Oct. 3, 1967 A. J. PALFEY 3,344,574

BUILDING PANEL

Filed Sept. 2, 1964

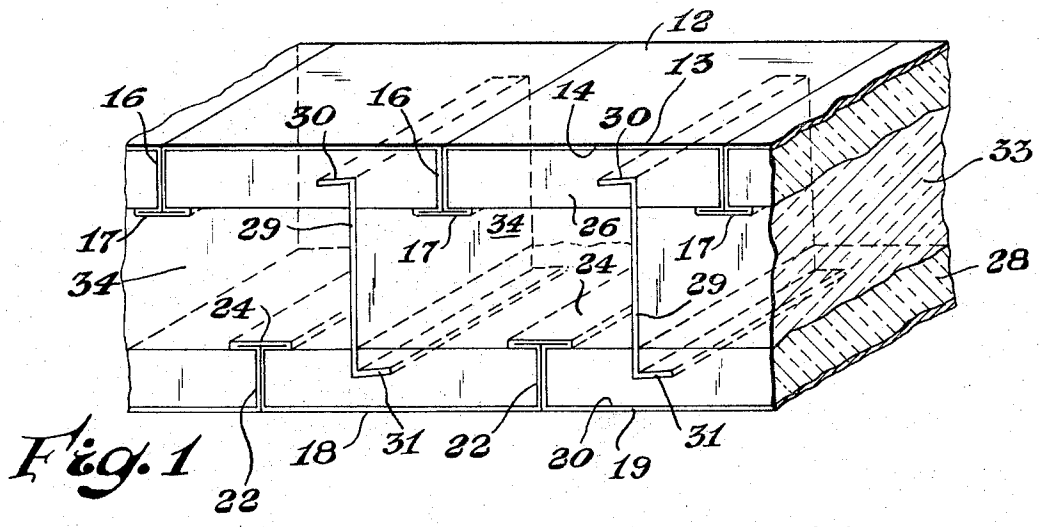


Fig. 1

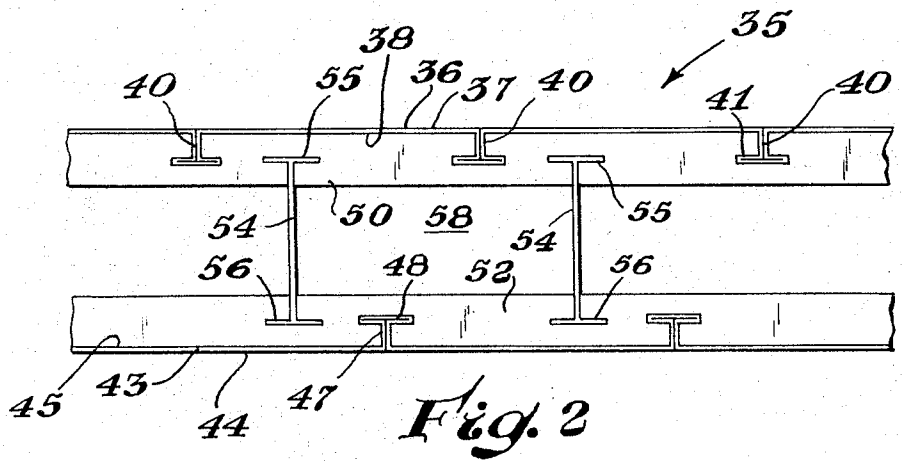


Fig. 2

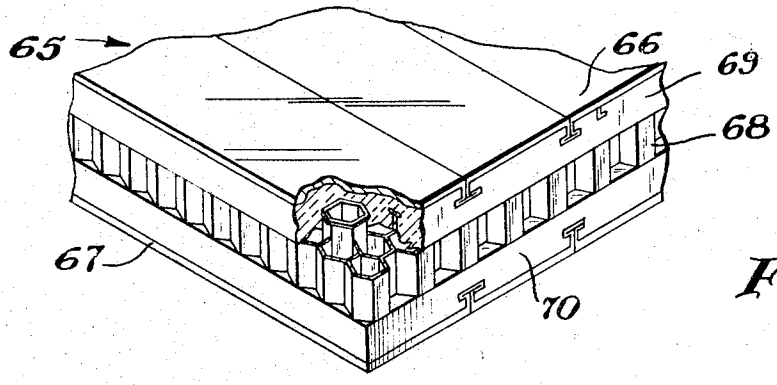


Fig. 3

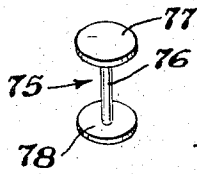


Fig. 4

INVENTOR.
Albert J. Palfey
BY
ATTORNEY

United States Patent Office 3,344,574 Patented Oct. 3, 1967

3,344,574
BUILDING PANEL

Albert J. Palfey, Midland, Mich., assignor to The Dow Chemical Company, Midland, Mich., a corporation of Delaware

Filed Sept. 2, 1964, Ser. No. 393,941
5 Claims. (Cl. 52—615)

This invention relates to an improved building panel. It more particularly relates to a fire resistant building panel having improved insulating properties.

