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Frobosilo et al.

(54) **WALL CONSTRUCTION**

(76) Inventors: **Raymond C. Frobosilo**, Astoria, NY (US); **Sam Borgia**, Astoria, NY (US); **Melyin Lindner**, Levittown, NY (US)

Correspondence Address:
NOTARO & MICHALOS P.C.
Suite 110, 100 Dutch Hill Road
Orangeburg, NY 10962-2100

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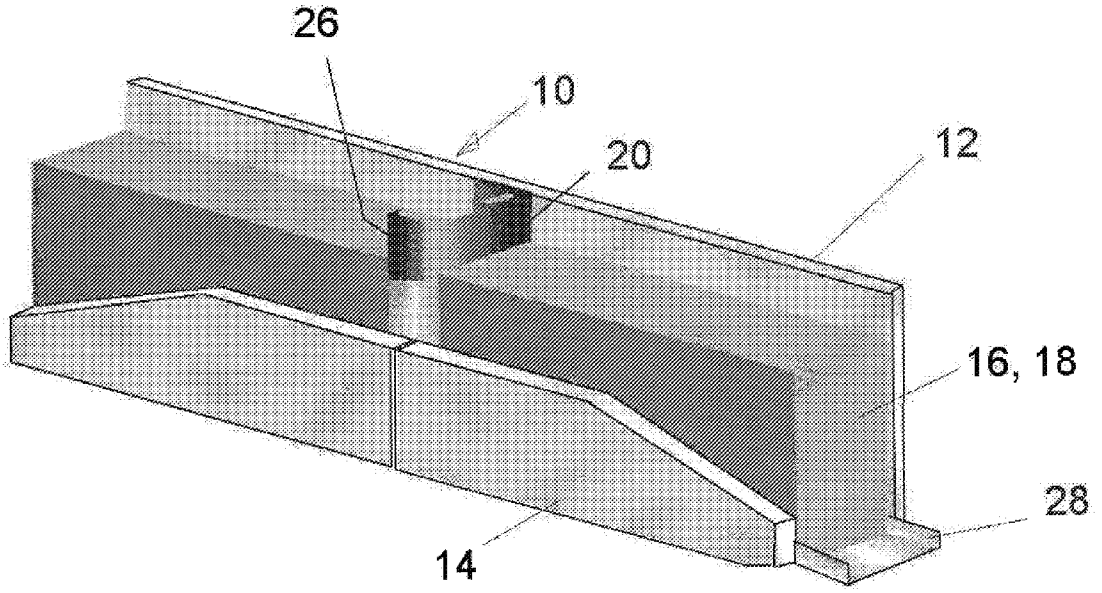
(57) **ABSTRACT**

A fire resistant wall construction has inner and outer spaced apart panels each made of at least one layer of catalyzed magnesia cement such as DRAGONBOARD brand panels, mineral wool insulation between the panels and a plurality of studs, such as metal studs, connected to the panels for supporting and separating the panels along the wall construction.



