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Kenaga

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[54] **PANEL CONSTRUCTION**

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[52] **U.S. Cl.** **52/629,** 52/588, 52/593, 160/201

[51] **Int. Cl.** **E04c 2/08**

[58] **Field of Search** 52/593, 71, 526, 52/588, 614, 619, 629; 160/201

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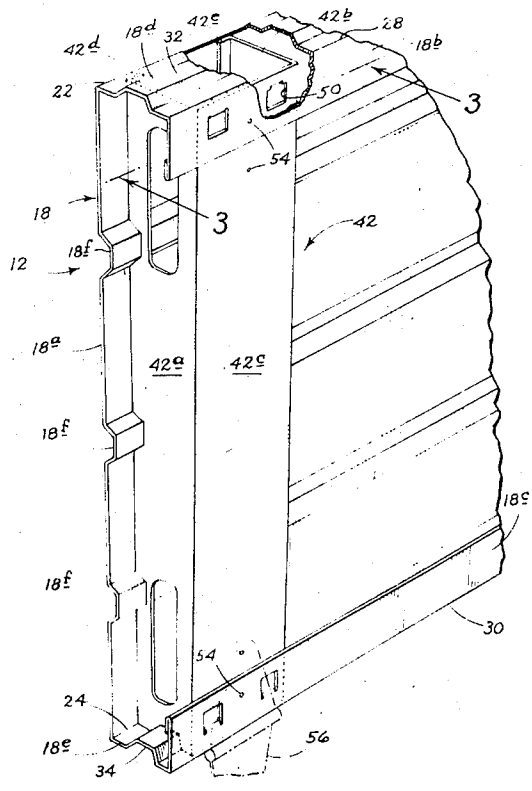
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[57] **ABSTRACT**

A tab-connected panel including a substantially rectangular sheet of metal which has had its ooopsite edges bent over toward each other to form spaced-apart edge margins spaced outwardly from and overlying the central expanse of the sheet. An elongated stiffener extends laterally of the sheet with its opposite ends wedged in the spaces between the edge margins and the central expanse. Tabs formed in the edge margins are bent over and into openings in the stiffener to secure the sheet to the stiffener. A raised ridge is formed along one edge of the panel and a groove is formed along its opposite edge so that similar panels placed in edge-to-edge relation will interlock.

2 Claims, 3 Drawing Figures



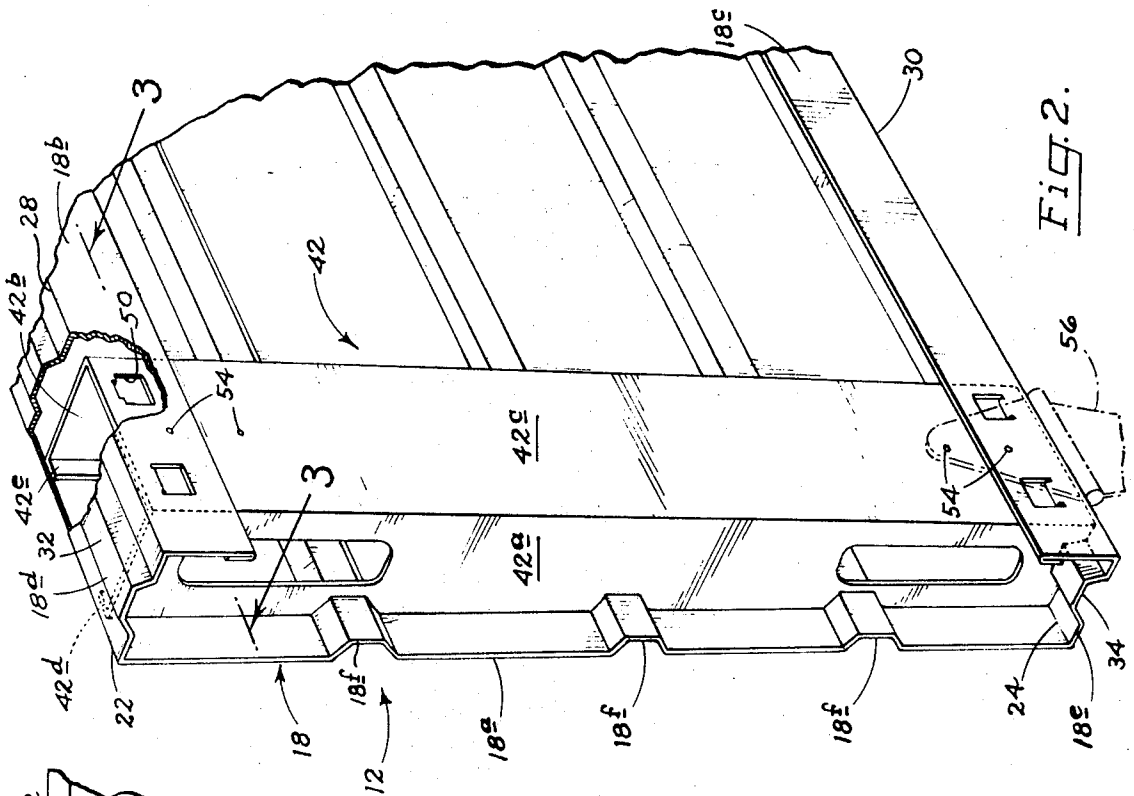


Fig. 2.

