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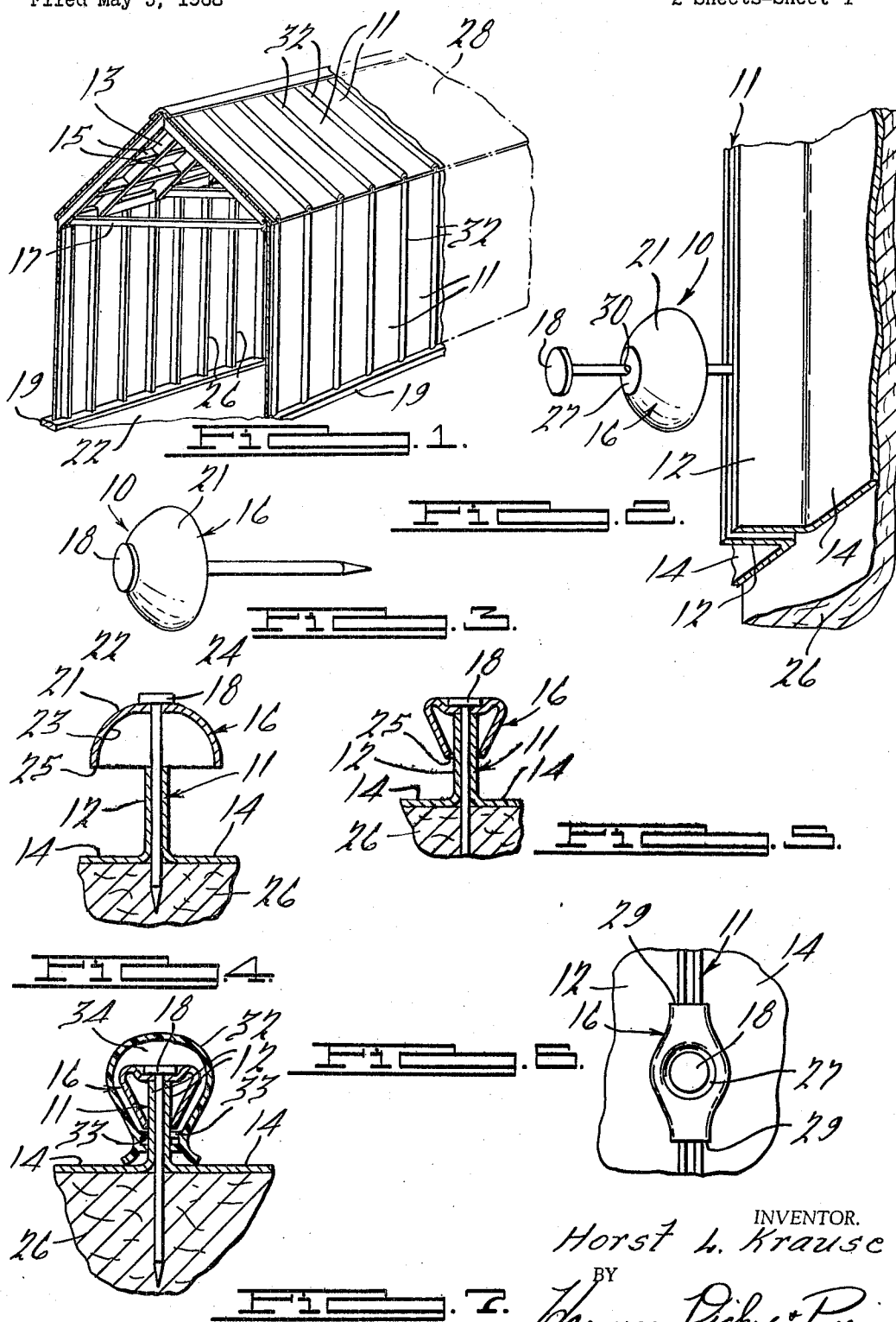
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3,495,368

