Dec. 26, 1961 W. W. KRAUSS ET AL 3,014,560

BUILDING PANEL

Filed Jan. 12, 1955 4 Sheets-Sheet 1

Fig. 1.

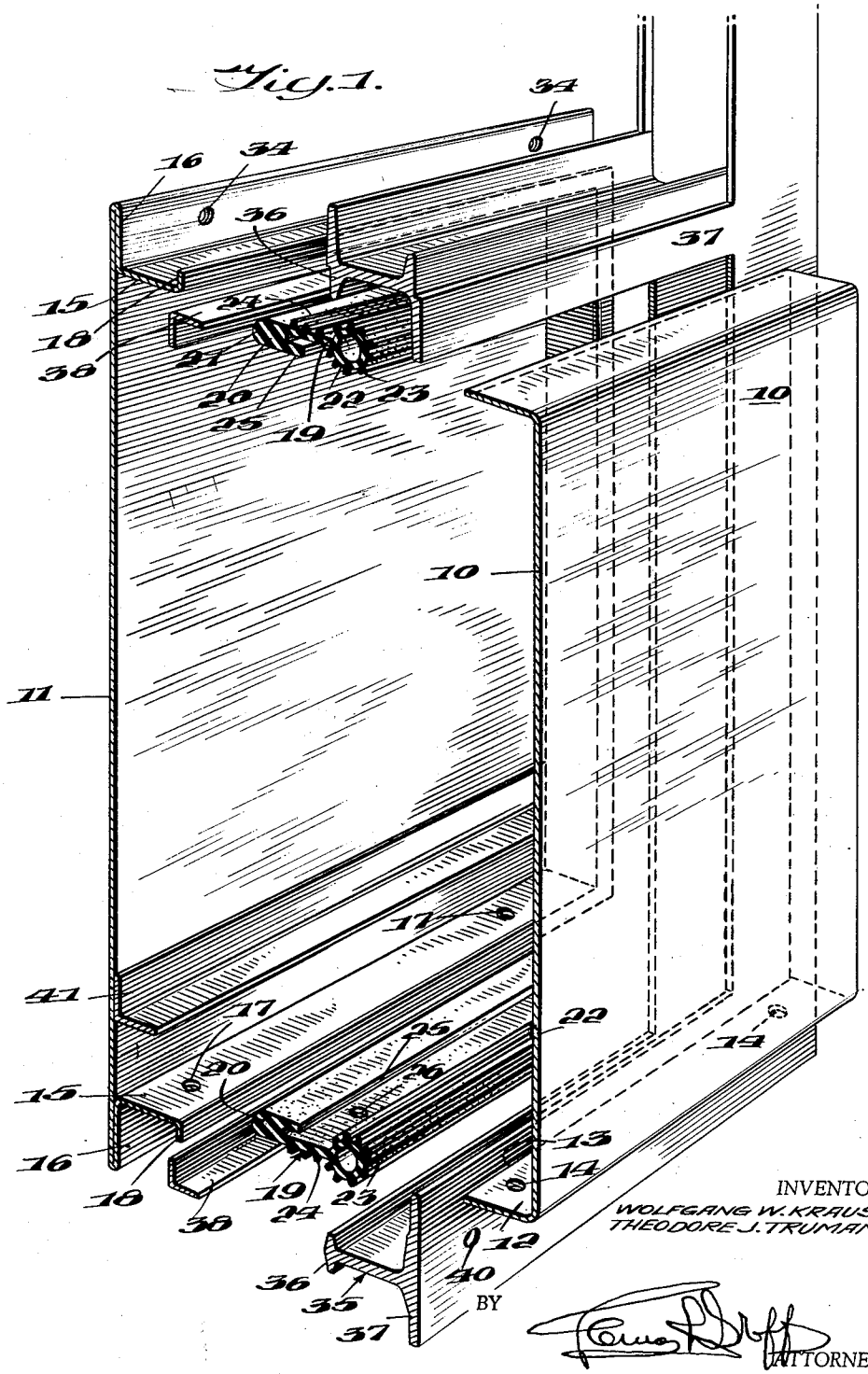

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Fig. 3.

