SYSTEM OF WALL FACINGS

Inventors: Sergiy Pacha, Zaporizhzhya (UA); Yevgeny Pacha, Zaporizhzhya (UA)

Correspondence Address:
Daniel N. Smith
One Salem Green, Suite 500
Salem, MA 01970 (US)

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ABSTRACT
The subject invention discloses a novel building system of portable light-weight wall panels for commercial and residential construction. The walls panels of the novel system are easy to manufacture in a variety of decorations and colors at a low price. Furthermore, these wall panels may be composed of environmentally friendly materials while providing a high level of insulation to commercial and residential structures. The walls panels of this system are small in size and light weight, making them easy to transport from manufacturers to construction sites. In addition, the small size and weight of these wall panels makes them easy to lift for on-site installation on the interior or exterior of walls with minimal training to installation staff.
SYSTEM OF WALL FACINGS

CROSS REFERENCE TO RELATED APPLICATION

[0001] This application claims the benefit of U.S. Provisional Patent Application No. 61/161,732 filed on Mar. 19, 2009, the contents of which are incorporated herein by reference.

FIELD OF THE INVENTION

[0002] This invention relates to a novel building system of composite wall facings.

BACKGROUND OF INVENTION

[0003] There are many composite wall panel systems used for residential and light commercial building projects that employ foam insulation.

[0004] For example, U.S. Pat. No. 6,978,581 B1, Spakovsky discloses a composite building block with a connector having a recess in the shape of a wall unit. The block is made of material different than the wall units and may be integrally formed per the requirements of a particular roof construction project. In one embodiment, the connector comprises a center form, and one or more arms have connectors that connect to corresponding connectors formed on the wall units. The center form may partition the cavity between the inner and outer wall units into two or more cavities, which may then be partially filled with, for example, insulative material. U.S. Pat. No. 5,566,517 A, Ishii et al. disclose a projection formed on the back of an architectural panel used as a wall of a building, and a groove formed in the same direction as the projection. The projection of one face member is fitted in the groove of another face member which may form a pair with the former face member. U.S. Pat. No. 5,351,454 A, Hahne et al. disclose a self-supporting facade component in sandwich construction, composed of at least two supporting layers and at least one interposed insulating layer. U.S. Pat. No. 5,265,389 A, Mazzone et al. disclose a composite building panel including a core of a foamed polymeric insulating material, such as expanded polystyrene, having a plurality of uniformly spaced open box tubes retain in vertical grooves formed in the rear surface of the core by a two-part epoxy adhesive, and a plurality of uniformly spaced open box tubes retain in vertical grooves formed in the rear surface of the core by a two-part epoxy adhesive, the tubes being mechanically connected at their ends to one leg of continuous horizontal channels having their other leg adhered to the core at horizontal slots. U.S. Pat. No. 5,247,770 A, Ting discloses composite wall panels each consisting of two metal facing skins sandwiched with a structural foam core. U.S. Pat. No. 4,223,505 A, Krefel et al. disclose an apparatus for fastening building construction insulating panels to a supporting wall structure comprising a slotted channel member and an anchoring clip. The channel has flanges by which it is secured to a supporting wall structure and a slotted mounting surface spaced from the supporting wall a preselected distance to provide improved insulation. The anchoring clip has opposed flanges on one end for engaging the edges of adjacent insulating wall panels and an anchor on the opposite end for anchoring the clip in the channel and thereby holding the insulated panel to the supporting wall with the preselected spacing. U.S. Published Patent Application No. 2004/0118009 A1, Budge discloses a method of forming variable configuration key grooved panel forms to form a variety of different wall thicknesses.

[0005] These building systems are bulky, expensive, and heavy and require special equipment for installation.

[0006] Accordingly, a need exists for a low-cost, portable, and light-weight building system employing foam insulation that is easy to transport, lift and install that can be manufactured in a variety of outer decorations and colors.