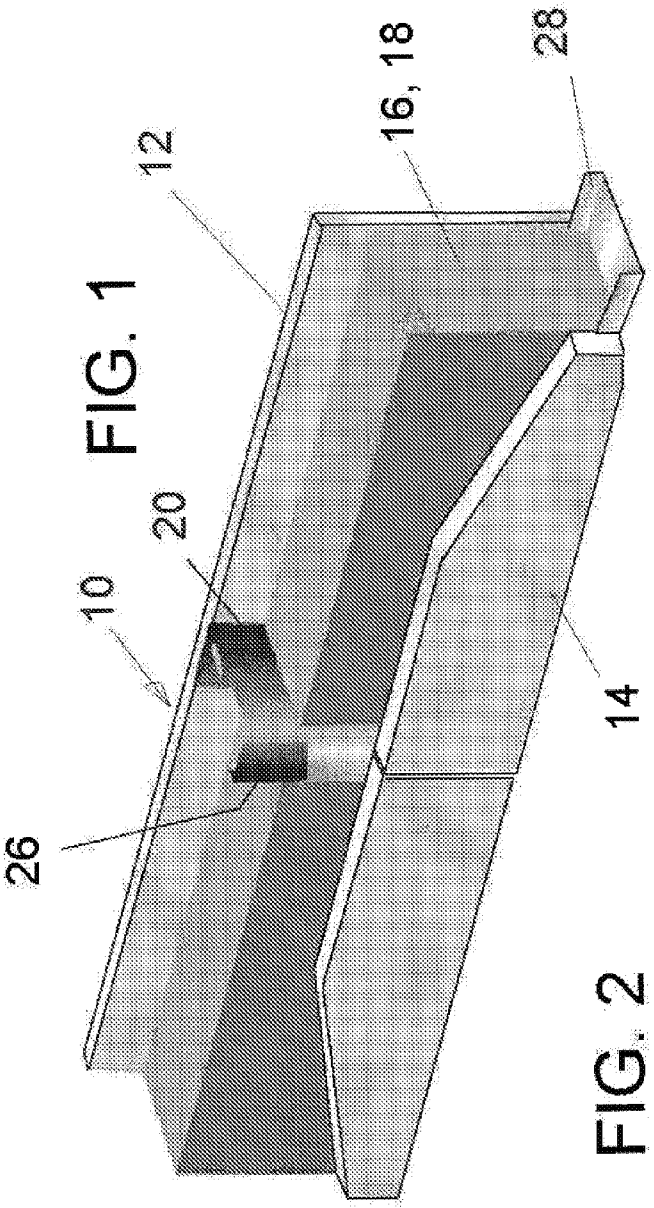


FIG. 1

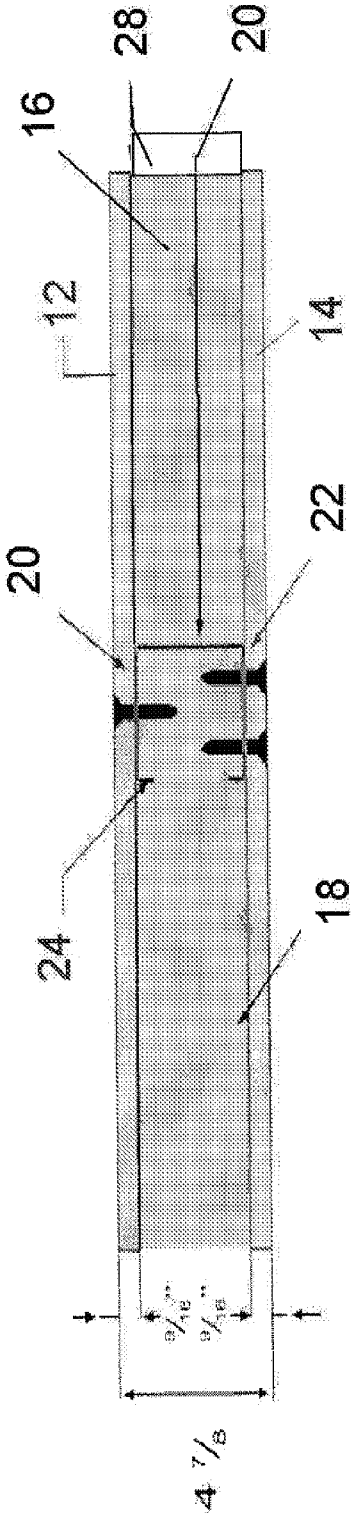


FIG. 2

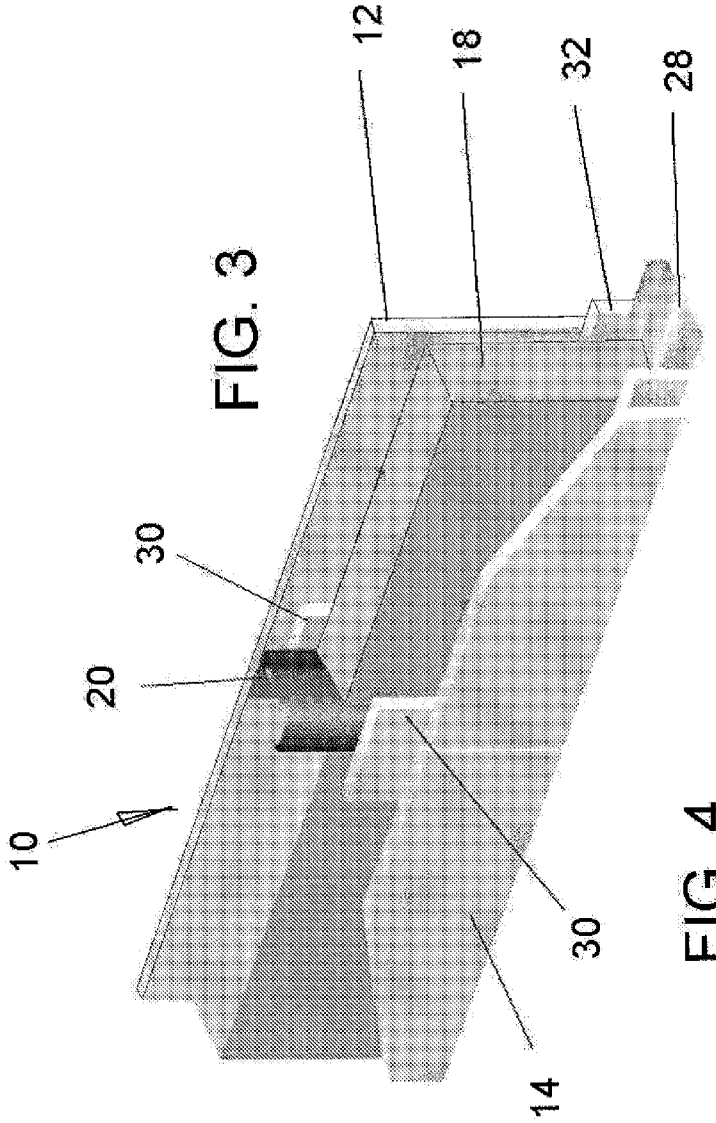


FIG. 3

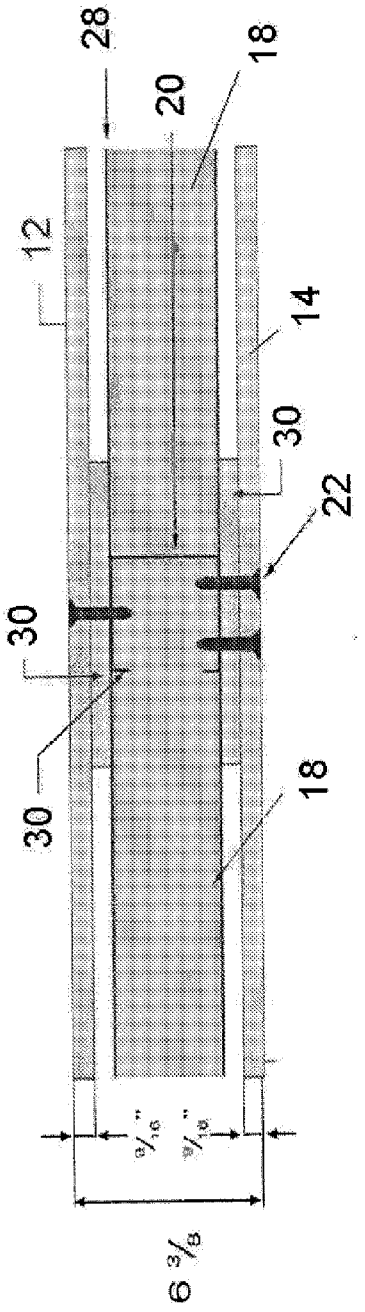


FIG. 4

WALL CONSTRUCTION

FIELD AND BACKGROUND OF THE INVENTION

[0001] The present invention relates generally to the field of residential and commercial building, and in particular to a new and useful wall construction that has various improved attributes, including increased fire-resistance.

