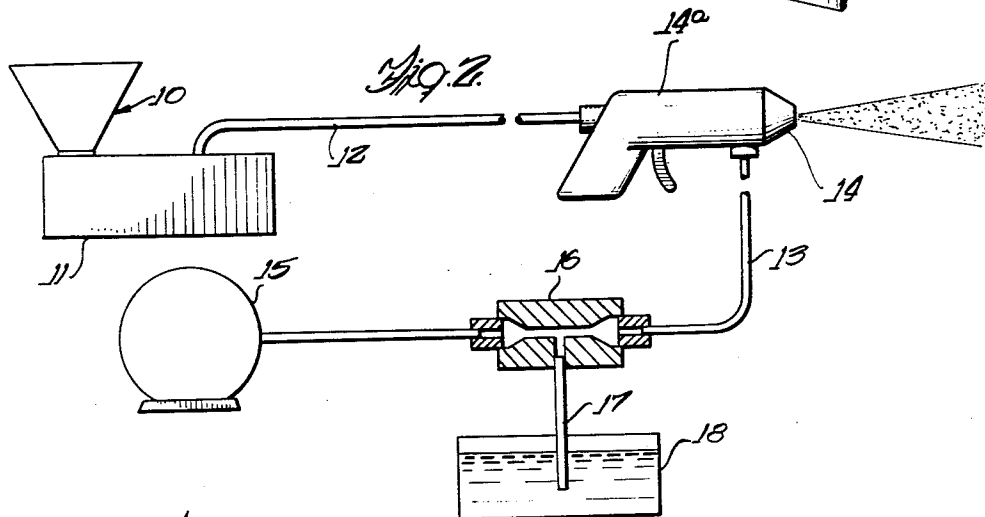
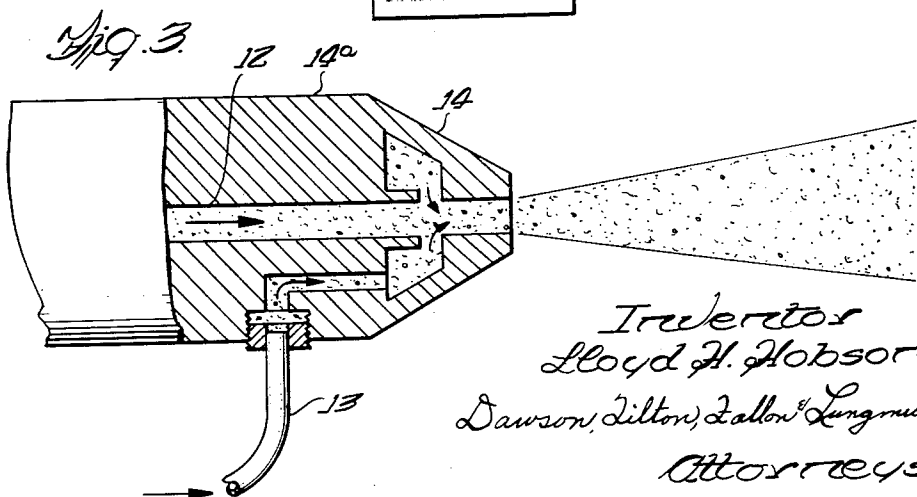
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METHOD OF APPLYING PLASTER

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1

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METHOD OF APPLYING PLASTER

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This invention relates to a method of applying plaster, and, more particularly, to a method of applying plaster to wallboard and the like.

Wallboard has become widely used as a substitute for plaster, especially in housing and associated construction. Generally, the wallboard includes an inner core of gypsum encased between outer liner or facing sheets made of paper. The wallboard is deemed desirable since its installation ordinarily results in savings, particularly in labor, over an equivalent plaster coat. However, even with the use of wallboard, there is substantial labor still involved. This occurs particularly in the covering of the seams or joints between adjacent panels and covering of the heads of the nails employed to secure the wallboard to studs or other interior wall-supporting surfaces. The covering of the seams and nailheads is particularly undesirable from the standpoint of the time that it consumes. Usually, several applications of covering material are required, this in addition to the tape usually employed. This results in extension of the time needed to complete the house or other structure, since it is necessary that the seam-covering material be adequately hardened or set prior to the time painting of the wall is performed.