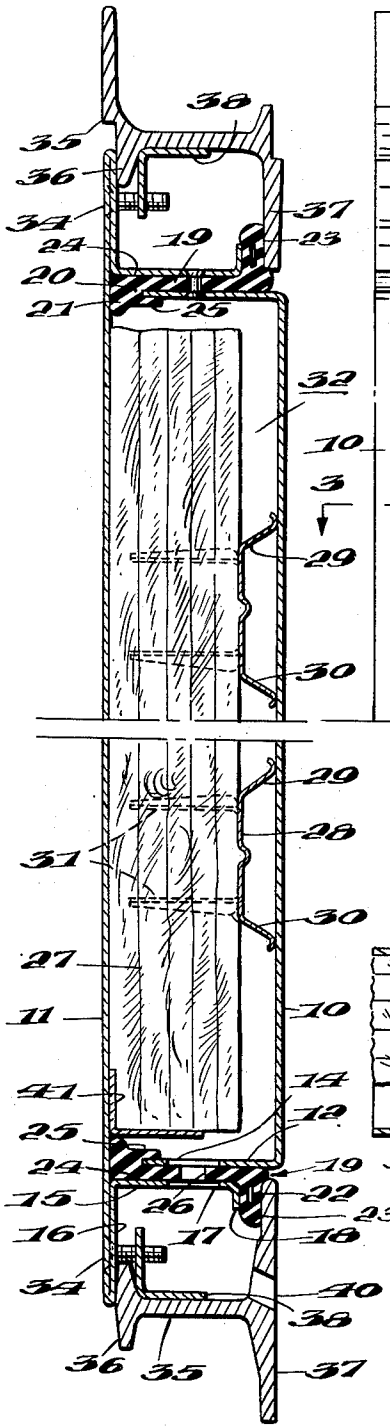

Fig. 2.

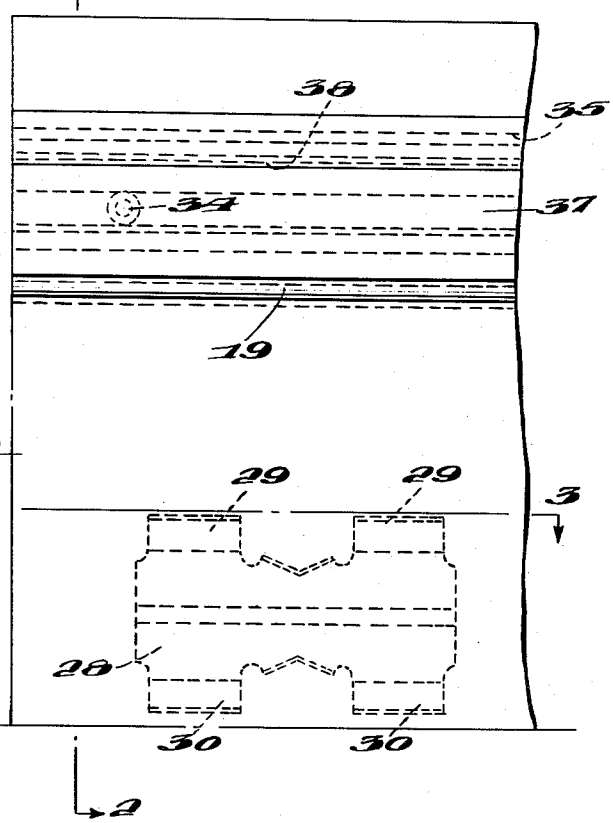

Fig. 4.

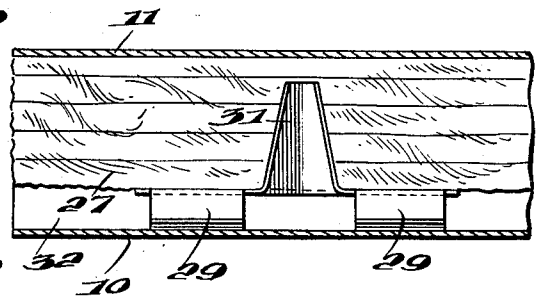

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Fig. 5.

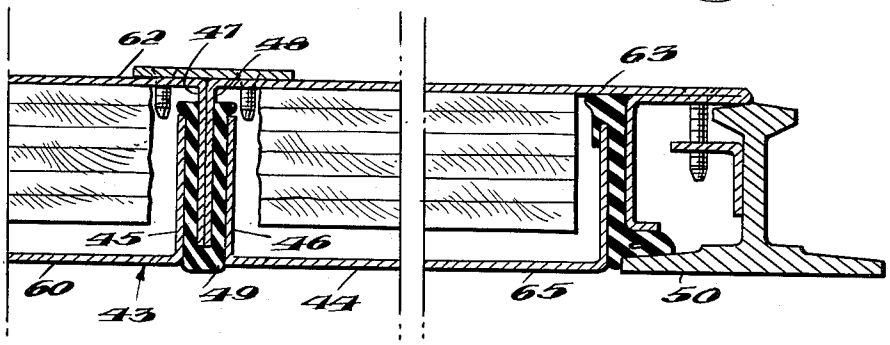

Fig. 6a.