BUILDING STRUCTURE AND FASTENER FOR USE THEREWITH

Filed May 3, 1968

2 Sheets-Sheet 1



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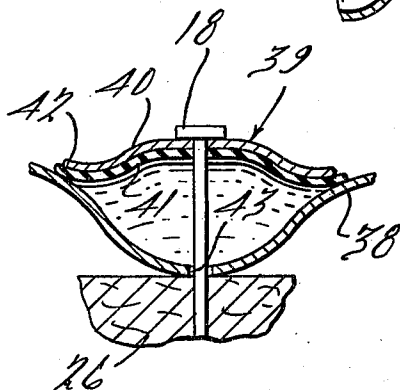
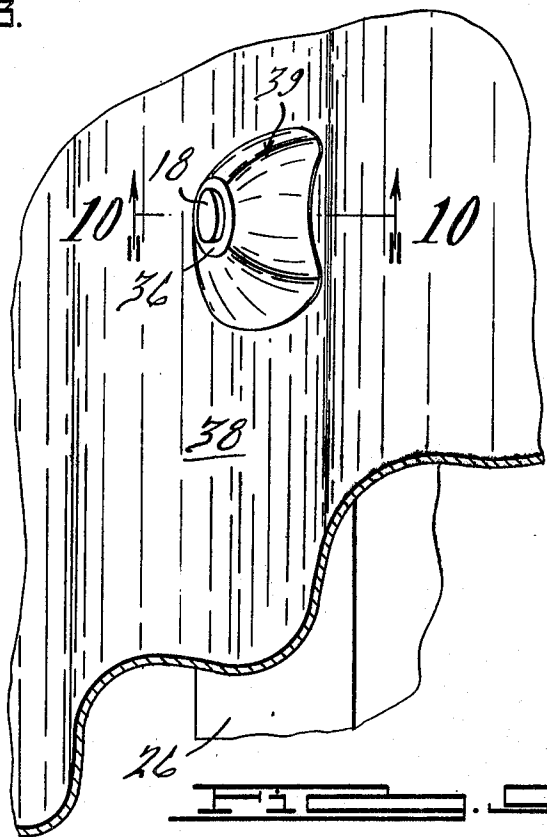
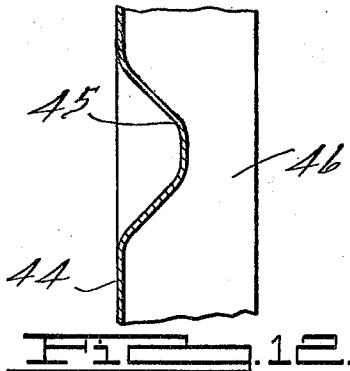
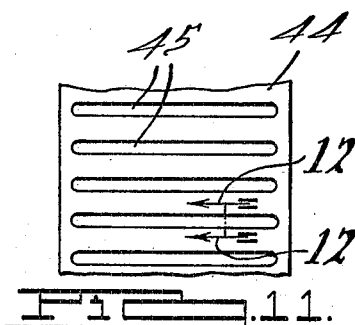
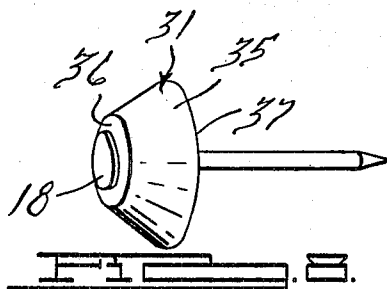


Fig. 10.

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BUILDING STRUCTURE AND FASTENER FOR USE THEREWITH

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4 Claims

ABSTRACT OF THE DISCLOSURE

A building having prefabricated and pre-finished metal panels covering a wooden supporting framework. The panels are held in place by special clamping members which deform into clamping engagement with the panels as nails are driven through them into the supporting framework.

BACKGROUND OF THE INVENTION

In recent years there has been an increasing demand for so-called "commodity sheets" used in the exterior paneling of utility type buildings. Such sheets or panels are made from sheet metal which has been corrugated, crimped, ribbed or otherwise formed. The panels are nailed or fastened to a wooden framework or building supporting structure to define enclosing walls and a roof for the building. Buildings of this general construction are frequently found on farms but they are also suited for many commercial and industrial uses.