This type of operation has suffered from another drawback in that the covering for the nailhead portions of the wallboard is frequently ineffective to resist any tendency the nails have to pop out of their places, so that the interior wall may become unsightly.

In view of this, it is seen that it would be desirable to provide a better covering for wallboard, especially if the same could be performed at less cost, or at least at no more cost, than the present operation. Desirably, this additional coating would include plaster, i.e., a gypsum material, to provide the requisite hardness, but therein has lain a difficult problem. The plaster, when used in an economically thin layer, has suffered from the drawback of drying out prior to setting, so that the desired hard layer of plaster is not achieved, but rather a readily frangible coat results.

It is an object of this invention to provide a novel method of applying plaster that overcomes the disadvantages and drawbacks set forth above, and particularly one which avoids the "dry out" problem and thus makes it feasible to apply plaster to "dry wall" construction.

Another object is to provide a novel plastering method in which a minor quantity of an accelerator material is incorporated into a flowing stream of plaster just before the plaster is applied to a wall, or the like.

Still another object is to provide a novel plastering method in which a thin plaster coat—of the order of less than about one-eighth inch—is applied to wallboard which is characterized by a hard finish, i.e., a high degree of crystallization.

Other objects and advantages of this invention may be seen in the details of construction and operation set forth hereinafter.

The invention will be explained in conjunction with an illustrative embodiment in the accompanying drawing, in which—

FIG. 1 is a fragmentary perspective view of spray equipment embodying features of the invention and which illustrates the application of plaster to wallboard;

FIG. 2 is an elevational view, partially in section, of

2

the apparatus seen in FIG. 1 and which features a Venturi-like connection facilitating the introduction of accelerator material into an air stream; and

FIG. 3 is a fragmentary elevational view, partially broken away, of the nozzle portion of the apparatus seen in FIG. 1 and wherein an air stream and a fluid plaster stream are combined just prior to application to a wall or other like surface.

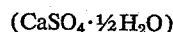
In the illustration given, and with particular reference to FIG. 2, the numeral 10 designates generally a reservoir or hopper of plaster which has been combined with water in suitable quantity to make the stream flowable. Fluid plaster from the hopper 10 is pumped therefrom by means of a pump 11 into a conduit 12. The conduit 12 joins with a second conduit 13 and at a point just prior to the nozzle 14. The conduit 13 leads from an air compressor 15 which is equipped with a Venturi fitting 16 between the compressor 15 and the nozzle 14. Communicating with the interior of the conduit 13 at the Venturi 16 is a subconduit 17 leading to a tank 18. The tank 18 is filled with an accelerator material and the reduced pressure in the Venturi fitting 16 is effective to aspirate fluid from the container 18 through the subconduit 17 into the main conduit 13. For this purpose, the nozzle 14 may be provided as part of a spray gun 14a of conventional design.

The fluid plaster entering the nozzle 14 from the line 12 and the air from the conduit 13 which entrains a certain amount of the accelerator material from the container 18 are mixed in the nozzle 14 and are applied to the surface of a wall 19, which is seen to be equipped with a plurality of wallboards 20, the wallboards 20 being anchored by suitable nails as at 21.

Illustrative of the practice of this invention are the following:

EXAMPLE I

For covering wallboard, I provide a fluidized plaster mix having a consistency of about 45 and a setting time of about 2 hours. The consistency referred to means that the plaster will be suitably fluidized when 45 lbs. of water are added to 100 lbs. of the calcined gypsum



This is the material provided in the hopper 10, and the 2-hour set time is achieved through the use of a suitable retardant. The retarder is frequently incorporated into the gypsum by the manufacturer and, depending upon the amount so incorporated, different set times are achieved.

The material is pumped from the hopper 10 to the nozzle 14, where it is combined with a 25% solution of ammonium sulfate. For this purpose, the plaster is fed at the rate of about $\frac{3}{4}$ gallon per minute, while 3 oz. of the 25% solution of the accelerator are employed. The air pressure ranges between 40 and 50 p.s.i., and the air flow rate is about 15 cu. ft. per gallon of plaster.

The plaster stream thus achieved was sprayed onto U.S. gypsum wallboard, and, under the conditions above given, it was found that the $\frac{1}{16}$ " thick coating was adequately set in about 10 minutes.

