

[54] PICK-UP COVER

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[22] Filed: **June 3, 1971**

[21] Appl. No.: **149,747**

Related U.S. Application Data

[60] Division of Ser. No. 15,602, March 2, 1970, abandoned, which is a continuation-in-part of Ser. No. 777,934, Sept. 9, 1968, abandoned.

[52] U.S. Cl. **52/79; 52/86; 52/90; 52/309; 52/631; 52/753 H**

[51] Int. Cl.² **E04H 1/12; F04C 2/24**

[58] Field of Search **52/238, 631, 731, 309, 52/69, 79, 86, 90, 753 H; 296/23**

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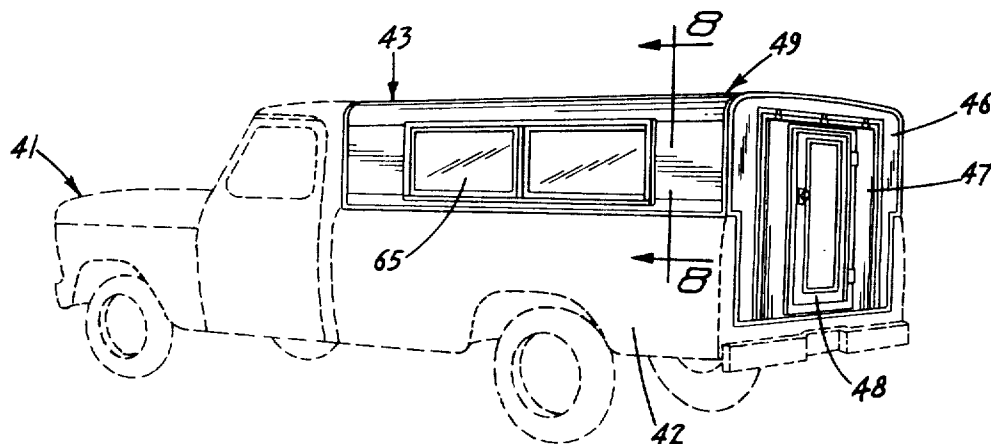
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[57] ABSTRACT

A sandwich panel multi-sided structure mountable on a vehicle body, as a pick-up truck or trailer. The structure is formed from a single flat sandwich panel comprising a bendable sheet metal facing and a rigid plywood facing bonded to opposite sides of a plastic foam core. The core is a compressible expanded polystyrene foam. The panel is provided with spaced pairs of transverse grooves extended through the rigid plywood facing toward the bendable metal facing. The grooves are along the corner sections and divide the panel into a roof section and opposite side sections. The side sections have openings for receiving window structures. The structure is formed by bending the sheet metal facing and compressing the core along the corner sections to form a roof converging outwardly and downwardly from a longitudinal ridge and upright side walls. The back of the pick-up cover is closed with an end wall having a door.