[0002] Sorel cement is a hydraulic cement mixture of magnesium oxide with magnesium chloride together with filler materials like sand or crushed stone. The usual weight ratio is 2.5 to 3.5 parts MgO to one part $MgCl_2$ and this material is also called magnesia cement. A major drawback of this type of cement is its poor resistance to water which makes it unsuitable for use as a drywall component.

[0003] U.S. Pat. No. 6,773,794 to Lindner, which is incorporated here by reference, teaches a construction panel having a small amount of plastic fibers mixed with inorganic magnesium compounds, water and other substances to be extruded to form a synthetic construction panel will significantly reduced slumping. This patent also discloses the use of a catalyst such as urea and poly(oxypropylene)monomethyl ether which causes a reaction in the otherwise water sensitive magnesia cement to render it water resistant and therefore better suited for use as a construction component.

[0004] Traditional wall board is made of gypsum, a soft mineral composed of calcium sulfate. While wall constructions using gypsum wall board have some fire resistance, in order to achieve recognized levels of fire resistance that are rated in hours, such as a 2, 3 or 4 hour wall, multiple layers of gypsum wall board must be used.

[0005] Mineral wool insulation, as opposed to conventional fiberglass insulation, typically refers to two types of insulation material, namely rock wool, a man-made material consisting of natural minerals like basalt, or diabase or slag wool, a man-made material from blast furnace slag (the scum that forms on the surface of molten metal). See, for example, products available at http://www.specjm.com/mineral-wool.php or http://www.rockwool.com/enrock/mineral_wool_insulation.asp.

SUMMARY OF THE INVENTION

[0006] It is an object of the present invention to provide a fire resistant wall construction that used inner and outer spaced apart panels that are each made of at least one layer of catalyzed magnesia cement, with mineral wool insulation in the space between the panels and a plurality of studs connected to the panels for supporting and separating them along the wall construction.

[0007] The fire resistant attribute of the wall construction of the invention can be augmented further by various additional feature that will be disclosed in greater detail here.

[0008] The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this disclosure. For a better understanding of the invention, its operating advantages and specific objects attained by its uses, reference is made to the accompanying drawings and descriptive matter in which a preferred embodiment of the invention is illustrated.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] In the drawings;

[0010] FIG. **1** is a perspective cut-away view of one embodiment of the invention for providing a rating of 2 hour fire resistance;

[0011] FIG. **2** is a sectional view of the wall construction of FIG. **1**;

[0012] FIG. **3** is a view similar to FIG. **1** but of a wall construction of the invention for providing a 3 hour fire resistance rating; and

[0013] FIG. **4** is a sectional view of the wall construction of FIG. **3**.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0014] Referring now to the drawings, in which like reference numerals are used to refer to the same or similar elements, FIG. **1** shows a fire resistant wall construction **10**, comprising an inner panel **12** and an outer panel **14** spaced by 4 inches from the inner panel to create a space **16**. The spacing may be from 2 to 6 inches. Each panel is made of at least one layer of what is referred to here as catalyzed magnesia cement, exemplified by 10 or 14 mm (or 9/16 inch) DRAGONBOARD brand wall board. Mineral wool insulation **18** in bat, rigid panel or loose fill form, is provided in the space **16** between the panels **12** and **14**, and a plurality of studs **20** are connected, e.g. by drywall screws **22**, to the panels for supporting and separating the panels along the wall construction **10**.

[0015] The commercially available wall board product made of inorganic magnesium compounds and marketed under the registered trademark DRAGONBOARD is meant to become a substitute for traditional drywall. Details about this product can be found at http://www.dragonboard.com. These details and the use of DRAGONBOARD brand wall board as a non-limiting example of catalyzed magnesia cement for the fire resistant wall construction of the present invention, were published after the date of the subject invention and within one year of the filing date of the subject application for patent. The term catalyzed magnesia cement is used here to mean any Sorel cement that has been subjected to a catalyzed reaction, like the one disclosed in U.S. Pat. No. 6,773,794 to Lindner for example, or other reactions using other catalysts to render it water resistant.

