This invention relates to improvement in the process of manufacturing gypsum boards known to the trade as gypsum plaster wallboard and gypsum plaster board, whereby the full strength of the set and hardened gypsum core sometimes weakened by excess temperature in drying, is restored, and at the same time efficient paper bond to this gypsum core by reason of this burning in over-drying, is established.

Gypsum boards are practically universally dried in large multiple deck high-temperature kilns to secure a large production in comparatively small plant space, and in comparatively short drying time. Gypsum board is manufactured in a continuous sheet form and cut to individual lengths before drying, as required for distribution. These individual lengths of green, hardened board automatically distribute to the various decks of the drying kiln, and as the individuals travel on the drying decks through the high drying temperature of the kiln, care is exercised to keep the marginal cut ends of each board in close contact with the marginal ends of the other boards flowing through the kiln on the same dryer deck.

This care is exercised to prevent the unprotected gypsum core in the cut marginal ends or edges being exposed to the high temperature of the circulating kiln atmosphere, which normally is above the calcination temperature of the gypsum core, and which by excess contact with such marginal edge can partially calcine it, that is, partially dehydrate the gypsum formed in the green board by the setting of the calcined gypsum or plaster of Paris used in the mixture of the core. If the boards in their aligned deck progress through the kiln are not closely abutted end to end, but separated by variable spaces at the marginal edges and ends, by reason of this hot kiln atmosphere, always above 215°F, the calcining point of gypsum, the core is usually partly calcined at its marginal ends or edges from one quarter of an inch to an inch, which calcining is termed in the trade "burning," and such boards are termed "burned boards." The marginal edge on a burned board is softer than the body portion of the board within the marginal edge, and such burned core has a tendency to crumble out from between the surfacing sheets of paper when the board is in transit and subsequently handled on the job. An additional defect lies in the fact, that the surfacing sheets of paper are loosened from such burned marginal edge or end and easily peeled or torn off of the inner gypsum core because of the bond between the paper surfacing and the core being destroyed by this burning or partial calcination.

Ordinarily this partially calcined or burned portion of the core at the marginal edges of the board sheets, is more porous than the interior body portion, because in the marginal portion the expelling of some of the combined water in the set and hardened gypsum has taken place, thus rendering this portion of the core of higher porosity and consequently more water absorbent. The board sheets as they come from the kiln are warm, usually above 100°F. even after leaving the cooling section of the kiln, and as the boards are removed from the kiln they are piled upon pallets holding perhaps one hundred or more dried gypsum boards. Because the boards are warm as piled on the pallet, the assembled piles of boards slowly cool down to room temperature. We discovered that by using an aqueous fluid to wet the burned marginal edges or ends of the boards when freshly piled from the kilns and still warm, the margins of the pile of boards, that is, the marginal edges and ends of the individual boards in the pile quickly absorb aqueous fluid almost as fast as it can be applied to such margins. As stated before, the softening of the marginal edge is due to the conversion in the kiln of some of the hydrated gypsum to partially hydrated gypsum or plaster of Paris, and the aqueous solution thus absorbed readily hydrates this plaster of Paris back to gypsum again, with the result that the marginal ends and edges become hard, and the bond of the paper surfacing sheets at such margins is restored, and thus the deleterious effect of over-drying or burning in the kiln, of these marginal ends and edges is nullified. Moreover, the pallet of boards is losing heat slowly, and continues to throw out sufficient heat to dry out the excess aqueous fluid absorbed beyond that necessary to set up hydrate and harden the burned calcined gypsum core, and to restore bond of paper surfacing to the core, and finally the piles of wetted board become
perfectly dry at their marginal edges just as if fresh from the kiln, and the individual board sheets are just as perfect as if the drying process in the kiln had operated in such fashion that no burning or calcining of the core at the marginal edges of the individual boards had taken place.

It is apparent of course, to those skilled in the art of gypsum products, their manipulation and manufacture, that this rehydrating treatment of burned marginal edges and ends can be applied in many ways as most convenient to the particular production process used. It is quite obvious that increased speed in rehydrating can be secured by an aqueous fluid containing substances that accelerate the hydration of plaster of Paris to gypsum, and also it would be recognized that increased hardness can be obtained by using aqueous solutions of other substances which are well known to impart this characteristic to gypsum products. We desire to incorporate all such aqueous fluid as within our practice because whatever modification of the process is used, the essential feature of accompanying hydration of the burned or calcined portions of the core, is secured. Having thus described our invention, what we claim is:

1. The process of rehydrating burned and softened marginal edges of kiln dried gypsum board, comprising the assembly of warm boards into piles, wetting the edges and ends with an aqueous fluid adapted to rehydrate the plaster of Paris therein, and evaporating the excess fluid by the retained heat in the assembled pile of treated board.

2. The process of rehydrating partially calcined marginal edges or ends of kiln dried gypsum board, comprising the wetting of such burned margins with an aqueous fluid adapted to convert plaster of Paris into gypsum while the retained kiln heat evaporates the uncombined excess heat required for thorough wetting of said margins.

3. The process of restoring the bond of paper surfacing to a partially calcined or burned gypsum board core layer at its marginal edges, comprising assembling warm boards into piles, wetting the burned margins with an aqueous fluid adapted to saturate the paper and core body at such margins, and to rehydrate the plaster of Paris therein, and evaporating the excess fluid by the retained heat in the assembled piles of treated gypsum board.

4. The process of rehydrating burned marginal edges of kiln dried gypsum board to restore the bond of paper surfacing to the core at such burned margins, comprising wetting the burned margins with an aqueous fluid, adapted to saturate the paper and core at such margins, and to rehydrate the plaster of Paris therein, which in crystallizing to gypsum cements the paper surfacing to the core margins.

5. The process of restoring the hardness of the burned and softened marginal edges of kiln dried gypsum board, which comprises wetting said softened edges with an aqueous fluid adapted to rehydrate the plaster of Paris therein and restore the bond between the paper cover sheets and the core of said board.

6. A dried gypsum wallboard having the marginal edges thereof rehydrated so that the degree of hydration of the gypsum core near said marginal edges is substantially equal to that near the center of the board.

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