6 Claims, 11 Drawing Figures



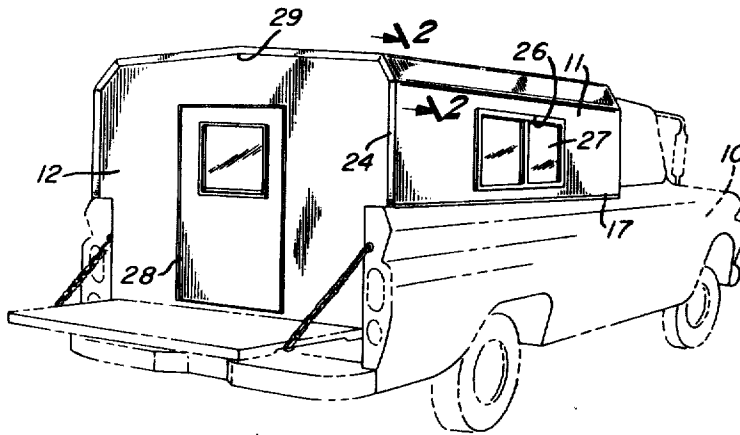


FIG 1

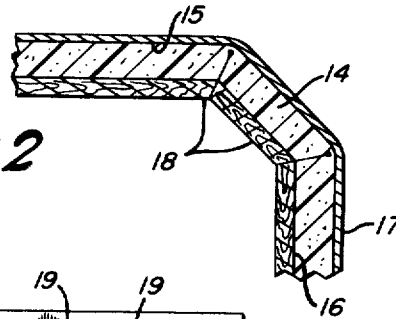


FIG 2

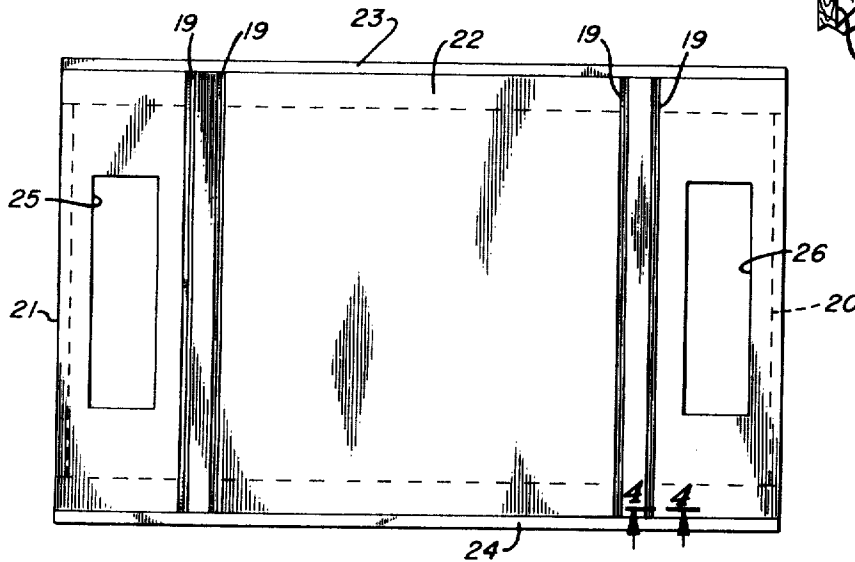


FIG 3

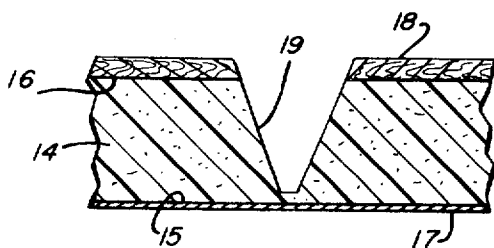


FIG 4

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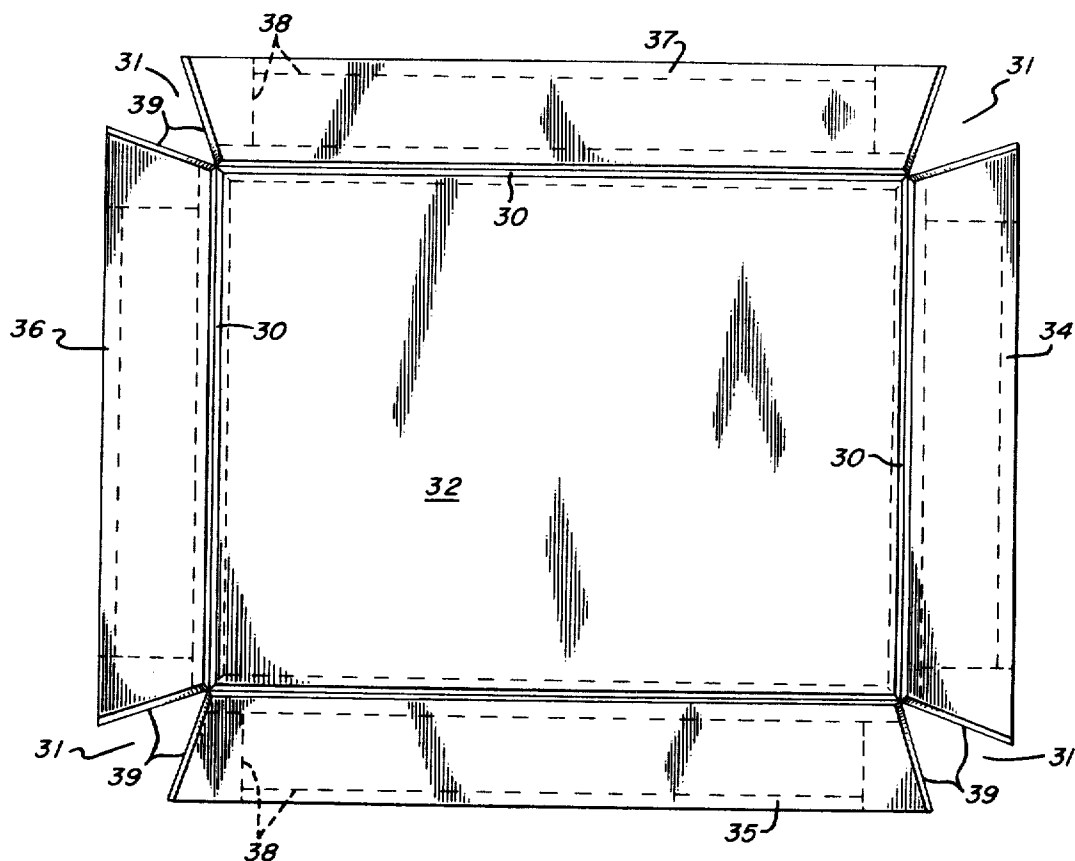