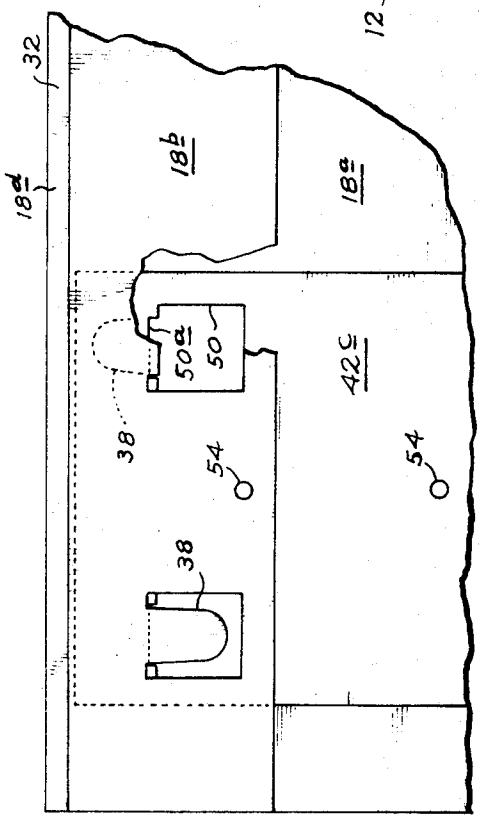


Fig. 3.

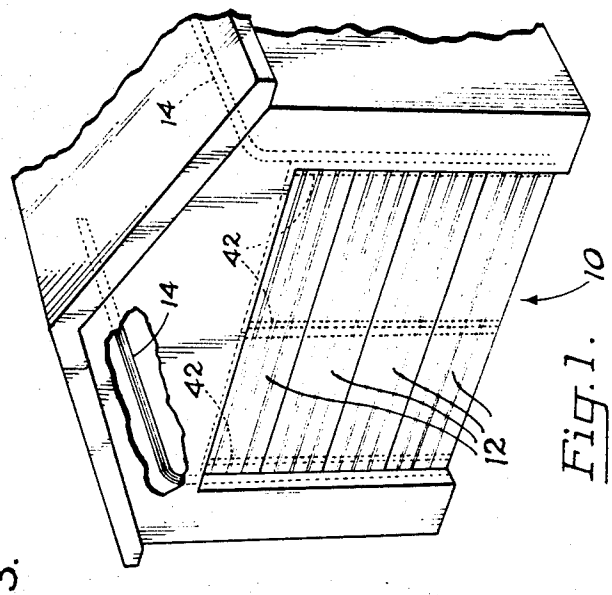


Fig. 1.

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PANEL CONSTRUCTION

This invention relates to panels, and more specifically to panels made of sheet metal connected to stiffeners by bendable tabs.

In the past, panels, and especially metal panels, for use in garage doors, prefabricated building walls, and the like have been manufactured by securing a sheet of metal to a series of elongated stiffeners, or to some type of frame, by extending fasteners through holes in the sheet which is to form a face of the panel, or by deforming the face sheet in such manner as to grip underlying stiffeners. This, however, has not always produced a satisfactory panel, since the fasteners or face sheet deformation may be unsightly. Further, the holes needed to receive such fasteners may not be weathertight. Panels so produced also require considerable time to manufacture.

A general object of the invention is to provide a novel panel which may be quickly, simply and economically produced.

Another object of the invention is to provide a novel panel which includes a facing sheet which is secured to a stiffener, with no fastener holes being required in the panel facing sheet.

A further object is to provide a novel panel in which a covering metal sheet is secured to a backing stiffener with no break or deformation required in the portion of the sheet which forms the face of the panel.

More specifically, an object is to provide a novel metal panel in which a sheet of metal has opposed edge margins bent over to form flanges along its opposite edges. An elongated stiffener extends laterally of the sheet, with one of its sides against, and its opposite side facing away from, one face of the sheet. The bent over edge margins of the sheet wrap snugly over the opposite ends of the stiffener and are secured to the opposite side of the stiffener.

A further object is to provide such a novel panel in which the edge margins are connected to the stiffener by bent over tabs on the edge margin.

