Dec. 25, 1962 H. E. SWITZGABLE, JR 3,070,196

SHEET METAL PANEL AND METHOD OF MAKING SAME

Filed April 14, 1960

Fig. 1.

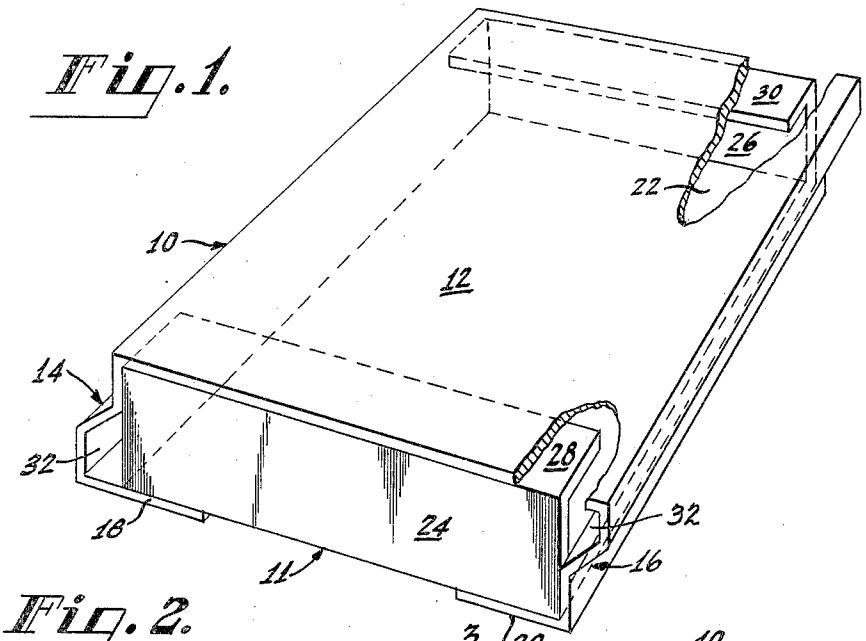


Fig. 2.

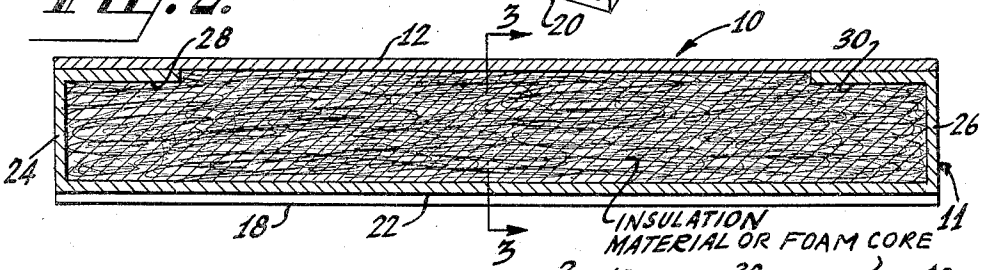


Fig. 3.

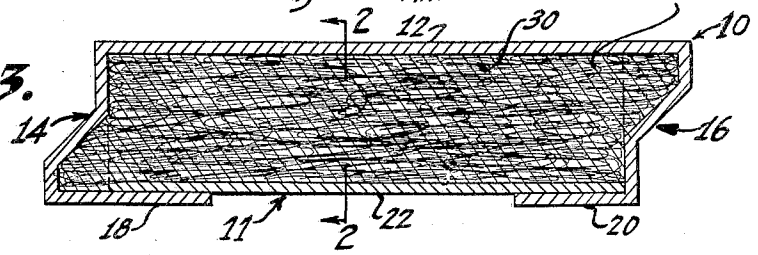
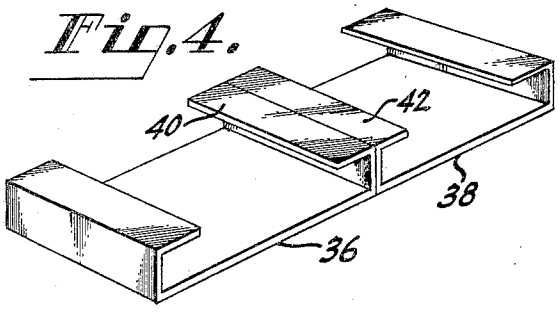


Fig. 4.



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SHEET METAL PANEL AND METHOD OF MAKING SAME

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This invention relates to sheet metal panel constructions, and methods of making same. The invention is particularly useful in the construction of door panels, such as for sectional steel doors, and also in the construction of buildings, partitions and various other enclosures.

It is an object of the invention to provide a sheet metal panel construction which consists of a minimum number of parts each of which can be conveniently and economically formed.

It is another object of this invention to provide a novel and economical method of constructing an attractive-appearing and rigid sheet metal panel which is also effective for thermal insulation purposes.