SUMMARY OF THE INVENTION

[0007] There are additional features of the invention that will be described hereininafter and which will form the subject matter of the claims appended hereto. In this respect, before explaining at least one embodiment of the invention in detail, it is to be understood that the invention is not limited in its application to the details of construction and to the arrangements of the components set forth in the following description or illustrated in the drawings. The invention is capable of other embodiments and of being practiced and carried out in various ways. Also, it is to be understood that the phraseology and terminology employed herein are for the purpose of the description and should not be regarded as limiting.

[0008] One embodiment of the subject invention discloses a building panel wall insulation assembly, comprising: a wall having a substantially flat panel-receiving face;

[0009] substantially flat building insulation panels comprising an inner foam layer facing the wall and an outer layer, wherein the inner foam layer is attached to the outer layer with an adhesive, further wherein the inner foam layer comprises two traversing slots that are substantially parallel to each other, wherein each traversing slot contains an internal groove; a panel fastening apparatus comprising a substantially flat rectangular surface mounted to the wall with a plurality of anchoring fasteners, two side walls extending substantially perpendicularly from the substantially flat rectangular surface, and a protrusion extending from each of the side walls, wherein each sidewall is positioned within one of the two traversing slots such that the protrusion is positioned within the internal groove thereby holding each building insulation panel on the wall.

[0010] In a further embodiment of the subject invention, the building panel wall insulation assembly may further comprise a second set of two traversing slots contained within the inner foam, wherein each of the second set of traversing slot contains an internal groove; a second panel fastening apparatus including: a second substantially flat rectangular surface mounted to the wall with a second plurality of anchoring fasteners, a second set of two side walls extending substantially perpendicularly from the substantially flat rectangular surface, and a protrusion extending from each of the second set of side walls; wherein each of the second set of sidewalls is positioned within one of the second set of traversing slots such that the protrusion is positioned within the internal groove.

[0011] In another embodiment of the subject invention, the building panel wall insulation assembly may further comprise a third set of two traversing slots contained within the inner foam, wherein each of the third set of traversing slot contains an internal groove; a third panel fastening apparatus including: a third substantially flat rectangular surface mounted to the wall with a third plurality of anchoring fasteners, a third set of two side walls extending substantially perpendicularly from the third substantially flat rectangular surface, and a protrusion extending from each of the third set
of side walls; wherein each of the third set of sidewalls is positioned within one of the third set of traversing slots such that the protrusion is positioned within the internal groove.  

In an additional embodiment of the subject invention, the building panel wall insulation may also comprises a second set of two traversing slots contained within the inner foam, wherein each of the second set of traversing slot contains an internal groove; a second panel fastening apparatus including: a second substantially flat rectangular surface mounted to the wall with a second plurality of anchoring fasteners, a second set of two side walls extending substantially perpendicularly from the second substantially flat rectangular surface, and a protrusion extending from each of the second set of side walls; wherein each of the second set of sidewalls is positioned within one of the second set of traversing slots such that the protrusion is positioned within the internal groove.

In one embodiment of the subject invention, the building panel wall insulation assembly may be installed in the interior of the wall.

In a further embodiment of the subject invention, wherein the building panel wall insulation assembly further includes a second adhesive placed between each of the installed building insulation panels.

Another embodiment of the subject invention is a method of installing a building panel wall insulation assembly onto a wall having a substantially flat panel-receiving face comprising: a) attaching a plurality of substantially flat inner foam layers to a plurality of substantially flat outer layers with an adhesive to form a plurality of substantially flat building insulation panels, wherein each inner foam layer further comprises one or more sets of two traversing slots that are substantially parallel to each other, further wherein each traversing slot contains an internal groove; b) attaching one or more panel fastening apparatus to the wall with a plurality of anchoring fasteners, wherein each panel fastening apparatus comprises a substantially flat rectangular surface, two side walls extending substantially perpendicularly from the substantially flat rectangular surface, and a protrusion extending from each of the side walls; c) installing each building insulation panel onto the wall by facing the inner foam layer to the wall and positioning each sidewall of the panel fastening apparatus within one of the traversing slots such that the protrusion is positioned within the internal groove; d) repeating step c) until the wall is covered in building insulation panels; and e) filling in any uncovered gaps with the adhesive.