Yet another object is to provide a novel panel which comprises a substantially rectangular sheet of metal with bent over edge margins at its opposite edges, with said edge margins forming flanges to rigidify the panel.

These and other objects and advantages will become more fully apparent as the following description is read in conjunction with the drawings wherein:

FIG. 1 illustrates a plurality of elongated panels constructed according to an embodiment of the invention, interconnected to form a garage door;

FIG. 2 is an enlarged perspective view of one end of a panel according to the invention with a portion broken away; and

FIG. 3 is an enlarged view taken generally along the line 3—3 in FIG. 2 with a portion broken away.

Referring now to the drawings, and more specifically to FIG. 1, at **10** is indicated generally a garage door formed of a plurality of elongated metal panels **12** hingedly connected to each other in edge-to-edge relationship. Panels **12** may have rollers secured to their ends, which rollers may travel in tracks, such as those illustrated at **14** in FIG. 1, permitting raising of the garage door in a conventional manner.

The construction of such a panel **12** will now be described, with reference specifically to FIG. 2 in which

an end of an individual panel removed from the door is illustrated.

The panel includes a substantially rectangular sheet of metal **18**, also referred to as a covering or facing sheet. Sheet **18** in the embodiment illustrated includes a central expanse **18***a*, a pair of opposed, spaced-apart, bent over edge margins **18***b*, **18***c*, and connecting portions **18***d*, **18***e* which extend between, and interconnect, opposite edges of the central expanse and the edge margins.

Connecting portions **18***d*, **18***e* are bent outwardly and away from central expanse **18***a* along bend lines **22, 24**, respectively, and project substantially normally outwardly from one face of the central expanse. Thus, it may be said that one edge of each connecting portion joins to an edge of the central expanse, with the juncture between the connecting portion and central expanse being along one of the aforementioned bend lines.

Edge margins **18***b*, **18***c* are bent inwardly and toward each other from their associated connecting portions along bend lines **28, 30**, respectively. Thus it may be said that each edge margin is connected along one of its edges to one edge of its associated connecting portion, with such juncture between the connecting portion and the edge margin being at a bend line. Edge margins **18***b*, **18***c* are spaced outwardly from, extend substantially parallel to, and overlie portions of the central expanse. These edge margins are also referred to herein as flanges.

Connecting portion **18***d* has a raised ridge **32** formed therein which extends longitudinally of the panel and is disposed substantially midway between bend lines **22, 28.** Connecting portion **18***e* has a groove **34** formed therein which extends longitudinally of the panel and is disposed midway between bend lines **24, 30.** Groove **34** in the edge of a panel is adapted to receive a ridge, such as that indicated at **32**, on a similar panel placed in edge-to-edge abutting relation with panel **12**, thus to form a measure of interlocking between the two panels. Such interlocking of a ridge **32** in a groove **34** of an adjacent panel acts to align the faces of the adjacent panels, permits one panel to provide edge support for an adjacent panel, and provides a measure of weathersealing between the edges of the panels.

A series of laterally spaced channels **18***f* extend longitudinally through the face of the central expanse of the sheet and impart rigidity to it as well as being decorative.

Referring to FIG. 3, spaced at intervals along edge margin **18***b* substantially U-shaped segments have been removed from the edge margin to produce tabs, such as that indicated generally at **38.** Tabs **38** when so formed extend away from connecting portion **18***d*. Tabs are formed in adjacent pairs at each position along the edge margin where it is desired to place a stiffener, as will be more fully described below. Similar tabs are formed in edge margin **18***c*, with the tabs in edge margin **18***c* being disposed substantially directly across the panel from the tabs formed in edge margin **18***b*. The tabs in edge margin **18***c* when so formed also extend in a direction away from their associated connecting portion **18***e*.

Completing a panel are elongated stiffeners, such as that indicated generally at **42** in FIG. **2**, and shown in dotted outline at spaced intervals along the length of a panel in FIG. **1**. A stiffener is substantially channel-

shaped, having flanges 42*a*, 42*b* forming a pair of opposed sides for the stiffener, and a web 42*c* connecting flanges 42*a*, 42*b* and forming another side for the stiffener. Narrow flanges 42*d*, 42*e* extend inwardly toward each other from flanges 42*a*, 42*b*, respectively, and form portions of a side of the stiffener opposite side 42*c*.

Accommodating notches are formed in flanges 42*a*, 42*b*, 42*d*, 42*e* for receiving channels 18*f* in the central expanse of the sheet. Notches formed in one set of ends of flanges 42*a*, 42*b* receive that portion of connecting portion 18*e* of the panel which forms groove 34.