EXAMPLE II

In another example, I employed a 3-hour setting gypsum which was to be sprayed at the rate of $\frac{3}{4}$ of a gallon per minute. In achieving a superior coating for gypsum wallboard, I fed 2 oz. of a 33% solution of ammonium sulfate to the fluid plaster just as the same was exiting from the nozzle. This resulted in a setting time of approximately 30 minutes.

In most cases, a setting time of the gypsum in situ can range up to about 45 minutes through the use of a

satisfactory amount of an accelerator material. However, in some arid climates where evaporation is greater, more accelerator material should be employed so as to reduce the setting time to not over 15 to about 20 minutes.

A comparison of the costs involved in the procedure previously employed for installing wallboard and that embodying teachings of this invention can be seen from the table below.

Table
COSTS IN CENTS PER SQUARE FOOT

Item	Old Method	Inventive Method
Wallboard.....	6.0	5.25
Labor—board installation.....	3.0	3.0
Board finishing materials.....	0.5	2.0
Finishing labor.....	3.0	1.5
	12.5	11.75

Where there is a complete covering for the wallboard, as in the inventive procedure, it is possible to employ the less expensive, unglazed type of wallboard. The cost of finishing the board is less expensive, in so far as materials are concerned—in the older method, the cost of tape and the "sealing mud" being less than the cost of the gypsum in the plaster. However, there is considerably greater expense in the labor of taping and applying "mud" than there is in spraying the plaster onto the wallboard. Outstanding advantages accrue from the inventive method in that there is no "nail popping," and further the prolonged delay between installation of the board and painting is avoided, the painting being possible to be performed in the inventive procedure some hours after the wallboard is installed, which results, in the least, in a saving of three days.

In the inventive procedure, a variety of accelerator materials may be added to the plaster which has been previously equipped with a retarder. The retarder itself, as pointed out above, is frequently incorporated into the calcined gypsum during the process of its manufacture. Most frequently, retarders are by-products of the meat packing industry, being derived from the cattle hooves, horns, etc.

The accelerators most frequently are selected from a group of soluble sulfates such as the ammonium, potassium, and aluminum salts. In some instances, uncalcined gypsum ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$) may be employed. The uncalcined gypsum is not soluble, and hence presents a problem of achieving a uniform dispersion within the plaster stream. Of these, I prefer the ammonium sulfate as an accelerator, since it is quite soluble, upwards of 60% solutions being feasible, and it has a minimal corrosive effect on any metal parts which are associated with the wall.

Excellent results are obtained when the accelerator is incorporated into the plaster by virtue of the disseminating air stream and where the air is provided in a quantity sufficient to uniformly disperse the accelerator throughout the fluid plaster.

The plaster itself is desirably retarded in its setting capacity from about 1 to 4 hours. Ordinarily, a setting time of 4 hours is employed in past operations, since this minimizes the number of times the equipment has to be washed out during a work day. However, plaster having such a set will not be effective as a covering for wallboard, and the like, since the thicknesses employed, less than about $\frac{1}{4}$ ", dry out so rapidly as to preclude sufficient crystallization which is necessary for the compressive strength of the gypsum to be realized. However, with 40 to 45 consistency gypsum, I find that through the inventive process it is possible to achieve compressive strengths of the order of 3500–4500 p.s.i.

In the foregoing table, a further comparison can be

made for the instance where the procedure employing an accelerator is used but where the plaster is applied by hand—as by a hawk and trowel. I find that in such a case the cost per square foot of applying the plaster coat amounts to some 3.5¢, which brings the cost of a plaster coat to somewhat more than that encountered when tape and "mud" are employed.

Contributing to the greater expense in the manual procedure is the fact that the quick setting time precludes the mixing of any substantial quantity of the plaster. For example, when a 10-minute set is specified, only that quantity of plaster can be mixed which the plasterer can apply within 10 minutes. Thus, the plasterer is spending considerable time making up small batches of the plaster and washing out his equipment. From this, it will be appreciated that spraying provides definite operational advantages, since set times of considerably longer periods can be employed in the reservoir 10, the abbreviation of the set time occurring only as the plaster leaves the nozzle 14.