In further embodiments of the subject invention, the inner foam layer may comprise extruded polystyrene foam.

In other embodiments of the subject invention, the wall may be a load-bearing wall.

In additional embodiments of the subject invention, the outer layer may be composed of a material selected from the group consisting of leather, metal, plastic, wood and glass.

In further embodiments of the subject invention, the plurality of anchoring fasteners may be selected from the group consisting of nails, bolts or screws.

In other embodiments of the subject invention, the building insulation panels may be a shape selected from the group consisting of triangular, square and rectangular.

In an additional embodiment of the subject invention, the assembly may be installed in the interior of the wall.

An additional embodiment of the subject invention is a system of wall decoration and insulation that comprises composite panels, steel profiles, fastening elements and an adhesive-sealant. A further embodiment of the subject invention is a system of wall decoration and insulation that comprises a composite panel with two layers bonded to one another with an adhesive-sealant. In this embodiment, the composite panel may have an outer protecting layer that consists of material selected from the group of glass, metal, wood, plastic, or leather. Also in this embodiment, the composite panel has an inner insulating layer that comprises a plate of extruded polystyrene foam. Further in this embodiment, the backside of the composite panel comprises two pairs of slots for installation to mounted profiles. Each of these two slots may have an inner groove with a hooked shape.

In one embodiment of the subject invention, steel profiles may be made by rolling thin sheet steel with zinc galvanization. In another embodiment of the subject invention, steel profiles may have a cross-sectional “C” shape.

In further embodiments of the subject invention, the adhesive may have resistance to atmospheric influences such as temperature and humidity fluctuations, frost, heat, sun radiation and wind load. In other embodiments of the subject invention, the adhesive may be elastic enough to compensate for thermal expansion. In even further embodiments of the subject invention, the adhesive may be tinted in different colors. In other embodiments of the subject invention, the adhesive may have short drying time. In further embodiments of the subject invention, the adhesive may be composed of incombustible materials. In other embodiments of the subject invention, the adhesive may be composed of ecologically friendly materials. In additional embodiments of the subject invention, the adhesive may be composed of materials that maintain its qualities for long period.

There has thus been broadly outlined important features of the invention in order that the detailed description thereof that follows may be better understood, and in order that the present contribution to the art may be better appreciated. There are additional features of the invention that will be described hereinafter and which will form the subject matter of the claims appended hereto. These together with other embodiments of the invention, and with various features of novelty which characterize the invention, are pointed out with particularity in the claims annexed to and formed as part of this disclosure.

For a conceptual understanding of the invention and its operational advantages, refer to the accompanying drawings and descriptive matter in which there are embodiments of the invention illustrated. Other features and advantages of the present invention will become apparent from the following description of the embodiment(s), taken in conjunction with the accompanying drawings, which by way of example; illustrate the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

Advantages of the present invention will be apparent from the following detailed description of embodiments thereof, which description should be considered in conjunction with the accompanying drawings, in which:

FIG. 1A illustrates a front view of the rear side of a single composite wall panel (foam side) of the wall system.

FIG. 1B illustrates a top view of a composite wall panel of the wall system.

FIG. 1C illustrates a side view of a composite wall panel of the wall system.
FIG. 2 illustrates a cross-sectional view of a portion of a composite wall panel of the wall system. FIG. 3A illustrates a cross-sectional view of a portion of a composite wall panel of the wall system with slots of foam backing on the composite wall panel lined up with a steel profile on a wall for installation. FIG. 3B illustrates a cross-sectional view of a portion of a composite wall panel of the wall system being installed onto a wall by inserting two protrusions on the steel profile into the slots on the foam backing of the composite wall panel. FIG. 3C illustrates a cross-sectional view of a portion of a composite wall panel of the wall system being installed onto a wall by inserting two hooked ends of the protrusions into two hooked grooves in the slots on the foam backing of the composite wall panel. FIG. 4 illustrates a cross-sectional view of a portion of a composite wall panel of the wall system attached to a wall. FIG. 5 illustrates an isometric view of composite wall panels attached to horizontal steel profiles which are attached to a wall. FIG. 6 illustrates an isometric view of a wall with installed composite wall panels.