FIG 5

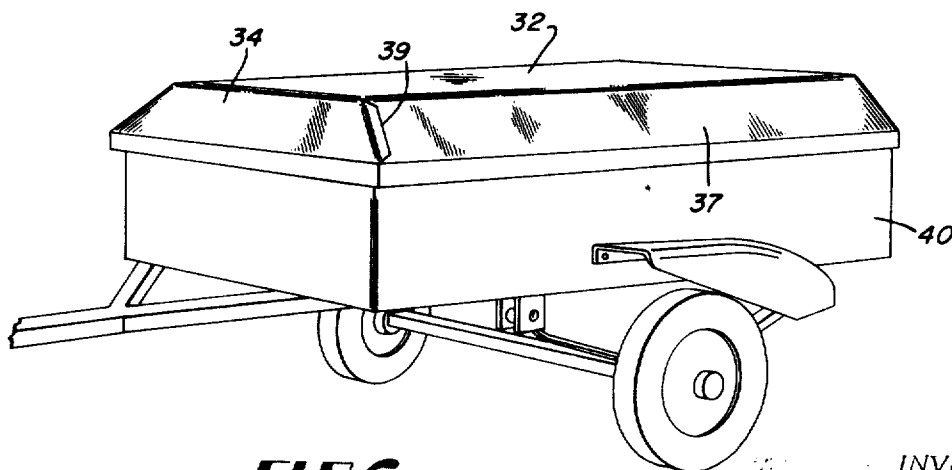
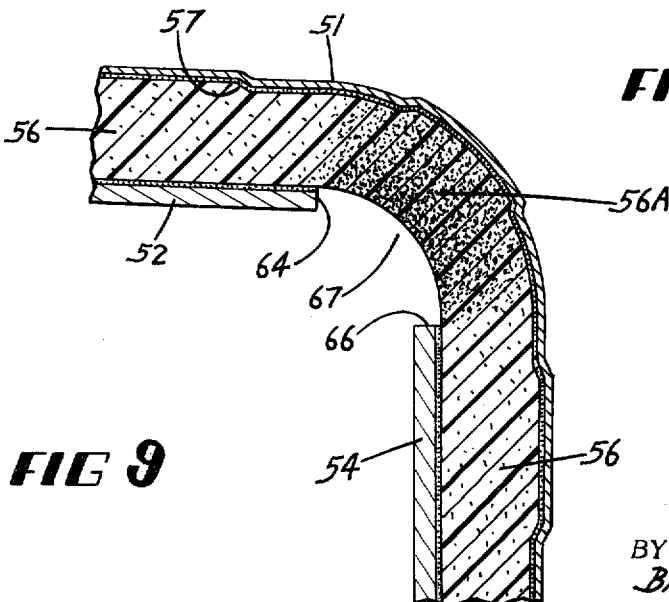
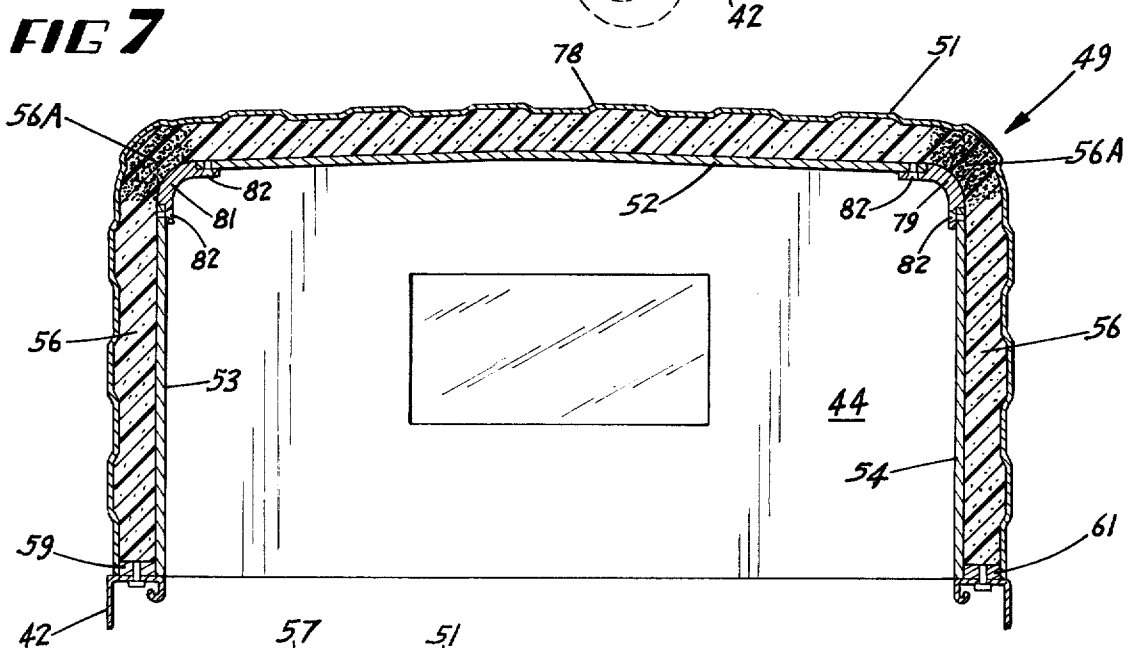
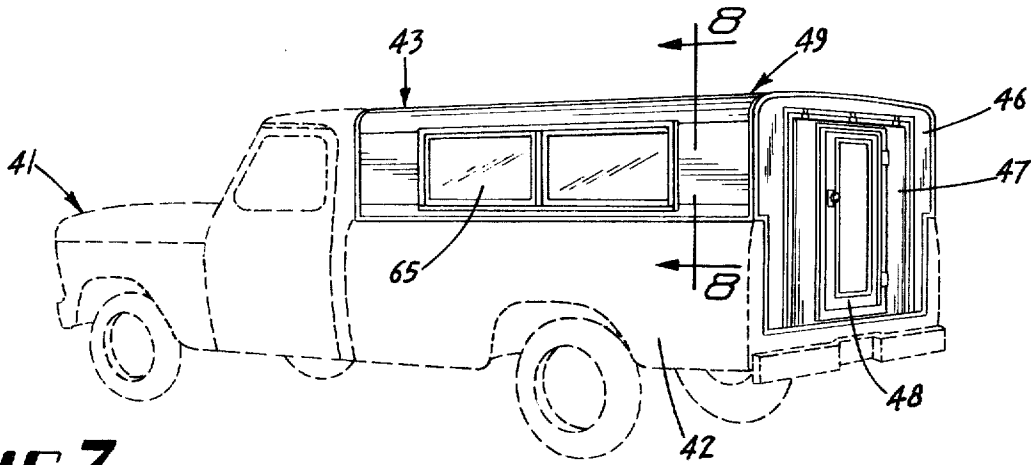