A wide variety of composite panels have been constructed for building purposes. Many of the light weight panels are somewhat deficient in fire resistance in that cellulosic sheets form the outer surfaces, or in cases where metallic sheets or layers form the outer surfaces, combustible and heat decomposable materials are disposed immediately adjacent thereto and oftentimes in contact with the metallic surfaces giving rise to premature deorientation on exposure to fire. Oftentimes such panels, even when faced with metallic materials, provide a substantially direct thermal path from one face of the sheet to the other. Oftentimes in order to achieve maximum insulation cellular organic material such as foam plastics are employed in such panels. Frequently considerable difficulty is encountered when panels of this nature are subjected to fire as the plastic material oftentimes melts causing the panel to delaminate and providing further combustible fuel and increasing the fire hazard.

It is an object of this invention to provide an improved heat insulation building panel having metallic surfaces.

A further object of the invention is to provide an improved building panel which will be relatively light in weight and provide a minimal thermal path from one face of the panel to the other.

A further object of the invention is to provide an improved building panel which is fire resistant and incorporates a plastic foam.

Another object of this invention is to provide an improved building panel which does not readily delaminate when exposed to fire.

A further object of the invention is to provide a building panel of relatively high physical strength.

These benefits and other advantages in accordance with the present invention are achieved by utilizing a building panel comprising at least a pair of spaced apart metallic facing sheets, each of the sheets having defined therein a plurality of rib members, each of the rib members projecting toward the inside of the panel, each of the spaced apart metallic sheets having a coating on the inner surface thereof comprising a layer of an inorganic nonflammable nonmetallic material, a plurality of connecting members extending generally between the inorganic layers adjacent the facing sheets and securing the layers in spaced relationship, each of the connecting members being partially embedded in each of the layers of inorganic material and being in spaced relationship to the metallic facing sheets.

Further features and advantages of the invention will become more apparent from the following specification when taken in connection with the drawing wherein:

FIGURE 1 is a schematic sectional representation of a section of a panel in accordance with the present invention;

FIGURE 2 is an alternate embodiment of a panel in accordance with the invention;

FIGURE 3 schematically depicts a cutaway view of a panel in accordance with the invention wherein a honeycomb type core is employed;

FIGURE 4 is an alternate embodiment of a spacing or connecting member.

In FIGURE 1 there is illustrated a panel in accordance with the invention generally designated by the reference numeral **10**. The panel **10** comprises in cooperative combination a first face sheet **12** having an exterior surface **13** and an interior surface **14**. The sheet **12** defines a plurality of ribs **16** which extend or project from the inner surfaces **14**. The ribs **16** terminate in a flange **17**. A generally similar second face sheet **18** is disposed remotely from the sheet **16**. The facing sheet **18** has an outer surface **19** and an inner surface **20**. A plurality of ribs **22** are formed in the sheet **18**. The ribs **22** extend inwardly into the panel away from the face **20** of the sheet **18**. Each of the ribs **22** terminates in a flange or enlarged portion **24**. A first layer of inorganic nonflammable material **26** is disposed adjacent to the face **14** of the panel **12**, and is rigidly secured thereto by at least the flanges **17** of the ribs **16**. A similar inorganic nonflammable coherent layer **28** is disposed adjacent the surface **20** of the face sheet **18** and is maintained in position by the flanges **24** of the ribs **22**. A plurality of rib members **29** are disposed between the face sheets **12** and **18**. The rib members **29** have flanges **30** and **31**. The flanges **30** are embedded within the insulating layer **26** wherein the flanges **31** are embedded within the insulating layer **28**, thus effectively maintaining the facing sheets **12** and **18** in fixed relationship while providing no direct path having high thermal conductivity from one face to the opposite face. A cellular thermoplastic material such as foam plastic **33** is disposed within spaces **34** defined by the insulating layers **26**, **28**, and adjacent rib members **29**.

In FIGURE 2 there is illustrated a sectional view of an alternate panel in accordance with the invention generally designated by the reference numeral **35**. The panel **34** comprises a first metallic face sheet **36** having an exterior face **37** and an interior face **38** and defining a plurality of ribs **40**, the ribs **40** depend from the face **38** and terminate the flange **41**. Oppositely disposed and in spaced relationship to the face sheet **36** is a generally similar facing sheet **43** having an exterior surface **44** and an interior surface **45** and a plurality of dependent ribs **47** depending from the face **45**. Each of the ribs **47** terminate remote from the face **45** in a flange **48**. A layer of rigid nonflammable cementitious material **50** is in contact with the face **38** of the sheet **36** and encapsulates the ribs **40** and their flanges **41**. A like layer of cementitious material **52** is in contact with the face **45** of the sheet **43** and encapsulates the ribs **47** thereof. A plurality of bridging spacer members **54** having terminal flanges **55** and **56** rigidly secure the layers **50** and **52** in fixed spaced relationship to each other. Between the layers **50** and **52** is defined a space **58**.