DETAILED DESCRIPTION OF EMBODIMENTS

The following will describe, in detail, several embodiments of the present invention. These embodiments are provided by way of explanation only, and thus, should not unduly restrict the scope of the invention. In fact, those of ordinary skill in the art will appreciate upon reading the present specification and viewing the present drawings that the invention teaches many variations and modifications, and that numerous variations of the invention may be employed, used and made without departing from the scope and spirit of the invention.

The subject invention discloses a novel building system of portable light-weight wall panels for commercial and residential construction. The walls panels of this system are small in size and light weight, making them easy to transport from manufacturers to construction sites. In addition, the small size and weight of these wall panels makes them easy to lift for on-site installation on existing walls with minimal training to installation staff. These panels may be constructed on-site or manufactured as complete panels and brought to the site. In another embodiment of the subject invention, the wall panels are weather-resistant, including, but not limited to: wind resistant, frost resistant and water resistant. In another embodiment of the subject invention, the panels provide heat and/or sound insulation.

The present invention is a universal composite wall panel with a unique method of installation and mounting to the surface of a wall. The composite panel comprises a base layer and outer layer that are bonded to each other with a layer of glue-sealant or adhesive-sealant. The base layer comprises a plate of extruded polystyrene foam. The outer layer, in one embodiment, comprises a sheet of glass. In such a system, this combination of materials is very resistant to atmospheric influences including wind load, fluctuations of temperature and humidity, and sunlight. In another embodiment of the subject invention, which is developed for interior decoration, the outer layer may comprise metal, wood, plastic, leather or glass.

Both embodiments of the present invention have the same system of attachment to a wall. The base layer contains two pair of slots on the backside of each panel. These slots are designed for installation at steel profiles, what are attached to the wall. The internal shape of these slots complements the extruded shapes of the attached steel profiles. Thus, with little effort, a panel is clicked-and-locked tightly to the pair of extruded steel profiles. Joints between panels are then filled with an adhesive-sealant.

The walls panels of the novel system are easy to manufacture in a variety of decorations and colors at a low price. Furthermore, these wall panels may be composed of environmentally-friendly materials while providing a high level of insulation to commercial and residential structures.

A single composite wall panel of the subject invention is illustrated in FIGS. 1A-2. The single wall panel 1 is composed of a sheet of extruded polystyrene foam backing 2 attached to an outer layer 3 by an adhesive-sealant 4. In another embodiment of the subject invention, the adhesive-sealant is an incombustible adhesive. In another embodiment of the subject invention, the adhesive sealant is temperature resistant, wind resistant, frost resistant and/or water resistant. In another embodiment of the subject invention, the adhesive-sealant provides heat and/or sound insulation. The adhesive-sealant 4 has to provide a high level of adhesion in wide range of temperatures, flexibility to compensate thermal expansion, frost resistance and sunlight resistance, and incombustibility.

In one embodiment of the subject invention, the outer layer 3 is composed of a sheet of glass. An outer layer 3 of glass has the advantages of stability to atmospheric influence, low thermal conductivity and the ability to reflect light. It works as interconnected system. The layer of glass 3 and the layer of adhesive sealant 4 protect the base layer of polystyrene foam from atmospheric influence. More than that, this combination of materials reflects sunlight to provide additional heat insulation. At the same time the base layer 2 maintains high level of main heat insulation.

In another embodiment of the subject invention, the outer layer may be made of metal, plastic, wood or glass. In a further embodiment of the subject invention, the outer layer may have a finished coat applied (not shown). This coating may be unlimited in colors and textures for a variety of appearances.

In another embodiment of the subject invention, the outer layer may be made of metal, plastic, wood or glass. In a further embodiment of the subject invention, the outer layer may have a finished coat applied (not shown). This coating may be unlimited in colors and textures for a variety of appearances.

In other embodiments of the subject invention, the wall panels 1, foam backing 2 and outer layers 3 may be manufactured into a variety of shapes, including, but not limited to: square, rectangular, or triangular.