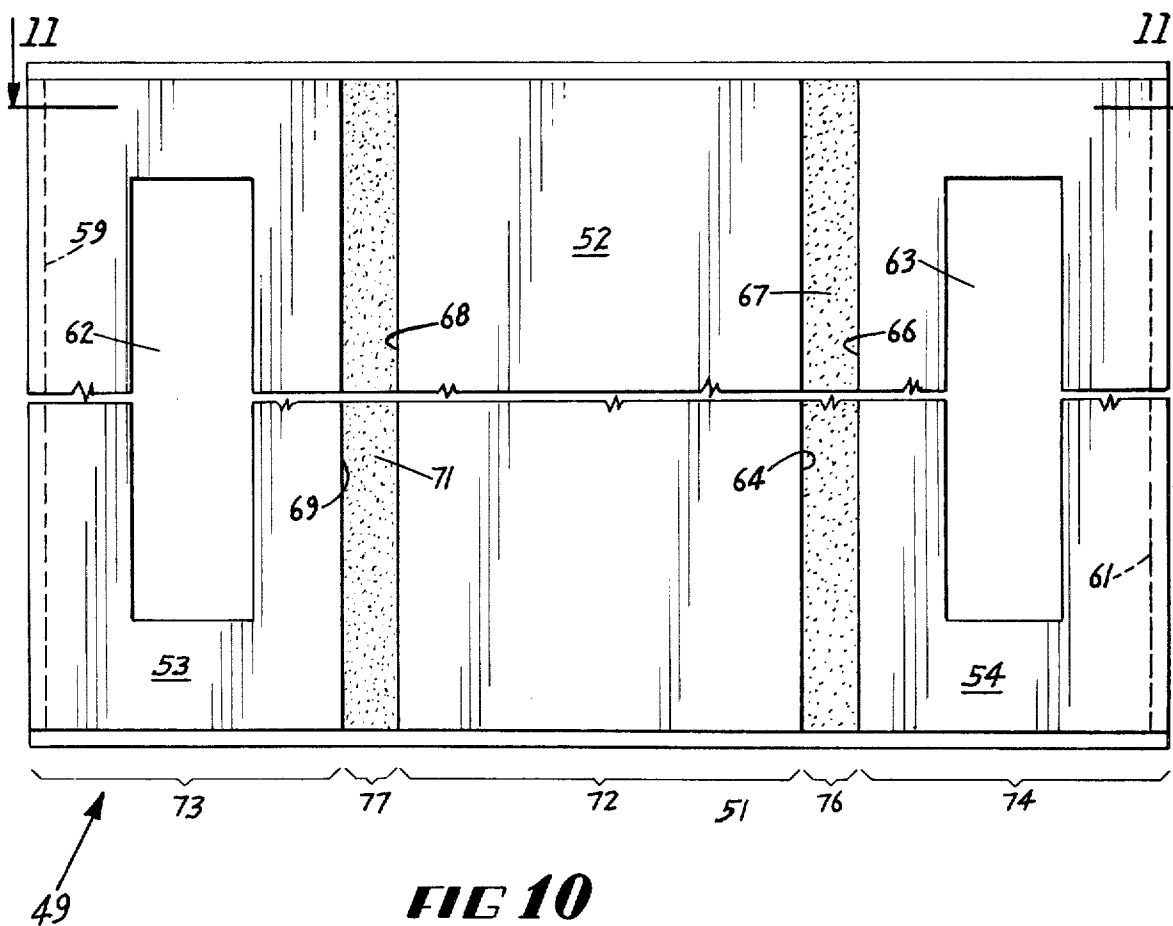
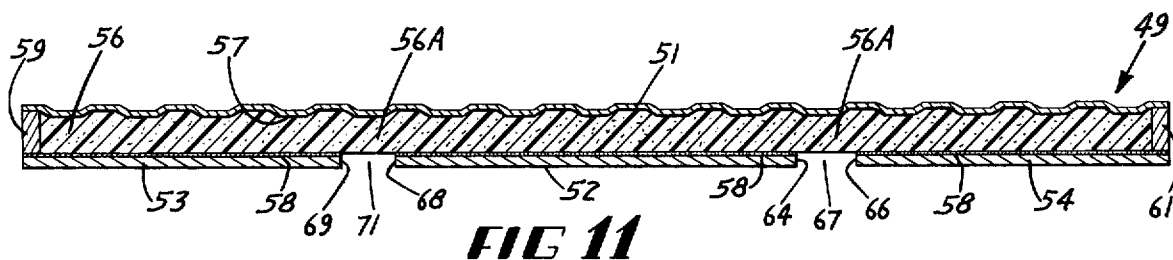
FIG 6