In the installation of metal commodity sheets or panels onto a supporting framework it is generally required that overlapped sheets be drilled with a power drill in order to form nail holes. Nails are then driven through such holes into the supporting framework. This procedure has been bothersome and buildings of this general type are frequently located on sites remote from a source of electric power. Furthermore, the nail holes tend to rust and to leak water into the building. While the nail holes can be puttied, this is a time consuming and undesirable procedure.

It has been found that panels which have been drilled and nailed to a supporting framework will frequently warp as the result of their thermal expansion and contraction. This thermal expansion and contraction will also apply undesirable stresses to the nails and to the supporting frame work which tends to deteriorate the building. Another problem in buildings covered with standard commodity sheets has been the capillary action created in tight joints between overlapped sheets. This has a tendency to draw water into the joints with consequent rusting of the sheets. In addition, many such buildings are used as chicken coops or for other purposes where odors are produced. Under such circumstances it is necessary to equip such buildings with special expensive vents inasmuch as the panel construction itself does not provide any venting for the interior of the building.

In view of the above problems as well as other considerations, it is believed that an improved building construction employing a prefabricated sheet metal covering should possess at least some of the following advantages: The ability to be assembled by relatively unskilled workmen with simple non-power hand tools, rapid and low cost assembly, the use of low cost panels and fasteners, self-venting simplified sealing for the sheet joints and fasteners, the elimination of nail holes in the sheets, attractive appearance, a fastening and joint construction which seals against the flow of water into the joints and building interior, the minimizing of maintenance expenses,

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the ability of the sheets to expand and contract with temperature changes without warping and without imposing stresses on the fasteners and other supporting structure, strength and durability. The construction of the present invention is designed to overcome the foregoing problems and to possess the above stated advantages. Other advantages flowing from the present invention will become apparent from the ensuing description of the preferred embodiments of the invention.

SUMMARY OF THE INVENTION

The present invention relates to a building construction per se as well as to fasteners used in such building and the method of erecting the building.

The building employs elongated sheet metal panels which are formed with right angle flanges along their sides. The panels are held on studding or other supporting structure by nails or other fasteners driven between the flanges of adjacent panels. The nails pass through special clamping members which are originally cup-shaped but which deform over the flanges as the nails are driven. Extruded plastic channel members are placed over adjacent pairs of flanges and cover the fasteners. The clamping members thus grip and hold the panels in place without actually puncturing the panels. The channel members seal the joints between panels against the entry of water while, at the same time, venting the building to atmosphere. The deformable clamping members may also be used with other types of standard commodity sheets or panels wherein the nails are then driven through nail holes drilled in the panels, and in such case the clamping members desirably form a seal to exclude water and the like, from entering through the nail holes.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGURE 1 is a perspective view of a building constructed in accordance with the present invention;

FIGURE 2 is a perspective view of a portion of the structure of FIGURE 1, with the fastener assembly being shown before it is driven;

FIGURE 3 is a perspective view of the fastener assembly shown in FIGURE 2;

FIGURE 4 is a sectional view of the structure of FIGURE 2 with the fastener assembly shown only partly driven;

FIGURE 5 is a view similar to FIGURE 4, but with the fastener assembly being shown fully driven;

FIGURE 6 is a plan view of the structure shown in FIGURE 5;

FIGURE 7 is a sectional view of the structure in FIGURE 5 with the addition of a channel member fitted over the joint between the adjacent panel member;

FIGURE 8 is a perspective view of a modified form of the fastener assembly as shown in FIGURES 2, 3 and 4;

FIGURE 9 is a perspective view of the structure showing another form of the present invention;

FIGURE 10 is a sectional view of the structure of FIGURE 9, taken along the line 10—10 thereof;

FIGURE 11 is a plan view of a modified form of panel usable in lieu of the panels shown in FIGURES 1 and 2; and