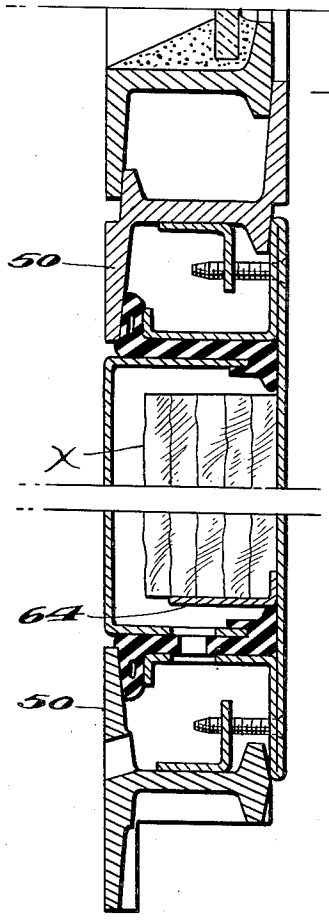

Fig. 6.

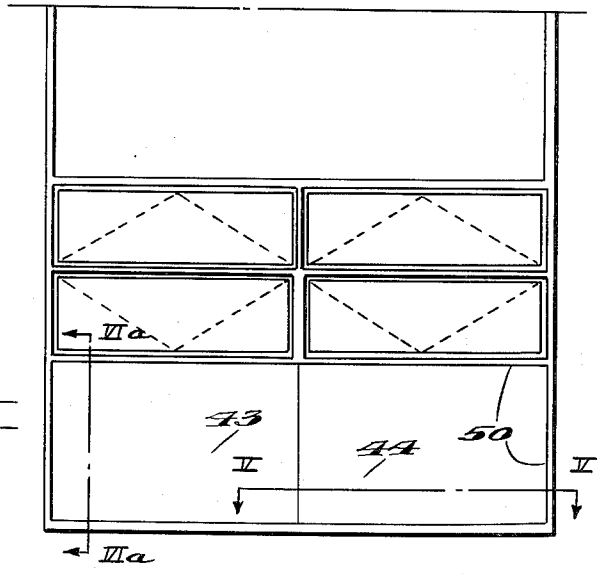

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Fig. 7.

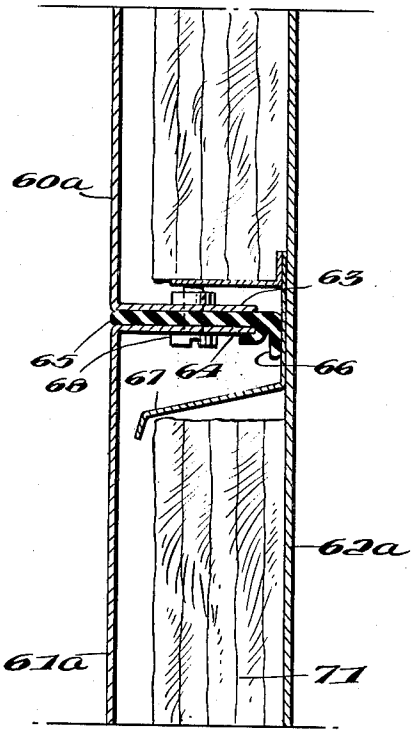
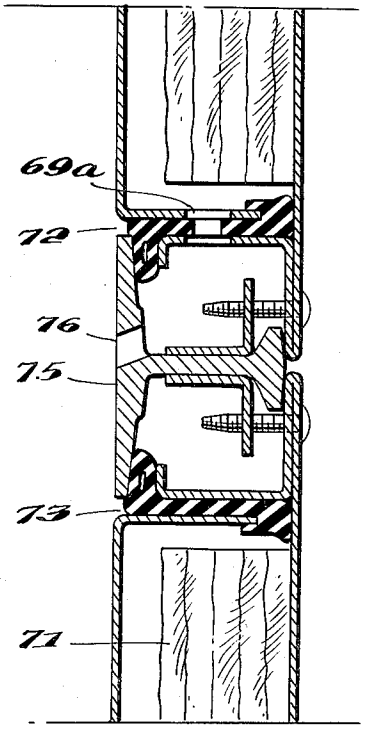


Fig. 8.