FIG. 2 illustrates an enlarged cross-sectional view of portion 20 of a composite wall panel 1. The rear side 5 of foam backing 2 contains two pairs of slots 6a and 6b traversing the entire length of the rear side 5 of foam backing 2. Within each of these slots 6a and 6b lies a hooked groove 7a and 7b, respectively.

Fastening elements 8 are used to horizontally mount steel profiles 10 onto a wall 9 upon which the wall panels 1 will be placed.
In various embodiments of the subject invention, these fastening elements may be, but are not limited to: nails, bolts or screws.

In embodiments of the subject invention, the steel profile 10 is used to attach a wall panel 1 to the surface of a wall 9. This steel profile 10 is usually used in the construction of sheetrock walls. This type of steel profile 10 has cross-sectional “C-shape” with two protrusions 11a and 11b. Each protrusion, 11a and 11b, contains a hooked end, 12a and 12b, respectively.

The general method of wall panel installation according to the present invention is illustrated in FIGS. 3A-3C. FIGS. 3A-3C illustrate a cross-sectional view of the step by step process of locking the steel profile 10 within a panel 1 to install it onto wall 9.

As shown in FIG. 3A, once a steel profile 10 is mounted to a wall 9, a composite wall panel 1 may be lifted such that slots 6a and 6b of foam backing 2 are aligned with elastic protrusions 11a and 11b of steel profile 10.

Once alignment is reached, protrusions 11a and 11b of steel profile 10 are inserted into slots 6a and 6b of foam backing 2, respectively, as shown in FIG. 3B.

As shown in FIG. 3C, as protrusions 11a and 11b are further inserted, hooked ends 12a and 12b are inserted into the hooked grooves 7a and 7b of foam backing 2, respectively.

Once hooked ends 12a and 12b are fully inserted into hooked grooves 7a and 7b, the composite wall panel 1 is clamped and locked into place on wall 9. A cross-sectional view of the attached composite wall panel is shown in FIG. 4.

To complete wall system installation, joints between the attached composite wall panels 1 on wall 9 are filled with an adhesive sealant 4. In one embodiment of the subject invention this adhesive sealant may be the same adhesive used to attach outer layer 3 to foam backing 2 to form composition wall panel 1. In another embodiment of the subject invention this adhesive sealant may be a different adhesive from the one used to attach outer layer 3 to foam backing 2 to form composition wall panel 1.

FIGS. 5 and 6 illustrate a wall 9 with attached composite wall panels 1.

The many aspects and benefits of the invention are apparent from the detailed description, and thus, it is intended for the following claims to cover such aspects and benefits of the invention, which fall within the scope, and spirit of the invention. In addition, because numerous modifications and variations will be obvious and readily occur to those skilled in the art, the claims should not be construed to limit the invention to the exact construction and operation illustrated and described herein. Accordingly, all suitable modifications and equivalents should be understood to fall within the scope of the invention as claimed herein.

What is claimed is:

1. A building panel wall insulation assembly, comprising: a wall having a substantially flat panel-receiving face; substantially flat building insulation panels comprising an inner foam layer facing the wall and an outer layer, wherein the inner foam layer is attached to the outer layer with an adhesive, further wherein the inner foam layer comprises two traversing slots that are substantially parallel to each other, wherein each traversing slot contains an internal groove; a panel fastening apparatus comprising a substantially flat rectangular surface mounted to the wall with a plurality of anchoring fasteners, two side walls extending substantially perpendicularly from the substantially flat rectangular surface, and a protrusion extending from each of the side walls; wherein each sidewall is positioned within one of the traversing slots such that the protrusion is positioned within the internal groove thereby holding each building insulation panel on the wall.

2. The building panel wall insulation assembly of claim 1, further comprising: a second set of two traversing slots contained within the inner foam, wherein each of the second set of traversing slots contains an internal groove; a second panel fastening apparatus including: a second substantially flat rectangular surface mounted to the wall with a second plurality of anchoring fasteners, a second set of two side walls extending substantially perpendicularly from the second substantially flat rectangular surface, and a protrusion extending from each of the second set of side walls; wherein each of the second set of sidewalls is positioned within one of the second set of traversing slots such that the protrusion is positioned within the internal groove.

