March 6, 1962 W. BRAUER 3,023,489

STRUCTURAL PANEL

Filed May 12, 1954

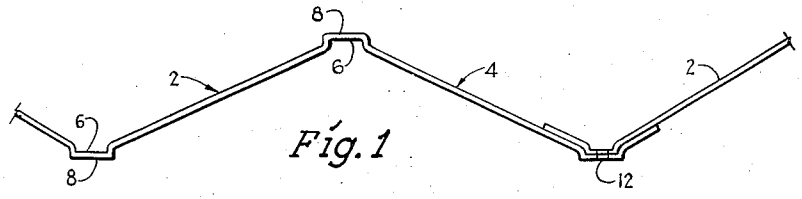

Fig. 1

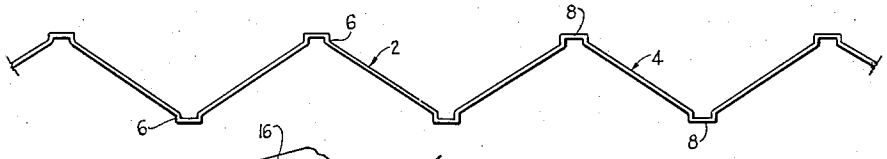

Fig. 2

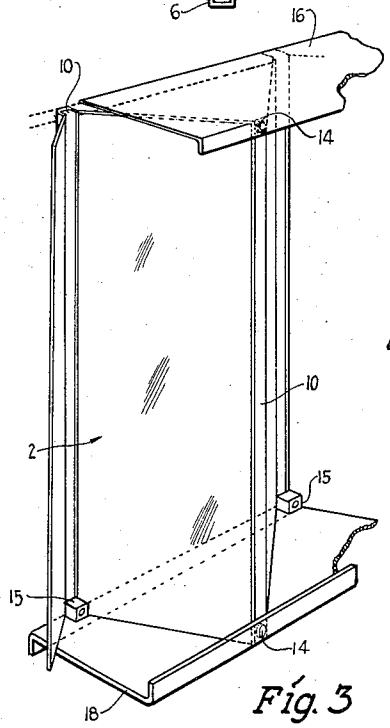

Fig. 3

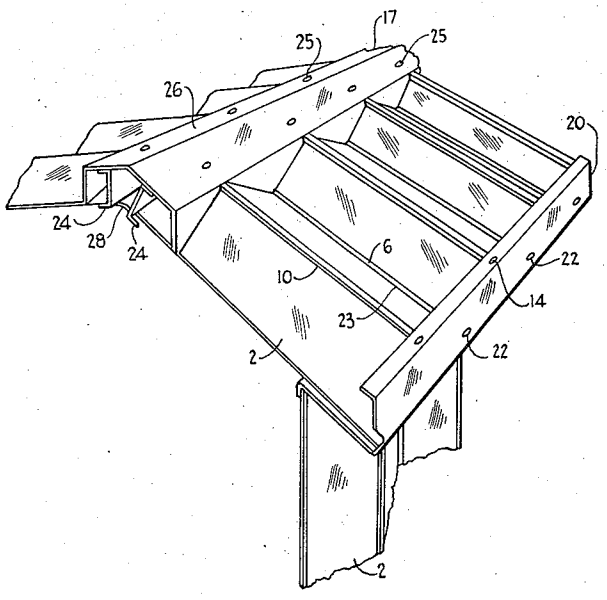

Fig. 5

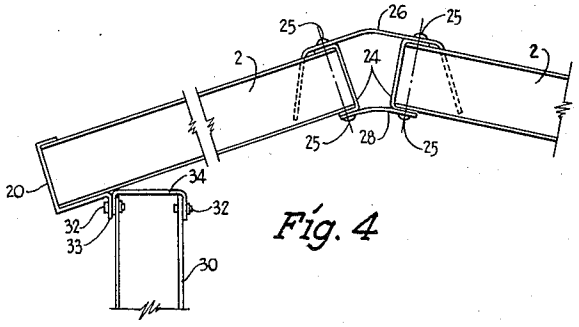

Fig. 4

INVENTOR.
Walter Brauer

BY

ATTORNEY

United States Patent Office 3,023,489 Patented Mar. 6, 1962

3,023,489

STRUCTURAL PANEL

Walter Brauer, P.O. Box 2206, Corpus Christi, Tex.

Filed May 12, 1954, Ser. No. 429,202
2 Claims. (Cl. 29—180)

This invention relates to panel structures, and more particularly, but not by way of limitation, to light weight panels formed into an undulated pattern of constant pitch for use in the construction of industrial, farm and residential buildings.