[0016] Returning again to FIG. **1**, the studs **20** can be conventional wood studs, e.g. 2×3 or 2×4 studs, or preferably are each a metal stud of bent 18 or 20 ga. galvanized sheet steel having an in-bent flange **24** at each side for embracing the insulation **18** that extends into the hollow of each stud.

[0017] The studs are each at least partly wrapped in gasket tape **26**, such as gasket tape made of polytetrafluoroethylene, especially where the insulation will touch the stud. A metal track **28** is provided between the panels and under the insulation as well.

[0018] Referring now to FIGS. **3** and **4**, a three (3) hour wall construction of **10** of the present invention includes the features of the construction **10** in FIGS. **1** and **2**, but also includes a 3 inch wide furring strip **30** of the same catalyzed magnesia cement as the panels **12** and **14**, placed between at least one, but preferably both sides or all of the studs **20** and the adjacent panels **12** and **14** for creating a space between each panel and the insulation for further increasing fire resistance. Similar furring strips **32**, e.g. 2 inches tall are between each panel **12** and **14** and each side of the track **28**. The furring strips like the panels are fixed in place by drywall screws **22**.

[0019] For even further increased fire resistance, e.g. for a four (4) hour rating, two layers of catalyzed magnesia cement **12** and **14** are provided as each panel. This compares to the four (4) gypsum drywall panels that would be needed on each

side of the wall for the same fire rating, or the two (2) gypsum drywall layers on each side that would be needed for three or even two hour fire ratings.

[0020] The gasket tape **26** may be made for example of polytetrafluoroethylene (PTFE) commonly known by its trademark TEFLON, used to wrap all or part of each metal stud in each embodiment although other gasket tape material can be used.

[0021] The terms "inner" and "outer" are used for convenience only and may be reversed or may designate upper and lower panels since the wall construction of the invention can also be used for ceilings as well.

[0022] Although a preferred composition of this catalyst for the catalyzed magnesia cement is the one disclosed in U.S. Pat. No. 6,773,794 to Lindner, others that are known or are to be discovered by those skilled in the at may also be used to characterize this catalyzed magnesia cement of the present invention.

[0023] The catalyst may be of the following general composition, for example: a mixture of an organic base and a Polyoxy(oxyalkyl)mono(X) ether blend, the alkyl group being from 2 to 50 carbon units, the X group being a propyl group or alkyl group of 25 containing carbon units, or any other ether or solvent suitable. The blend of the base and ether can be 1:99 or the reverse.

[0024] The a construction panel may be a mixture of inorganic magnesium compounds, pulverized wood fibers, water and glass or synthetic fiber cloth which is formed as an edged layer and is permitted to set, with a small amount of fine plastic fibers, thereby to minimize slumping of the layer at its edges during setting.

[0025] While specific embodiments of the invention have been shown and described in detail to illustrate the application of the principles of the invention, it will be understood that the invention may be embodied otherwise without departing from such principles.

What is claimed is:

1. A fire resistant wall construction comprising: inner and outer spaced apart panels each made of at least one layer of catalyzed magnesia cement, mineral wool insulation between the panels and a plurality of studs connected to the panels for supporting and separating the panels along the wall construction.

2. A fire resistant wall construction according to claim **1**, wherein the studs are each a metal stud.

3. A fire resistant wall construction according to claim **1**, wherein the studs are each a metal stud and are each at least partly wrapped in gasket tape.

4. A fire resistant wall construction according to claim **1**, wherein the studs are each a metal stud and are each at least partly wrapped in gasket tape made of polytetrafluoroethylene.

5. A fire resistant wall construction according to claim **1**, including a furring strip between at least one of the studs and a panel for creating a space between at least one panel adjacent the furring strip and the insulation for increasing fire resistance.

6. A fire resistant wall construction according to claim **1**, including a furring strip made of catalyzed magnesia cement between at least one of the studs and a panel for creating a space between at least one panel adjacent the furring strip and the insulation for increasing fire resistance.

7. A fire resistant wall construction according to claim **1**, including a metal track between the panels and under the insulation.