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PICK-UP COVER

CROSS REFERENCE TO RELATED APPLICATIONS

This application is a division of U.S. application Ser. No. 015,602 filed Mar. 2, 1970, now abandoned. U.S. application Ser. No. 173,234 filed Aug. 19, 1971 is a continuation of application Ser. No. 015,602. Application Ser. No. 015,602 is a continuation-in-part of U.S. application Ser. No. 777,934 filed Sept. 9, 1968, now abandoned. Application, Ser. No. 777,934 is a continuation of U.S. application, Ser. No. 536,058, filed Mar. 21, 1966, now abandoned.

BACKGROUND OF INVENTION

Numerous types of structures have been fabricated to enclose tops of vehicle bodies. These structures are either fabricated at the site of mounting the structures on the vehicle body or are prefabricated into multi-sided structures and shipped to an assembly location. The fabrication of the multi-sided structures at the place of installation does not utilize mass production techniques to manufacture the structures. Completing the multi-sided structures at a manufacturing location and then shipping the structures to the points of distribution is not an economical transportation procedure, as the multi-sided structures utilize considerable transport space. Also, only a limited number of structures can be shipped in a single load. An example of this type of covering structure or top for a truck body is shown in U.S. Pat. No. 2,848,274.

Collapsible or knockdown structures have been used in the construction of vehicle body covers. These structures have panels that are connected to each other to form the complete cover. These panels require separate connecting structures and seals to hold the panels in assembled relation with each other. Examples of these types of pick-up covers are shown in U.S. Pat. No. 2,690,351 and No. 3,219,383.

SUMMARY OF INVENTION

The invention relates to a multi-sided structure or cover adapted to be mounted on the body of a pick-up truck. The cover has generally upright side wall sections and a center or roof section connected to the side wall sections with corner sections. All of the sections of the structure are formed from a single sandwich panel having a pliable outer facing and an inner rigid facing bonded to opposite sides of an expanded, compressible, plastic foam core. The longitudinal corner sections have both an outer pliable facing and core integrally joined with the outer facing and core of both the roof section and side wall sections.

In one form of the invention, the corner sections have closed longitudinal V-groove means in the inner facing and core separating the side wall sections from the roof section. The bottom of each V-groove means is spaced from the pliable outer facing, whereby the core in the corner section is continuous with the core of the roof section and side wall sections. The pliable outer facing, along with the core in the corner sections, has longitudinal bend portions generally parallel to the longitudinal V-groove means. The plastic foam core in the corner sections is bonded to the outer facing and compressed, thereby reinforcing the corner sections. The roof section has an upwardly directed longitudinal

ridge, whereby the roof section converges upwardly from the corner sections.

In another form of the invention, the pick-up cover has a one-piece sandwich construction panel having generally upright side wall sections, a roof section, and longitudinal corner sections joined to the side wall sections with the roof section. The sandwich panel has a pliable outer facing and a plurality of inner rigid facings bonded to opposite sides of an expanded, compressible, plastic foam core. The inner rigid facings are separated from each other along the corner sections, whereby the panel has shallow spaces or grooves on the inside of the panel. These spaces are parallel to the longitudinal corner sections of the cover. The corner sections of the cover have a bent or curved pliable outer facing and a compressed core bonded to the curved portion of the outer facing.

An object of the invention is to provide a multi-sided structure which can be manufactured from panels that are shipped as single flat pieces in relatively large quantities and can be quickly and easily assembled into a finished cover with a minimum of time and labor. A further object of the invention is to provide the pick-up cover with a sandwich panel structure which has a longitudinal ridge or crown to compensate for changes in temperature without separating the outer skin from the foam plastic core or buckling the roof section. Also, another feature of the invention is to provide a pick-up cover that has reinforced longitudinal corner sections having an uninterrupted outer skin and compressed foam plastic core bonded to the outer skin. An additional feature of the invention is to provide the pick-up cover with strength and thermo-insulating characteristics.