FIGURE 12 is a sectional view of the structure shown in FIGURE 11, taken along the line 12—12 thereof.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring first to FIGURE 1 of the drawings, a building is shown in which a plurality of identical sheet metal panels 11 are fastened to a wooden supporting framework consisting of vertical studs 26, rafters 13, roof cross members 15, joists 17 and toe plates 19. The framework

is positioned on a concrete slab 22. The panels 11 which are positioned on the outside of the studs 26 form enclosing walls for the building while the panels 11 positioned on the rafters 13 and roof cross members 15 form a roof for the building. The wall forming panels 11 rest on the toe plates 19 but are held in place against the studs 26 by identical fastener assemblies 10. The panels 11 on the roof are also held in place by the fastener assemblies 10.

As illustrated in FIG. 2, the panels 11 are provided with flat planar portions 14 which engage the supporting framework. A pair of parallel flanges 12 are formed along the opposite sides of the panels 11 at right angles to the main planar portion 14 thereof. The panels 11 are elongated and flanges 12 run lengthwise of the panel. The lengths and widths of the panels selected for any given building may vary although the flanges 12 are preferably between $\frac{3}{4}$ of an inch and 2 inches in height.

The panels 11 are positioned on the supporting framework in parallel, side-by-side relation, so that the confronting flanges 12 of adjacent panels are spaced apart a short distance. The spacing of the panels 11 permits the insertion therebetween of a headed fastener in the form of a nail 18 which also passes through a generally cup-shaped clamping member 16 (see FIGS. 2-4). The clamping member 16 is of generally concavo-convex configuration, having a convex outer peripheral surface 21 and a concave inner peripheral surface 23. The surfaces 21 and 23 extend between an annular lip 25 and a central flat portion 27. The flat portion 27 is provided with an aperture 30 which is located generally centrally of the clamping member 16. The spacing between adjacent flanges 12 of the panels 11 is shown as being equal to the diameter of the shank of the nail 18 although a somewhat greater spacing is readily accommodated by the fastener assembly 10. In fact, one of the advantageous features of the present invention is that very accurate placement of the panels is not necessary.

A plurality of fastener assemblies 10 are spaced at suitable intervals along the lengths of the panels 11 in the joints or spaces between adjacent panels. FIG. 2 shows the fastener assembly loosely positioned in such a joint prior to the time the nail is driven. FIGURE 4 shows the fastener assembly with the nail 18 driven to a depth such that when the head of the nail rests on the flat area 27, the lip 25 of the clamping member 16 will rest on the free edge of the flanges 12. Continued driving of the nail 18 beyond the point shown in FIG. 4 will produce deformation of the clamping member 16, causing it to wrap around the flanges 12 and assume the configuration illustrated in FIG. 5. At this point the nail 18 has been fully driven so that the flat portion 27 of the clamping member 16 is brought to rest against the edges of the flanges 12. The deformed configuration of the clamping member 16 is further illustrated in FIG. 6 from which it will be seen that opposite portions 29 of the lip 25 will remain in engagement with the edges of the flanges 18, while the portions of the lip 25 intermediate the portions 29 will move toward the panel portions 14 and toward one another so as to engage the outer sides of the flanges 12.

As illustrated in FIG. 7, an extruded plastic channel capping member 32 is adapted to be snap fitted over each adjacent pair of flanges 12 to enclose the clamping members 16 and close the space between adjacent flanges 12. The channel members 32 are generally of U-shaped configuration and have opposed inner sealing ribs 33 which contact the flanges 12 between the planar portions 14 of the panels 11 and the clamping members 16. By this means the entry of dirt, water and other undesirable elements into the spacing between the flanges is prohibited. The channel members 32 are resilient and their natural shape will hold the ribs 33 in engagement with the flanges 12. The ribs 33 will engage the clamping members 16 to prevent the channel members 32 from coming off of the flanges 12. Accordingly, the clamping

members 16 also serve to retain the channel members 32 on the flanges 12.