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3,014,560

BUILDING PANEL

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Filed Jan. 12, 1955, Ser. No. 481,403
4 Claims. (Cl. 189—34)

The present invention relates to an insulated laminated metal building panel.

Heretofore, walls such as are required for large buildings to provide structural strength, insulation and waterproof properties have usually been constructed of masonry. For example, the usual masonry wall may be approximately twelve inches thick, that is, four inches of brick, six inches of backup and two inches of furring, lath and plaster. This construction is built by a large crew of laborers using elaborate scaffolding construction and such twelve inch thick masonry structures have an assembly weight of approximately 78.16 pounds per square foot. Masonry construction is expensive in the first instance because of relatively expensive building trades field labor and also because this type of construction requires additional cost in foundation over constructions having less weight per unit of wall area. Thus reduction in cost is effected by getting the wall units, or the principal portions thereof, preassembled so that the assembly time at the job site is kept to a minimum.

It is an object of this invention to provide a novel all metal panel for assembly on the job site, whereby all wall masonry construction is eliminated completely.

The development of the present insulated metal panel has resulted in a design that permits "breathing" or the free flow of air into the panel while still preserving the insulating and weathering characteristics of the panel. These attributes have not been attained heretofore.

Accordingly, another object of the invention is to provide a novel laminated insulated panel, whereby the above advantages are obtained.

A further object is to provide a novel positioning and mounting system for insulation material between metal sheets in a laminated panel.

A further object is to provide a novel plastic sealing means for each laminated panel.

Still another object is to provide a novel laminated panel having one or more weep holes for escape of condensation and which allow for continuous ventilation of the space between the panels.

Yet another object is to provide a novel spacing clip for properly positioning the insulation in the panel.

Also generally an object is to provide an economical light weight panel for building wall constructions having the many foregoing attributes.

Many other objects and advantages of the present invention panel will become apparent from the following detailed description when read in conjunction with the accompanying drawings, wherein:

FIG. 1 is a pull-apart view of the several elements of the novel panel in their respective positions for assembly as a unit with the insulation and the spacing clips therefor removed for clarity.

FIG. 2 is a front elevational view of a portion of the panel assembled and including the insulation clip.

FIG. 3 is a longitudinal cross section view on line 2—2 of FIG. 2 of the panel assembled and mounted in a suitable one-story metal frame with a weep hole opening to the exterior atmosphere, which frame is subsequently to be secured to the several floor levels of a building.

FIG. 4 is a section taken on the line 3—3 of FIG. 2 illustrating the insulation and clip for the same.

FIG. 5 is a further embodiment of the invention in a

cross section of a vertical joint between two panel units and of a vertical joint connected to a vertical frame member taken on the line V—V of FIGURE 6.

FIG. 6 is a front view of a frame enclosing a pair of insulated panels with a vertical joint connection.

FIG. 6*a* is a cross section view of a horizontal joint with a stainless steel ledge adapted to support an insulation pad taken on the line VI^a—VI^a of FIGURE 6.

FIGURE 7 is still a further embodiment of the invention in cross section of a horizontal joint between panel units having at least two outside pans with adjacent flanges and one continuous inside pan.

FIG. 8 is a cross section of horizontal joint connections to each side of a horizontal frame member as distinguished from the vertical joint and frame connection of FIG. 5.

Referring in detail to the drawings and first with particular reference to FIGS. 1 and 3, the panel comprises basically two spaced apart sheets, namely an exterior sheet 10, such as a sheet of porcelain enamel and an interior sheet 11, such as a sheet of furniture steel or the like. These sheets are each formed with flanges, which skirt the periphery of the sheets 10 and 11 at substantially right angles from the rear face of each sheet. For example, sheet 10 is smaller in surface area than sheet 11 and includes a flange 12 terminating in a straight edge 13. The flange 12 is also formed with one or more openings 14 therein for the reasons hereinafter to be explained. The internal flange 15 of larger sheet 11 is set back from the peripheral edge of the sheet. This is accomplished by folding a section 16 of the sheet 11 back upon itself before forming the flange 15. This flange, like flange 12, is made with one or more openings 17 adapted to be aligned with the one or more openings 14, as shown in FIG. 3. Also, flange 15 includes an outwardly turned edge or gasket abutment member 18.