The stiffener has such length that when it is positioned as shown in FIG. 2, extending laterally of the central expanse of the sheet, its opposite ends fit against the inwardly facing surfaces of connecting portions 18*d*, 18*e*. Flanges 42*a*, 42*b* have such width that with flanges 42*d*, 42*e* against central expanse 18*a*, opposite end portions of side 42*c* are contiguous to the surfaces of edge margins 18*b*, 18*c*, respectively, which face the central expanse.

Each end portion of side 42*c* of the stiffener has a pair of openings formed therein, such as that indicated generally at 50 in FIG. 3, which openings are positioned to underlie a pair of tabs 38 with the stiffener positioned as shown in FIGS. 2 and 3. An opening 50 is substantially rectangular. The side of the opening nearest the end of the stiffener with which the opening is associated has an indentation 50*a* therein which has a width only slightly greater than the width of a tab 38. Indentations 50*a* in a pair of openings 50 are spaced whereby they may be aligned with a pair of tabs as shown in FIG. 3. The portion of the stiffener forming the long edge of indentation 50*a* forms what is referred to herein as a lip having an undersurface which faces toward the central expanse of the sheet.

Edge margin 18*b* is secured to the stiffener by bending tabs 38 down and into openings 50 and back and toward the end of the stiffener, and, also, back and toward its associated connecting portion. All of the tabs in FIG. 2 are illustrated as having been bent back and under the lip of an opening, as has the right tab illustrated in FIG. 3. Such bent-over tabs secure the edge margins to the side of the stiffener which faces away from the central expanse of the sheet, thus locking the sheet to the stiffener with no fastener having to be passed through the central expanse of the sheet which will form a visible face in the panel.

In order to prevent any rattling in assembled panels when they are made up into garage doors or the like, a bead of adhesive may be applied between flanges 42*d*, 42*e* and the central expanse of the sheet which bonds the sheet to the stiffener. The tabs connecting the sheet to the stiffeners hold the sheet securely on the stiffeners and the adhesive prevents any rattling of the sheet against the stiffeners.

Holes 54 extending through edge margins 18*b*, 18*c* and side 42*c* of the stiffener adjacent opposite ends of the stiffener are adapted to receive screws to attach hinges or other connecting means to the panels, whereby adjacent panels may be connected to each other in edge-to-edge relationship. A hinge for connecting the panel illustrated in FIG. 2 to an adjacent panel is indicated generally in dot-dash outline at 56.

A panel of the construction described lends itself to being manufactured by inexpensive mass-production techniques. A rectangular sheet of metal may be fed longitudinally through appropriate forming rolls to produce the desired bent-over edge margins, connecting portions, and grooves and channels extending longitudinally of the sheet. Tabs are formed in the edge margin by punches. Preformed stiffeners having openings already formed in their opposite end portions are fit on the sheet with the end portion underlying the edge margins. The stiffeners are positioned with openings 50 aligned with the tabs in the edge margins. The tabs then simply may be bent into the openings and back toward the end of the stiffener to secure the sheet to the stiffener.

A panel, according to the invention, has been described with regard to a single elongated panel which may be hinge-connected to similar panels to form a garage door. It should be understood, however, that such panels may be put to other uses also, such as for building walls, roofs, and any other situation where an inexpensively produced, yet sturdy panel is required.

While a specific embodiment of the invention has been described herein, it should be obvious to those skilled in the art that variations and modifications are possible without departing from the spirit of the invention.

It is claimed and desired to secure by letters patent:

1. A tab-connected panel comprising

a sheet of metal having a central expanse, a pair of opposed connecting portions at opposite edges of the central expanse bent outwardly in the same direction from and at substantial angles relative to said central expanse, each connecting portion having an outer edge spaced outwardly from said central expanse, and opposed edge margins bent over toward each other from said outer edges of the connecting portions, said edge margins being spaced outwardly from and overlying portions of one face of said central expanse and having bendable tabs thereon, and

an elongated stiffener extending laterally of and adjacent said face of the central expanse and having opposite end portions which are received in the spaces between said edge margins and the central expanse of such sheet, each end portion having an end extremity which abuts an inwardly facing surface of a connecting portion and an opening formed therein adjacent its associated edge margin, said opening being aligned with a tab on said edge margin and presenting a lip at a side of the opening nearest said end extremity of the stiffener, said lip having an undersurface which faces the central expanse of the sheet, a tab on the end margin being bent back on itself toward said end extremity of the stiffener, into said opening and under said lip to secure said edge margin to said stiffener.

2. The panel of claim 1 wherein said stiffener comprises a channel-shaped member including an elongated web and a pair of elongated, opposed marginal flanges extending outwardly in the same direction from one face of the web, the stiffener is positioned with said web substantially paralleling and spaced from the central expanse of said sheet and with outer edges of said flanges resting on said central expanse, and said opening in an end portion is formed in said web.

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