IN THE DRAWINGS

FIG. 1 is a perspective view of a pick-up truck shown in light lines with a multi-sided hollow structure of this invention mounted thereon;

FIG. 2 is an enlarged sectional view taken along the line 2-2 of FIG. 1;

FIG. 3 is a plan view of a sandwich panel cut and grooved but not formed and is drawn to the same scale as FIG. 1;

FIG. 4 is an enlarged fragmentary sectional view taken along the line 4-4 of FIG. 3 and is drawn to an even larger scale than FIG. 2;

FIG. 5 is a different form of panel that has been both grooved and cut to produce a five-sided hollow device and drawn to substantially the same scale as FIG. 3;

FIG. 6 is a perspective view of the blank in FIG. 5 formed into its ultimate shape;

FIG. 7 is a perspective view of a cover of the invention mounted on the body of a pick-up truck;

FIG. 8 is an enlarged sectional view taken along the line 8-8 of FIG. 7;

FIG. 9 is an enlarged sectional view of a corner section of the cover;

FIG. 10 is a plan view of a sandwich panel in its pre-formed flat transport position; and

FIG. 11 is a sectional view taken along the line 11-11 of FIG. 10.

Referring to the drawings, a practical use to which this invention may be put is in making what are known as covers and campers for trucks of the pick-up type such as shown at 10 in FIG. 1. Both sides, such as the one 11, and the roof of the cover or camper are con-

structed from a blank formed according to this invention. The end member 12 and a second end member fitting in the opposite end of the cover adjacent the cab of truck 10 complete the structure.

The portion of the cover including side 11, as shown in FIG. 3, is made flat in a single piece. Ends 12 and its counterpart, also being flat, enable the entire device to be shipped in a knockdown condition in a space no larger than two of the elements shown in FIG. 3 before it is bent into shape. At an ultimate destination, there is very little problem in bending the element, shown in FIG. 3, and assembling it to the two ends, such as the one 12 which makes the unit ready to be installed on a truck.

As is best seen in FIG. 4, the sandwich panel from which the elements of this invention are made comprises a core member, as shown at 14, secured to facing members 17 and 18. Bonding materials 15 and 16 may be similar or dissimilar to each other depending on a number of factors, such as the materials to be bonded and perhaps the use to which the panel will be put. At least one of the facing members, shown in FIG. 4 as facing member 17, must be pliable. That is to say, it must be material that is capable of being bent without fracturing. A specific example of an acceptable combination for a particular function is illustrated in FIGS. 1 to 4 as being a sandwich panel having a foam polystyrene core 14 with a first facing 18 of plywood and a second facing 17 of metal, as aluminum.

The panel shown in FIG. 3 is as wide as the structure shown on truck 10 in FIG. 1 is long. This panel is grooved, as shown at 19 in FIG. 4, the grooves extending transversely across the panel, as shown at 19 in FIG. 3. The broken lines represent the inserts of wood that may be inserted at the edges of the panel. As for example, at 20 there may be a railing of wood which would have a corresponding member 21 on the opposite side of the panel, shown in FIG. 3, to assist in securing the cover to the truck body. At each longitudinal edge are portions where the polystyrene core 14 has been cut back in order to leave a marginal edge 23 and 24 of uncovered sandwich panel facing 17.

The openings, shown at 25 and 26, may be used to install windows such as the ones shown at 27 in the member 11 of FIG. 1.

The grooves 19 divide the entire panel into a series of sections, including a center section 22, which are coupled together at least by the pliable facing 17. As shown in FIGS. 2 and 4, a portion of the polystyrene or other core materials of the sandwich panel may also continue to link the sections after grooving.

Panel 12 may be provided with an opening closed with a door such as the one shown at 28. The panel 12 also may be of a different elevation having one or more top portions with the top center, as shown at 29, being slightly higher than any other portions of the panel. The end member, adjacent to the cab of the truck 10, may be similarly formed in order to bend the top center of portion 11 or center section 22 into a sort of ridge pole effect. In other words, the center section 22 converges outwardly to the longitudinal ridge 29 which extends parallel to the closed V-grooves, as shown in FIGS. 1 and 2. This bending of the roof may alter both the appearance and the water shedding characteristics of the structure. It also tends to provide more rigidity to the otherwise completely flat roof portion of the portion 11.

The manner in which member 12 and member 11 are secured together is not of patentable importance and is not shown in detail, since it may be done in any one of a number of ways. Illustrated here, for example, the flap edges 23 and 24 may be used to secure the panel 12 and its corresponding opposite panel adjacent the cab to the portion 11, as shown in FIG. 1.

In FIG. 5, it may be seen a panel generally similar to that shown in FIGS. 2, 3 and 4. The specific difference in this species resides in the fact that the panel has not only been grooved, as shown at 30, but it has also been cut, as seen at 31, whereby when force is applied to the various sections of the panel, illustrated in FIG. 5, it may assume the configuration shown in FIG. 6. In this manner, center 32 of the panel, shown in FIG. 5, is surrounded by a series of wings designated 34 through 37 in a clockwise direction around the center panel 32 and beginning at the right thereof. The broken lines in the figure, at 38 for example, mark out areas where the foam polystyrene or other core material of the paneling is replaced by a material that has greater tensile strength, as wood for example, for purposes of attaching hardware, such as hinges and the like, to the structure. When force is applied to the various wings 34, 35, 36 and 37, they may be bent with respect to the center panel 32 to form the multi-sided figure shown in FIG. 6. In this case, the panel is being used as a cover for the two wheeled trailer 40. As can be seen in FIG. 5, each of the openings or cuts 31 is bordered by uncovered edges or flanges of facing material. In each case, the pliable facing of the sandwich panel has been bared to leave flanges for attaching tabs 39 of the uncovered pliable sandwich board facing. These tabs are used in forming the corners of the multi-sided structure shown in FIG. 6. A cover member 32-35 may be hinged at either side or either end to the trailer box 40. Alternatively, it simply may be resting thereon with some kind of aligning members extending between the two to hold them in position. The cover is lifted off when it is desired not to cover the box 40. Obviously, the cuts 31 could be made substantially deeper and/or wider and change the configuration substantially. Also, the grooves 30 need not necessarily extend in a straight line on all four sides and this could produce an effect somewhat similar to that illustrated in FIG. 1 in the form of the device shown there. In each case, the critical fact is the combination of grooves in sandwich panels having at least one pliable face. These grooves extend from the face opposite the pliable face and leave unbroken, at least the pliable face. Bonding material is placed between all of the various facing members and core members in all of the figures, although not always illustrated.