The flanges 12 and 15 of the sheets 10 and 11 extend in spaced apart parallel relation toward each other when in panel forming position. The sheets and their respective flanges are held separated by a sealing unit, such as a vinyl gasket 19, so that the two sheets nowhere touch each other. The gasket 19 comprises a body especially formed to coact with the flange 12 and its straight edge 13 and the flange 15 and its edge or abutment member 18. For example, the gasket includes a web or strip 20 having a straight longitudinal edge 21 and a hollow tubular edge 22 with elongated ribs 23. The strip face is also formed with longitudinal ribs 24 on one face for yielding contact with the face of the flange 15, while on its opposite face adjacent the longitudinal straight edge thereof it is formed with a stop, such as a longitudinally extending integral fin 25 angled rearwardly from the straight edge of the gasket, so as to provide a groove so that the straight edge embraces the related edge of the flange 12 and securely seat the longitudinal straight edge 13 of this flange, when the sheets are in assembled position. The gasket 19 is also formed with one or more openings 26 for alignment facilitated by the stop 25 with openings 14 and 17 of the flanges, see FIG. 3.

When the sheets are assembled with the gasket in position therebetween the same may be secured permanently by fastening means, such as rivets or the like punched through the thickness of the flanges and gasket strip.

Prior to assembly of the sheets 10 and 11 a pad or mat of insulation, such as a glass fiber mat 27 is placed flat upon the inner face of sheet 11 and a plurality of clips 28 with spring arms 29 and 30 and having penetrating means 31 are forced into position through the pad or mat material, so the spring arms are held yieldably under pressure against the inner face of sheet 10. To prevent any possibility of the insulating pad slipping

downward due to vibration during shipment or after the unit assembly is installed in place in the completed structure, a continuous stainless steel shelf angle 41 is secured to the inside face of the interior sheet immediately below and supporting the insulating pad 27. Thus, the pad 27 is yieldably held between the sheets and in spaced relation to sheet 10 and the flange 12 thereof, to thereby provide an airspace 32 and permit breathing and expansion and contraction of the panel through the holes 14, 26 and 17 in the gasket 19 and flanges 12 and 15.

The interior sheet 11 with the inset flange 15 is formed with openings near its edge for anchor means, such as bolts 34, whereby an assembled panel may be mounted in a skeleton wall frame 35 having a head 36 and a relatively wider base 37 completely from the inside of a building structure, thereby doing away with the need for the usual exterior scaffolding. When the assembled panel is positioned in the frame opening therefor the gasket tubular part 22 is squashed between the footing means 18 of flange 15 and the base 37, while the inner faces at the edge of the sheet 11 engage against the head 36 of the wall frame 35. The panel is secured in watertight position in the frame by angle strips 38 having threaded openings for bolts 34. These strips 38 conform to the opposite side of the frame head position 36 and when the bolts 34 are threaded tight the panel is securely clamped to the frame head in a watertight connection. If desired, a mastic may be applied between the portion 36 and sheet 11. The base 37 of the frame is bored through angularly, to thereby provide a weep hole 40 below the openings in the gasket and flanges from the airspace 32. Thus, in addition to permitting breathing, and pressure equalization of the panel, moisture accumulation arising from condensation may readily drain therefrom.

The frame construction into which the assembled panel unit or units are fitted may be of different specific forms to mount a panel unit or units adjacent to another panel unit or units or adjacent to a stationary window light or to a movable window ventilator.

The construction of the present novel panel provides for mass production as each separate part is readily made as a standard product and then each part may be assembled into the complete panel unit easily and accurately. For example, the sheet 11 is laid flat with the flanges 15 projecting upward, and the insulation pad 27 is positioned on the sheet between the flanges 15 with the clip arms exposed, then the fin 25 of the gasket 19 is hooked over the straight edge 13 of flange 12, so that the strip portion 20 of the gasket 19 is flat against the exterior face of the flange with their respective openings 14 and 26 in alignment, and finally the sheet 10 with the gasket 19 attached is forced downward against the spring arms of the clips over the insulation pad 27 within the enclosure made by the flange 15, until the opening 17 of the flange is aligned with the openings 14 and 26 and the straight edge of the gasket 19 abuts the inner face of the sheet 11 and the footing 18 engages the gasket tube portion 22, which is subsequently deformed by pressure developed between the frame base 37 and the flange footing 18.