8. A fire resistant wall construction according to claim **1**, including a furring strip made of catalyzed magnesia cement between at least one of the studs and a panel for creating a space between at least one panel adjacent the furring strip and the insulation for increasing fire resistance, a metal track between the panels and under the insulation and a further furring strip made of catalyzed magnesia cement between the track and a panel for creating a space between the panel and the track for further increasing fire resistance.

9. A fire resistant wall construction according to claim **1**, including a furring strip made of catalyzed magnesia cement between at least one of the studs and a panel for creating a space between at least one panel adjacent the furring strip and the insulation for increasing fire resistance, and a metal track between the panels and under the insulation, the stud also being a metal stud.

10. A fire resistant wall construction according to claim **1**, wherein the catalyzed magnesia cement is a mixture of an organic base and a polyoxy(oxyalkyl)mono(X) ether blend, the alkyl group being from 2 to 50 carbon units, the (X) group being a propyl group or alkyl group of 25 containing carbon units, or other ether or solvent, the blend of the base and ether being in a ratio of 1:99 to 99:1.

11. A fire resistant wall construction according to claim **1**, wherein the catalyzed magnesia cement panel is a set mixture of inorganic magnesium compounds, pulverized wood fibers, water and glass or synthetic fiber cloth with fine plastic fibers therein.

12. A fire resistant wall construction comprising: inner and outer spaced apart panels each made of at least one layer of catalyzed magnesia cement, mineral wool insulation between the panels and a plurality of studs connected to the panels for supporting and separating the panels along the wall construction, the studs each being a metal stud, and a metal track between the panels and under the insulation.

13. A fire resistant wall construction according to claim **12**, including a furring strip made of catalyzed magnesia cement between at least one of the studs and a panel for creating a space between at least one panel adjacent the furring strip and the insulation for increasing fire resistance.

14. A fire resistant wall construction according to claim **12**, wherein the studs are at least partly wrapped in gasket tape.

15. A fire resistant wall construction according to claim **12**, wherein the catalyzed magnesia cement is a mixture of an organic base and a polyoxy(oxyalkyl)mono(X) ether blend, the alkyl group being from 2 to 50 carbon units, the (X) group being a propyl group or alkyl group of 25 containing carbon units, or other ether or solvent, the blend of the base and ether being in a ratio of 1:99 to 99:1.

16. A fire resistant wall construction according to claim **12**, wherein the catalyzed magnesia cement panel is a set mixture of inorganic magnesium compounds, pulverized wood fibers, water and glass or synthetic fiber cloth with fine plastic fibers therein.

17. A fire resistant wall construction comprising: inner and outer spaced apart panels each made of at least one layer of catalyzed magnesia cement, mineral wool insulation between the panels and a plurality of studs connected to the panels for supporting and separating the panels along the wall construction, the studs each being a metal stud, a metal track between the panels and under the insulation, and a furring strip made

of catalyzed magnesia cement between at least one of the studs and a panel for creating a space between at least one panel adjacent the furring strip and the insulation for increasing fire resistance, the studs being are at least partly wrapped in gasket tape.

18. A fire resistant wall construction according to claim **17**, including a furring strip made of catalyzed magnesia cement between each stud and each panel for creating spaces between the panels strip and the insulation for increasing fire resistance, and a further furring strip made of catalyzed magnesia cement between the track and each panel for creating spaces between the panels and the track for further increasing fire resistance.

19. A fire resistant wall construction according to claim **17**, wherein the catalyzed magnesia cement is a mixture of an organic base and a polyoxy(oxyalkyl)mono(X) ether blend, the alkyl group being from 2 to 50 carbon units, the (X) group being a propyl group or alkyl group of 25 containing carbon units, or other ether or solvent, the blend of the base and ether being in a ratio of 1:99 to 99:1.

20. A fire resistant wall construction according to claim **17**, wherein the catalyzed magnesia cement panel is a set mixture of inorganic magnesium compounds, pulverized wood fibers, water and glass or synthetic fiber cloth with fine plastic fibers therein.

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