It will be noted that the channel members 32 define a channel 37 which is open to the spaces between adjacent flanges 12. The channel 34 will serve to conduct air, fumes, odors and the like which will pass from the interior of the building through the spacing between the flanges into the channel 34. Looking at FIG. 1, it will be seen that the lower ends of the channel members 32 which are mounted on the roof are open to the atmosphere at their lower ends. Accordingly channels 34 of the roof mounted channel members 33 are exposed to atmosphere at their lower ends. The channel members 32 may be made in any desired colors and their positioning over the flanges 12 and clamping members 16 considerably enhances the appearance of the building.

FIGURE 8 illustrates a somewhat modified form of clamping member 31 which is used with the panels 11. The clamping member 31 is similar to the clamping member 16 except that the segmentally spherical walls 21 and 23 of the clamping members 16 have been replaced with conical walls 35 which extend from a flat upper portion 36 of the clamping member 31 to an annular lip 37. The clamping member 31 will deform in substantially the same manner as the clamping member 16.

FIGURE 9 illustrates still another clamping member 38 which is of a two part construction, including a concavo-convex metal element 39 and an elastomeric or rubber element 40 bonded to the concave side of the member 39. The elastomeric element 41 extends around a lip 42 of the metal member 40 so as to seal against a panel member 38 with which this fastener assembly is utilized. It will be seen that the panel member 38 with which the structure is used is of conventional corrugated shape and has a nail hole 43 drilled therethrough for the reception of the nail 18. The advantage of the construction illustrated in FIGS. 9 and 10 is that the rubber element 40 will seal around the nail hole 43 to prevent water and other undesirable elements from passing through the nail hole 43. Furthermore, the nail hole 43 need not be accurately drilled. Irrespective of where on the panel 38 the nail hole is drilled the clamping member 39 will automatically conform to the non-planar shape of the panel 39.

FIGS. 11 and 12 illustrate a somewhat modified form of panel 44 which may be used in lieu of the panel 11. The panel 44 only differs from the panel 11 by the provision of ribs 45 which are embossed thereon in a direction transverse to flanges 46 provided along the opposite sides of the panel. The ribs 45 substantially increase strength of the panel 44 and cooperate with the flanges 46 in reducing any tendency of the panel to undulate or defect.

It should be noted that the joints of some of the panels 11 or 44 which are mounted on the roof of the building are not located over the rafters 13. The nails for such joints are driven into the roof cross members 15. Accordingly, odors which rise within the building are free to flow into such uncovered joints and escape to the atmosphere in the manner previously described.

While preferred embodiments of the invention illustrated herein are believed to achieve the advantages herebefore set forth, it will be apparent that the invention is susceptible of further modification, variation and change without departing from the fair meaning or scope of the subjoined claims.

What is claimed is:

1. A panel assembly covering a supporting structure, said assembly including a pair of panels arranged in side-by-side closely spaced relation, said panels having flanges along the adjacent edges thereof projecting away from the supporting structure and provided with parallel edges at the free ends thereof, a plurality of fasteners spaced along the free ends of said flanges securing said panels to said supporting structure, each fastener including a clamping member and a driven element penetrates a centrally

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positioned aperture in said member, each clamping member being generally U-shaped in cross-section and having a bight-portion overlying the free ends of said flanges and convergent legs with arcuate free edges projecting toward said panels and engaging the outer surfaces of said flanges, said legs clamping said flanges against said driven member. Capping means overlying said spaced flanges and spaced fastener along the length of said flanges.

2. The structure set forth in claim 1 wherein said capping means includes a channel member of generally U-shaped cross-section fitted over said flanges and defining a channel therewithin which is open to the space between said panels in locations between said fasteners.

3. The structure set forth in claim 1 wherein said capping means includes a channel member of generally U-shaped cross-section fitted over said flanges, said channel member having sealing surfaces on the opposite sides thereof engaging the outer surfaces of said flanges inwardly of said clamping members whereby said surfaces engage said clamping members to limit movement of said channel member off of said flanges.

4. The structure set forth in claim 3 wherein said channel member is made from a sufficiently resilient material to permit it to be manually snap-fitted over said clamping members.

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