After a thin plaster coat, i.e., of the order of $\frac{1}{32}$ "– $\frac{1}{8}$ " has been applied, it is thereafter possible to finish the plaster coat as desired. I find it advantageous to provide a set time in the accelerated plaster of from about 15 to 45 minutes, which is adequate for the plasterer to suitably finish the corners as by the use of an angle trowel and also to finish the remaining surface as by floating it through the use of rubber or sponge floats, troweling, etc. It is especially desirable to trowel between boards to insure a satisfactory joint, and this is readily effected when the set times are of the order indicated.

I prefer to alter the set characteristics of the final plaster stream through varying the concentration of the accelerator material within its water solvent. The same variation can be achieved by varying the amount of the accelerator solution employed, but I find it simpler to change the formulation rather than the amount.

The inventive procedure may also be advantageously employed in providing a scratch coat over metal lath. The scratch coat is provided on the lath in order to reinforce the same for the application of subsequent coats of plaster. In conventional practice, the scratch coat is put on the lath and allowed to dry until the following day, after which the second or brown coat is applied. By this time, the scratch coat has set sufficiently so that the brown coat can be smoothed without affecting the lath configuration. It will be appreciated that the lath, being somewhat resilient, needs to be stiffened in order to permit the smoothing. In the case of the scratch coat, the thickness employed is of the order previously indicated as useful for covering wallboard—about $\frac{1}{8}$ inch measured outward of the surface to be covered, in this case, the exposed lath surface. With lath, however, a certain amount of plaster extends inwardly through the lath apertures to provide the desired "keying" action—which may amount to an additional $\frac{1}{4}$ inch of plaster thickness. When the plaster is sprayed on the lath in accordance with the inventive procedure to provide the scratch coat, the set is correspondingly more rapid so that it is no longer necessary to let a day elapse before the second or brown coat can be satisfactorily applied. Setting times of the order realized with wallboard can be achieved in this instance, which means that the time savings in the development of a complete plaster surface over metal lath are substantial.

While, in the foregoing specification, I have set forth a detailed description of embodiments of the invention for the purpose of illustration thereof, many variations in the foregoing details may be made by those skilled in the art without departing from the spirit and scope of the invention.

I claim:

1. In a method of applying fluid gypsum plaster, the steps of incorporating a retarding material into the plaster to delay the setting time thereof, flowing plaster through

5

a conduit toward a discharge nozzle, just prior to discharge of said plaster incorporating an accelerating material therein, and projecting the accelerated plaster onto a surface.

2. The method of claim 1 in which said plaster has incorporated therein an amount of retarder material sufficient to provide a set from about one to four hours and in which an amount of accelerator material is added to result in a plaster set of less than about forty-five minutes.

3. The method of claim 2 in which the accelerator material is added in a quantity sufficient to provide a set of about 15 to 30 minutes.

4. In a method of applying gypsum plaster to wallboard, and the like, the steps of providing a fluid plaster having a retarder incorporated therein, flowing the said plaster through a conduit, just prior to discharge of said plaster incorporating air therein, said air having entrained therein a minor quantity of an accelerator material, and projecting the accelerated plaster onto a surface.

5. The method of claim 4 in which about 15 cubic feet of air is employed for each gallon of plaster.

6. In a method of applying gypsum plaster to wallboard to finish the same, the steps of providing a stream of fluid plaster material having a setting time of about 1-4 hours, incorporating into said stream just before discharge thereof an amount of accelerator material sufficient to reduce the set time to less than about 45 minutes, and projecting the accelerated plaster stream to a wall surface in an amount resulting in a thickness less than about $\frac{1}{8}$ inch.

6

7. The method of claim 8 in which the said wallboard is a gypsum board comprising a gypsum core equipped with outer paper sheets.

8. The method of claim 6 in which said accelerator is previously incorporated into an air stream and the air stream is thereafter incorporated into the plaster stream.

9. In a method of applying a gypsum plaster to a surface, the steps of providing a fluid plaster including gypsum and a retarder for said gypsum to provide a gypsum setting time of above one hour, pumping the fluid plaster through a conduit toward a discharge nozzle, incorporating an air-borne accelerator into the fluid plaster when the same is in the nozzle so as to reduce the setting time to less than about forty-five minutes, and projecting the accelerated plaster onto said surface.

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