There are instances wherein insulating panels such as hereinbefore described in reference to FIGS. 1 through 4 are preferably connected together by vertical or horizontal joints. For example, it has been found impractical to satisfactorily porcelainize an area of steel exceeding an area, for example, of twelve or fifteen square feet without possible undulations in the reflective surface thereof. Accordingly, a special vertical joint between panels and a panel and frame as illustrated in FIG. 5 taken on the section line V—V of FIGURE 6 was devised between the vertical ends 41 and 42 of each of a pair of contiguous panels 43 and 44. These ends each comprise overlapped flanges 45 and 46 and 47 and 48, respectively, with an intermediate U-shaped packing member 49 receiving flanges 47 and 48 is squashed between flanges 45 and 46 when the panels are mounted in a rectangular frame structure 50, see FIG. 5.

The vertical joint between the frame 50 is the same as shown in FIGS. 1 and 3 with respect to frame 37.

A third embodiment relating to a horizontal joint is disclosed in FIG. 6*a* taken on the section line VI^a—VI^a of FIGURE 6 in the form of a stainless steel ledge 64. This ledge is to support a pad of insulation X and retain the same in vertical position on the inside wall of the interior panel.

A fourth embodiment of this invention relates to a horizontal joint between a panel having two exterior pans and one continuous interior pan as illustrated in FIG. 7. This panel consists of one standard interior pan 62^a and two exterior pans 60^a and 61^a, preferably porcelain enameled. These outside pans are formed with flanges 63 and 64 with a suitable gasket or packing 65 therebetween. This packing 65 extends beyond the free edges of the flanges and turns over at 66 against the face of a flashing element 67 secured to the inner side of pan 62^a. Preferably when the joint is horizontal, breathing holes alternating with bolts 68 are provided for ventilation of the top section. Below the holes the stainless flashing 67 extends angularly toward the inner face of pan 61^a to divert condensation water draining through the breathing holes to the outside porcelain protected pan, rather than being allowed to fall into the insulation 71 and thereby contact the inside painted pan 62^a.

In FIG. 8 there are illustrated with respect to the vertical joints just described in reference to FIG. 7, vertical joints 72 and 73 between the legs of a frame member 75. Frame 75 is formed with a weep hole 76 below and in communication with a weep hole 69^a through the joint 72. This arrangement is substantially identical with the lower frame formation 37 of FIG. 3.

Thus, there are provided novel laminated metal panel arrangements comparable with the conventional masonry constructions in insulation value and superior in many other respects, such as providing for construction and maintenance economy and interchangeability, as well as being vermin proof, fire resistant and self adjusting for weather variations and for slight misalignment of the wall frame members.

While only a few embodiments of the invention are specifically shown and described in detail, it is to be expressly understood that there may be changes made in the individual parts, combinations thereof and methods of assembly without departing from the concept of the invention. To determine the scope of the invention reference should be had to the appended claims.

We claim:

1. An insulated panel for placement in supports forming walls in building structures, comprising, in combination, an exterior sheet, peripheral flanges extending inwardly of the outer face of the sheet, an interior sheet of greater horizontal and vertical dimension than the exterior sheet, peripheral flanges at the edges of the interior sheet and including a portion folded back parallel to and in contact with the inner face of said sheet and thence disposed at a right angle to provide internal flanges spaced apart a distance greater than the distance between the flanges of the exterior sheet to receive said last mentioned flanges of the exterior sheet and providing a gasket web receiving space therebetween, the inner edges of the said internal flanges offset outwardly to provide a gasket abutment and a deformable sealing gasket including a web fitted in said gasket web receiving space and having at its inner end an overlying fin providing with the upper face of the web a grooved portion embracing the edge of the related flange of the exterior sheet, said gasket also having a tubular head portion partially collapsed by the related flange of the exterior sheet.

2. An insulated panel according to claim 1, wherein, the inner face of the interior sheet has a shelf angle attached thereto, an insulating pad of less thickness than

the space between the inner faces of the exterior and interior sheets and having its lower portion resting on said shelf angle, and clips between the outer face of said pad and the inner face of the exterior sheet, said clips including body portions and disposed at different elevations, to support the insulating pad, and also having means at one end to penetrate the insulating pad holding the same against downward sett ement, and spring means at the other end of each clip engaging the inner face of the exterior sheet and forcing the pad toward the interior sheet.

3. An insulated panel according to claim 1, wherein, the folded portions of the flanges at the peripheral flanges of the interior sheet are provided with openings, and angle strips have registering openings to receive fastenings to draw the strips into engagement with said support.

4. An insulated panel according to claim 3, wherein, the supports are flanged structural members arranged to provide frames for the panels.

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