In summary, the top and side walls of the pick-up cover are formed from a one-piece sandwich construction panel. This panel is fabricated in a flat form and cut and grooved prior to shipment to an erection location. This method of mass manufacturing and mass shipping of cover components results in substantial savings, reduced manufacturing time, less labor and lower transportation costs. The one-piece sandwich panel has a generally flat non-pliable rigid inner facing 18, as wood, plywood and the like. The outer facing 17 is pliable, as sheet metal, aluminum sheet and the like. Located between the facing is an expanded, plastic foam core 14. The core is identified as a foam polystyrene core. This type of material offers very low thermo-

conductivity, resistance to the transmission of water vapor and absorption of moisture, and resistance to relatively high static forces without deformation. Polystyrene foam has good compressive, flexural and shear strengths. Compressive strength of polystyrene foam increases with the density of the foam. A polystyrene foam having a density of 1.5 to 2.5 pounds per cubic foot has a compressive strength of approximately 35 psi. When the density of the polystyrene foam is increased to 3.6 to 4.2 pounds per cubic foot, the compressive strength increases to 65 to 130 psi.

In the formation of the cover, the corner sections, as shown in FIG. 2, are bent longitudinally closing the V-grooves 19. The foam plastic material in the corner sections remains bonded to the pliable outer facing 17 and compresses along the bases of the grooves. The compression of the polystyrene core increases the strength of the material longitudinally along the corner sections of the panel. The core material in the corner sections is compressed and remains in the corners attached to the outer facing 17. The compressed core reinforces and insulates the corners adjacent the bends in the pliable outer facing 17.

The center or roof section 22, as shown in FIG. 1, has an upwardly directed longitudinal ridge 29 so that the roof section converges upwardly and outwardly from the opposite corner sections of the cover. The foam plastic core 14, being compressible or yieldable, compresses when the outer facing 17 shrinks to a cold temperature and expands when the outer facing is subjected to heat. The result is that the core 14 follows the outer facing 17 as it moves. The ridge portion or crown 29 compensates for temperature changes to keep the roof section at its desired shape. If the roof section 22 were flat, it would buckle and shrink down in cold temperatures. With an increase in temperature, the roof section would continue to buckle down and not return to its flat position. The upwardly directed longitudinal ridge 29 prevents this buckling of the roof section.

Referring to FIG. 7, there is shown a pick-up truck, indicated generally at 41, having a body 42 enclosed with a cover or multi-sided structure, indicated generally at 43. The cover 43 has an upright front wall 44 adjacent the cab of the vehicle and a rear wall 46. The rear wall 46 has a large removable panel 47 carrying a door 48. The panel 47 is a large lift-off panel forming a major part of the back wall. This structure is shown and described in U.S. Pat. No. 3,496,689. A one-piece multi-sided sandwich panel, indicated generally at 49, mounted on the walls 46 and 47 and truck body 42, closes the top of the body 42.

Referring to FIGS. 10 and 11, the sandwich panel 49 has an outer pliable and bendable facing or skin 51 of sheet metal, corrugated sheet aluminum or like sheet material, and a plurality of rigid inner facings or members 52, 53 and 54, as plywood, hard board or the like. Sandwiched between the inner and outer facings is a core 56 of expanded compressible foam plastic, as expanded compressible foam polystyrene. The polystyrene foam core can be in flat board form. Layers of bonding materials 57 and 58 secure or bond the entire outer facing 51 and inner facings 52, 53 and 54 to the opposite sides of the core 56. The bonding material layers 57 and 58 are substantially continuous layers so that the entire inside surfaces of the inner and outer facings are firmly secured to the core 56. Interposed between the opposite edges of the facings 51, 53 and 51, 54 are

longitudinal rails 59 and 61. The bonding material layers 57 and 58 secure the rails 59 and 61 to the facings. Opposite sides of the panel have relatively large rectangular openings or cutouts 62 and 63 for accommodating windows 65 in the sides of the cover 43.