In FIGURE 3 there is illustrated a schematic partly in section view of a panel generally designated by the reference numeral **65** having a first metallic facing sheet **66**, a second metallic facing sheet **67**, a flanged honeycombed core **68**. The honeycombed core **68** is secured to and separated from the facing sheet **66** by means of the rigid uninflammable insulating layer **69**. A similar rigid nonflammable insulating layer **70** secures the flanged honeycomb **68** to the facing sheet **67** and provides separation therefrom.

FIGURE 4 is an isometric representation of an alternate embodiment of a spacing member generally designated by the reference numeral **75** which may be utilized in the practice of the invention. The spacing member **75** comprises an elongate body portion **76** which terminates at either end in the flanged heads **77** and **78**.

Panels in accordance with the present invention are readily fabricated from a wide variety of materials primarily dependent upon the type of service which is expected therefrom. Generally facing materials of alumi-

num, steel, or stainless steel are eminently satisfactory for most applications. Obviously materials having particular and desired properties for various applications may be utilized with generally equal facility. The nonflammable layers such as the layers **26** and **28** of FIGURE 1 are beneficially prepared from foamed glass, foamed slag, gypsum, plaster, concrete, vermiculite-cement panels, asbestosfiber cement and the like. The panel of FIGURE 1 is readily prepared by first precasting the insulating layer on one face sheet, inserting the spacing elements **29** through the plastic foam body **33**, placing the foam body on top of the uncured insulating layer, pressing the flanges of the spacing elements into the uncured material, pouring the material for the insulating layer **26** onto the foamed plastic material **33**, and pressing the face sheet **12** into the uncured insulating material and subsequently allowing the nonflammable insulating material to harden.

The sheet of FIGURE 2 is prepared by pouring the insulating material for the layer **52** onto the sheet **43**, inserting the spacing elements therein causing the insulating material to harden and form the insulating layer **52**. A similar layer **50** is poured on the face **38** of the facing sheet **36** and while in a wet deformable condition the previously prepared assembly is positioned by inserting the flanges **55** of the spacers **54** into the uncured insulating layer and permitting the uncured insulating layer to harden.

The panel of FIGURE 3 is readily prepared in a similar manner to that of FIGURE 2.

The panels in accordance with the present invention show vastly superior fire resistance to conventional panels not utilizing the present construction system. Panels in accordance with the present invention are also light in weight and are readily assembled by conventional means well known to the art.

As is apparent from the foregoing specification, the manufacture of the present invention is susceptible of being embodied with various alterations and modifications which may differ particularly from those that have been described in the preceding specification and description. For this reason, it is to be fully understood that all of the foregoing is intended to be merely illustrative and is not to be construed or interpreted as being restrictive or otherwise limiting of the present invention, excepting as it is set forth and defined in the hereto appended claims.

What is claimed is:

1. A building panel comprising at least a pair of spaced apart metallic facing sheets, each of the sheets having defined therein a plurality of rib members in spaced apart relationship over the sheet, each of the rib members projecting toward the inside of the panel and each of the spaced apart metallic sheets having a coating on the inner surface thereof comprising a layer of an inorganic nonflammable nonmetallic material, a plurality of connecting members in spaced apart relationship between the sheets, the connecting members extending generally between the inorganic layers adjacent the facing sheets and securing the layers in spaced relationship, each of the connecting members being partially embedded in each of the layers of inorganic material and being in spaced relationship to the metallic facing sheets.

2. A building panel comprising at least a pair of spaced apart metallic facing sheets, each of the sheets having an outer side and an inner side, each of the sheets having disposed on the inner surface thereof a plurality of rib members in spaced apart relationship over the sheet, each of the rib members terminating in an enlarged portion, a layer of inorganic nonflammable rigid nonmetallic material disposed adjacent the inner sides of each of the facing sheets, a plurality of connecting members in spaced apart relationship over the inner surfaces of the sheets, each of the connecting members being secured in the inorganic layers of the facing sheet and so constructed and arranged so as to maintain the facing sheets in spaced relationship to each other, and prevent a metal to metal thermal path between the spaced facing sheets.

3. The panel of claim **2** wherein the ribs terminate in a flange.

4. The panel of claim **2** wherein the connecting members are elongated ribs having two spaced apart flanges, each flange embedded within the inorganic material and being in spaced relationship to the metallic facing sheet.

5. The panel of claim **2** wherein the inorganic layer is a cementitious material.

References Cited

UNITED STATES PATENTS

1,630,857	5/1927	Meyercord	52—619
2,103,407	12/1937	Dean	52—481
2,356,309	8/1944	Garbe	52—450
2,699,669	1/1955	Nelsson	52—481
2,717,664	9/1955	Grafman	52—619
2,804,670	9/1957	Barker	52—481
2,911,076	11/1959	Saunders et al.	52—619
3,184,013	5/1965	Pavlecka	52—615

FRANK L. ABBOTT, *Primary Examiner.*

RICHARD W. COOKE, JR., *Examiner.*

J. L. RIDGILL, *Assistant Examiner.*