It is a further object of this invention to provide a sheet metal panel so constructed as to have a large measure of rigidity and of resistance to twisting or other deformations.

It is still a further object to provide a sheet metal panel having a finished appearance on all sides.

It is yet another object to provide a sheet metal panel adapted and constructed to be used where thermal insulation is desired.

The foregoing and other objects of the invention are achieved by a construction, and a method of construction, wherein two sheets of metal are formed to provide a shallow box-like structure. One of the sheets is formed to provide the top and two opposite sides of the box and to provide flanges extending from the sides towards each other in a plane parallel with the top. The other sheet of metal is similarly formed but is dimensioned to slide into the first one and to thereby constitute the bottom and two ends of the box-like structure. The interior of the box-like structure may be filled with a thermal insulation material. According to a preferred construction and method of construction, a foaming plastic liquid is applied to an inner surface of one of the formed metal sheets and is allowed to foam and solidify in place inside the assembled formed sheets to form a bonded rigid panel structure.

These and other objects and aspects of the invention are described in greater detail in connection with the appended drawings, wherein:

FIGURE 1 is a perspective view, with portions cut away, of a sheet metal panel constructed in accordance with the teachings of this invention;

FIGURE 2 is a longitudinal sectional view of the panel shown in FIGURE 1, and taken on the line 2—2 of FIGURE 3;

FIGURE 3 is a transverse sectional view of the panel of FIGURE 1 and taken on the line 3—3 of FIGURE 2; and

FIGURE 4 is a perspective view of two sheet metal elements which may be substituted for one of the formed sheet metal elements in the embodiment of FIGURES 1 through 3 for the purpose of providing greater rigidity, and providing localized strength for the attachment of hardware or the like.

Reference will now be made in greater detail to FIGURES 1 through 3 of the drawings which show a sheet metal panel that is particularly useful in the construction of rolling overhead garage doors or the like. The box-like sheet metal panel is constructed of a first sheet of metal **10** which is formed to provide the top and two

sides of the box, and a second sheet of metal **11** which is formed to provide the bottom and two ends of the box. The sheet of metal **10** has a major flat portion **12** constituting the top of the box, and has two opposite edges formed into a lap-joint-shaped side **14** and a complimentary lap-joint-shaped side **16**. It will be understood that while the sides **14** and **16** are shown as being lap joint shaped, the sides may be straight, or may be shaped to provide any other kind of joint such as a tongue-and-groove joint or a scarf joint. The metal sheet **10** is also additionally formed to provide flanges **18** and **20** extending from the bottoms of the sides **14** and **16**, respectively, toward each other and parallel with the surface of the top portion **12**. It is thus far apparent that the sheet of metal **10** is formed, as by means of a brake, to provide a unitary element constituting the top **12**, and the sides **14** and **16** of a box-like structure, and also to form the flanges **18** and **20**.

The second sheet of metal **11** used in the construction of the box-like structure is similarly formed to provide a major intermediate portion or bottom **22**, and ends **24** and **26** of the box-like structure. The metal sheet **11** is additionally formed to provide flanges **28** and **30** extending from the upper edges of the ends **24** and **26**, respectively, toward each other and parallel with the bottom portion **22** of the sheet. The metal sheet **11** is formed to provide the bottom **22**, the ends **24** and **26**, and the flanges **28** and **30**, the various portions of the metal sheet **11** being dimensioned so that the formed sheet **11** can be assembled into the position shown in the drawing by sliding the formed metal sheet **11** into and inside the formed metal sheet **10**.

When the sheet metal panel of FIGURES 1 through 3 is to be used in an environment where it is desirable to provide thermal insulation, a batt of insulating material is dimensioned and positioned in the formed metal sheet **11** prior to sliding the formed metal sheet **11** inside the formed metal sheet **10**. The batt of insulating material may comprise any of the pulp or textile or non-combustible fibers, or may comprise a block of solid foamed plastic. Alternatively, the batt of insulating material may be constituted by a honeycomb core having dimensions to fill the interior space.

It will be understood that a good measure of thermal insulation is provided by the box-like panel construction even though the interior is not filled with insulating material. This results from the fact that the box-like construction encloses a dead air space. The construction is particularly effective for this purpose when the sides **14** and **16** are straight and not lap joint shaped, or when the openings **32** are closed by any suitable means.

The formed metal sheets **10** and **11** may be fastened in the assembled position shown in the drawing by a suitable means, such as by applying an adhesive to portions of the flanges **18**, **20**, **28** and **30**, or by employing sheet metal screws or blind rivets connecting the flanges to the contiguous surfaces of the other formed metal sheet, or by employing through bolts such as in connection with the attachment of hardware to the panel.