The inner facings 52 and 53 have adjacent longitudinal parallel edges 64 and 66 forming sides of a longitudinal flat groove or recess 67. The facing 62 also has an edge 68 spaced from and substantially parallel to the edge 69 on the facing 63. A longitudinally spaced flat groove or recess 71 separates the edges 68 and 69. The facings 52, 53 and 54 can be bonded to the core 56 in a manner so that the edges 64, 66 and 68, 69 are parallel and evenly spaced from each other. These edges can be trimmed in parallel spaced relation with suitable cutting tools so that the cover can be formed with uniform straight corners. The entire core 56 adjacent the grooves 67 and 71, along with the outer pliable facing, remains whole and continuous so that the sandwich panel is always a one-piece member.

Referring to FIG. 8, the one-piece panel is divided into a center or longitudinal roof section 72 located between longitudinal side wall sections 73 and 74. The longitudinal corner sections 76 and 77 integrally join the roof section 72 with the side wall sections 73 and 74.

The sandwich panel 49, along with the front end wall 44 and the rear end wall 46, is shipped as a unit in a flat condition to the point of erection. The cover is formed by longitudinally bending the corner sections 76 and 77 to form a multisided structure, as shown in FIGS. 7 and 8. The pliable outer facing 51 has a substantially uniform curve in the corner sections. The core 56A in the corner sections is compressed with a resultant increase in density of the foam plastic material. The increase in density of the foam plastic material increases the strength of the core 56A along the corner sections. For example, a polystyrene foam having a density of 1.5 to 2.5 pounds per cubic foot has a compressive strength of approximately 35 psi. When the density of the material is increased to 3.6 to 4.2 pounds per cubic foot, the compressed strength increases to 65 to 130 psi. The polystyrene used in this application has a normal density of about 1.9 pounds per cubic foot. This density increases to approximately 4 pounds per cubic foot in the corner sections with a resultant substantial increase in the compressive strength of the core 56A in the corner sections. In addition to the increase in strength of the corner sections, the plastic foam core has insulating characteristics and resistance to the transmission of water vapor and the absorption of moisture. The bonding in the corner sections remains in tact, in that the compressed core 56A is not separated from the pliable outer facing 51. This corner section provides the strength for maintaining the shape of the roof section 72, as well as preventing sagging of the side wall sections which are weakened by the elongated openings 62 and 63.

As shown in FIG. 8, the sandwich panel 49 is mounted on the body 42. The roof section of the panel has an upwardly directed longitudinal central ridge or crown 78, whereby opposite portions of the roof slope in a downwardly and outwardly direction toward the corners of the cover. This crown 78 compensates for the expansion and contraction of the outer pliable facing 51 due to changes in temperature. The crown 78

prevents the buckling of the roof section when it is subjected to changes in temperature.

The insides of the corner sections are enclosed with longitudinal arcuate cover plates 79 and 81 attached to the inner facings 52, 54 and 52, 53 with fasteners 82, as screws, bolts and the like. The cover plates 79 and 81 can be elongated metal members which fill in the space between the opposite adjacent edges of the facings and thereby cover the compressed core material 56A. The cover plates also serve to reinforce and add to the strength of the corner sections and provide support for both the roof section 72, as well as the side wall sections 73 and 74 of the cover.

While there have been shown and described preferred embodiments of a multi-sided structure, it is understood that various changes in size and number of the sections may be made by those skilled in the art without departing from the invention.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A multi-sided cover adapted to be mounted on the body of a truck comprising: spaced generally upright end walls, a sandwich construction panel mounted on the end walls, said panel having generally upright side wall sections, a generally horizontal roof section, and longitudinally extended transverse curved corner sections joining the side wall sections with the opposite sides of the roof section, said panel being a one-piece member having a one-piece pliable outer facing, a plurality of spaced inner rigid facings, rigid longitudinal rail means extended between the outer edge portions of the inner and outer facings of the side wall sections adapted to be connected to a body of a truck, an expanded compressible plastic foam core, said core being continuous and having a substantially uniform thickness and extending between the rail means, bonding

means securing the entire outer facing to one side of the core, securing the inner facings to the opposite side of the core, and securing the rail means to the outer facing and inner facing of the side wall sections, said inner rigid facings being separated from each other longitudinally along the corner sections, said pliable outer facing and core of the corner sections having longitudinally extended transverse curved portions, said core of the corner sections being compressed and bonded to the curved portions of the pliable facing, the compressed core of the corner sections having longitudinal continuous transverse curved surfaces, cover means having curved surfaces which correspond to the curved surfaces of the compressed core of the corner sections, and means attaching the cover means to the inner facings to hold the curved surfaces of the cover means in engagement with the curved surfaces of the compressed core of the corner sections. facings

2. The cover of claim 1 wherein: the plastic foam core is polystyrene foam.

3. The cover of claim 1 wherein: said outer facing is sheet metal, said inner facings are plywood, and said plastic foam core is polystyrene foam.

4. The cover of claim 1 wherein: at least one of the sections has an opening to receive a building element different from said panel.

5. The cover of claim 1 wherein: said roof section has an upwardly directed longitudinal crown whereby the roof section converges upwardly from the corner sections.

6. The cover of claim 1 wherein: the cover means comprise elongated arcuate cover plates attached to adjacent inner facings to fill in the space between the opposite adjacent edges of the inner facings and cover the compressed core along the corner sections of the cover.

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