3. The building panel wall insulation assembly of claim 1, further comprising: a third set of two traversing slots contained within the inner foam, wherein each of the third set of traversing slots contains an internal groove; a third panel fastening apparatus including: a third substantially flat rectangular surface mounted to the wall with a third plurality of anchoring fasteners, a third set of two side walls extending substantially perpendicularly from the third substantially flat rectangular surface, and a protrusion extending from each of the third set of side walls; wherein each of the third set of sidewalls is positioned within one of the third set of traversing slots such that the protrusion is positioned within the internal groove.

4. The building panel wall insulation assembly of claim 1, further comprising: a second set of two traversing slots contained within the inner foam, wherein each of the second set of traversing slots contains an internal groove; a second panel fastening apparatus including: a second substantially flat rectangular surface mounted to the wall with a second plurality of anchoring fasteners, a second set of two side walls extending substantially perpendicularly from the second substantially flat rectangular surface, and a protrusion extending from each of the second set of side walls; wherein each of the second set of sidewalls is positioned within one of the second set of traversing slots such that the protrusion is positioned within the internal groove.

5. The building panel wall insulation assembly of claim 1, wherein the inner foam layer comprises extruded polystyrene foam.

6. The building panel wall insulation assembly of claim 1, wherein the wall is a load-bearing wall.

7. The building panel wall insulation assembly of claim 1, wherein the outer layer is composed of a material selected from the group consisting of metal, plastic, wood and glass.

8. The building panel wall insulation assembly of claim 1, wherein the assembly is installed in the interior of the wall.

9. The building panel wall insulation assembly of claim 1, wherein the outer layer is composed of a material selected from the group consisting of leather, metal, plastic, wood and glass.

10. The building panel wall insulation assembly of claim 1, wherein the plurality of anchoring fasteners is selected from the group consisting of nails, bolts or screws.
11. The building panel wall insulation assembly of claim 1, wherein the building insulation panels is a shape selected from the group consisting of circular, triangular, square and rectangular.

12. The building panel wall insulation assembly of claim 1, further comprising a second adhesive placed between each of the installed building insulation panels.

13. A method of installing a building panel wall insulation assembly onto a wall having a substantially flat panel-receiving face comprising:
   a) attaching a plurality of substantially flat inner foam layers to a plurality of substantially flat outer layers with an adhesive to form a plurality of substantially flat building insulation panels, wherein each inner foam layer further comprises one or more sets of two traversing slots that are substantially parallel to each other, further wherein each traversing slot contains an internal groove; 
   b) attaching one or more panel fastening apparatuses to the wall with a plurality of anchoring fasteners, wherein each panel fastening apparatus comprises a substantially flat rectangular surface, two side walls extending substantially perpendicularly from the substantially flat rectangular surface, and a protrusion extending from each of the side walls; 
   c) installing each building insulation panel onto the wall by facing the inner foam layer to the wall and positioning each sidewall of the panel fastening apparatuses within one of the traversing slots such that the protrusion is positioned within the internal groove; 
   d) repeating step c) until the wall is covered in building insulation panels; and 
   e) filling in any uncovered gaps with the adhesive.

14. The method of claim 13, wherein the inner foam layer comprises extruded polystyrene foam.

15. The method of claim 13, wherein the wall is a load-bearing wall.

16. The method of claim 13, wherein the outer layer is composed of a material selected from the group consisting of metal, plastic, wood and glass.

17. The method of claim 13, wherein the assembly is installed in the interior of the wall.

18. The method of claim 17, wherein the outer layer is composed of a material selected from the group consisting of leather, metal, plastic, wood and glass.

19. The method of claim 13, wherein the plurality of anchoring fasteners is selected from the group consisting of nails, bolts or screws.

20. The method of claim 13, wherein the building insulation panels is a shape selected from the group consisting of circular, triangular, square and rectangular.

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