A preferred construction, and method of construction, will now be described. A foaming plastic liquid is applied to the major surface of one of the formed metal sheets **10** or **11**. This is preferably done before the bottom formed sheet **11** is slid into the top formed sheet **10**, or simultaneously with the step of sliding the formed sheet **11** into the top sheet **10**. The foaming plastic liquid is applied by a pumping or spraying apparatus including a mixing valve which mixes the two ingredients necessary to initiate the foaming action. The foaming plastic should be one, such as polyurethane or epoxy, which will adhere to the formed metal sheets **10** and **11**.

After the foaming plastic liquid is applied to an interior

surface of one of the formed metal sheets, the sheets are maintained in the finally-desired assembled relationship while the plastic liquid foams and fills the interior space. After this occurs, the foam solidifies and bonds to the formed metal sheets **10** and **11** so that they are permanently fixed together as a panel. No other fastening means are required. It will be noted that the formed sheets **10** and **11** are so shaped that they can be disassembled only by a sliding motion. This motion is completely prevented by the bonded plastic foam in the interior of the panel. Therefore, the flanges **18**, **20**, and **28**, **30** need be made to extend from the respective sides and ends a distance just sufficient to provide the desired rigidity and the necessary bearing surfaces for locating the two formed sheets relative to each other.

In addition to bonding the formed metal sheets against sliding disassembly, the foamed-in-place plastic also acts as the core of a sandwich construction of which the top and bottom metal surfaces **12** and **22** constitute the exterior skins. This sandwich construction gives great strength against denting of the panel, as well as strength against twisting, bending and other deformation. Still another advantage of the foamed-in-place plastic core is the thermal insulation provided thereby, which makes the resulting panel especially desirable for incorporation in overhead garage doors.

When the sheet metal panel has a great length in the direction of the sectional view of FIGURE 2, and considerable rigidity is desired, the sheet metal panel may be constructed to include a plurality of formed metal sheets **36** and **38** as shown in FIGURE 4, in place of the single formed metal sheet **11** shown in FIGURES 1 through 3. When the members shown in FIGURE 4 are employed, the flanges **40** and **42** thereon provide additional rigidity for the assembled panel, and provide additional metal as a foundation for the connection of hardware or the like to the panel.

It is thus apparent that according to the teachings of this invention there is provided a sheet metal panel which is very rigid, is neat in appearance, provides thermal insulation and is simple and economical to fabricate.

What is claimed is:

1. A construction panel comprising a hollow, shallow, box-like structure constructed of a first sheet of metal formed to provide the top and two opposite sides of the box and to provide flanges extending from the sides toward each other in a plane parallel with the top, and a second sheet of metal formed to provide the bottom and two opposite ends of the box and to provide flanges extending from the ends toward each other in a plane parallel with the bottom, said second formed sheet being dimensioned to slide into said first formed sheet.

2. A construction panel comprising a hollow, shallow, box-like structure constructed of a first sheet of metal formed to provide the top and two opposite sides of the box and to provide flanges extending from the sides toward each other in a plane parallel with the top, a second sheet of metal formed to provide the bottom and two opposite ends of the box and to provide flanges extending from the ends toward each other in a plane parallel with the bottom, said second formed sheet being dimensioned to slide into said first formed sheet, and means to fasten said two formed sheets together in the assembled position.

3. A construction panel according to claim 2 wherein said fastening means is located to secure the flanges of at least one of said formed sheets to the contiguous surface of the other of said formed sheets.

4. A construction panel comprising a hollow, shallow, box-like structure constructed of a first sheet of metal formed to provide the top and two opposite sides of the box and to provide flanges extending from the side toward each other in a plane parallel with the top, a second sheet of metal formed to provide the bottom and two opposite ends of the box and to provide flanges extending from the ends toward each other in a plane parallel with the bottom, said second formed sheet being dimensioned to slide into said first formed sheet, and a batt of insulating material dimensioned to fit inside said second formed sheet and to be slid therewith into said first formed sheet.

5. A construction panel comprising a hollow, shallow, box-like structure constructed of a first sheet of metal formed to provide the top and two opposite sides of the box and to provide flanges extending from the sides toward each other in a plane parallel with the top, a second sheet of metal formed to provide the bottom and two opposite ends of the box and to provide flanges extending from the ends toward each other in a plane parallel with the bottom, said second formed sheet being dimensioned to slide into said first formed sheet, and a foamed-in-place plastic occupying the interior space of said box-like structure.

6. A construction panel as defined in claim 1 wherein a plurality of said second formed sheets are employed and are dimensioned to slide into said one first formed sheet to form a box-like structure having a plurality of chambers.

7. A construction panel comprising a hollow, shallow, box-like structure constructed of a first sheet of metal formed to provide the top and two opposite sides of the box and to provide flanges extending from the sides toward each other in a plane parallel with the top, said opposite sides of the box being formed to provide complementary joint-shaped surfaces, and a second sheet of metal formed to provide the bottom and two opposite ends of the box and to provide flanges extending from the ends toward each other in a plane parallel with the bottom, said second formed sheet being dimensioned to slide inside said first formed sheet.

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