The present invention is generally concerned with improvement over construction panels now available in that the structural design provides a panel adapted to support substantially four times the load per square unit of area, while only requiring about one-half as many purlins, or other supports, usually required in present day panels of this type, thereby considerably lessening the time and cost of assembly and construction. The novel structural design of this improved panel provides for the construction of small buildings, such as garages and the like, with no interior or exterior bracing except the panels themselves as herein described. The improved building panel is of an attractive appearance when utilized in building construction.

As an additional aid in construction work by using the improved panel, the proportions of the panel have been fabricated so as to allow the usage in the average case of whole panels without the necessity of having to sever a portion of the panel. The design is also such that the overlap of sections affords a large area of contact when two or more sections are being joined, thereby affording increased weatherproofing qualities.

It is an important object of this invention to provide a construction panel designed in such a manner to afford great rigidity and strength in use thereof.

It is also an object of this invention to provide a construction panel formed in such a manner so as to require only a minimum number of support or bracing members when utilized in the construction of buildings or the like.

Another object of this invention is to provide a construction panel of a pleasing appearance designed for ease and economy of construction, and facilitates overlapping connection during joining of multiple sections to provide efficient weatherproofing qualities.

Other objects and advantages of the invention will be evident from the following detailed description, read in conjunction with the accompanying drawings, which illustrate my invention.

In the drawings:

FIGURE 1 is an end view of the panel showing the arrangement for joining adjacent panels.

FIGURE 2 is an end view of a single panel.

FIGURE 3 is a perspective view of the panel assembly in vertical disposition.

FIGURE 4 shows an end view of a section of a roof assembly embodying the invention.

FIGURE 5 is a perspective view of a portion of a roof and wall section embodying the invention.

Referring to the drawings in detail (FIGS. 1 and 2) reference character 2 designates the novel panel which is preferably formed from a flat sheet 4, of aluminum or other suitable metals, glass-fibered plastic or the like, but not limited thereto, by any suitable forming or rolling process in any well-known manner. During the forming of the panel 2, there is provided an off-set portion 6 for a purpose as will be hereinafter set forth. The design of the flat sheet 4 with the up-set bends or recessed portion 6 will substantially increase the strength and rigidity of the panel both at the off-set recesses 6 and over the entire panel 2. The forming of the up-set

recesses 6 necessitates application of concentrated forming pressure without necessarily applying forming pressure over the entire panel 2. As the panel 2 is rolled or may be brake-formed, the forming pressure is applied at the immediate area of the up-set portions 6, and the flat rib-top 8 only. This concentration of forming effort permits the use of lighter rolling equipment. In the forming of the novel panel preferably by a rolling operation as set forth in applicant's co-pending application entitled "Methods and Apparatus for Forming Stressed Panels," Serial No. 532,194, filed September 2, 1955, to obtain greater lengths than provided by conventional brake forming, the up-set or recess portion 6 is formed by applying pressure to the material causing it to flow or deform into the shape as shown in the up-set portion, and this is the only portion to which the forming pressure is usually applied. This will provide for a permanent or fixed position for the up-set portion 6 and has the advantage of causing the material to stay in shape and maintain its over-all dimensions as required. The up-set portion provides work-hardened elongated ribs indicated generally at 10 making the entire panel 2 retain its shape with greater strength and rigidity, and gives a higher ratio of strength to weight. It has been found under test application that this ratio is about four to one.

The shape of the elongated ribs 10 permits the panel sections 2 to overlap in such a manner as to provide the weather proof joint at 12 and the substantially flat surface 8 is such as to receive the head of a rivet, or other such fastening means (not shown), thus effecting a substantially leak proof joint. It will be seen that the recessed portions 6 of the ribs 10 at the sides of the panel are dimensioned so as to receive cooperating flat surface 8 of an adjoining panel. The ribs 10 are substantially flat in the horizontal plane. However, it will be noted that the corners thereof (FIG. 1) have a very minute radius, since any die material usually has a slight radius at the corners. Furthermore, the innermost corners of the recess portion 6 have a minute radius to form a very slight curve in the substantially square shaped recess. The rib portion of the novel panel effects a trussed edge or a panel having edge strength to reduce flexing or stretching and provide increased strength and rigidity, particularly when bound at the edges as will be hereinafter set forth.

In FIG. 3 is disclosed a pre-formed panel 2 cooperating with a channel member 16, and a Z-bar member 18 normally used in the construction of side walls and the like of buildings. The Z-bar 18 is preferably fastened to a metal block or other suitable fastening device 15, also securing the panel 2 thereto by connection to the rib portions 10 of the panel. The channel members 16 are secured to one end of the panel 2 by any suitable fastening device such as bolts 14. This construction is preferably used for walls (but is not limited thereto), in small buildings, such as garages and the like, without the use of other re-enforcing or bracing members, thereby effecting considerable savings of materials and labor.

In FIGS. 4 and 5, the panel 2 is shown combined with an angled channel member forming an eave strip 20 provided with the drain holes 22 (FIG. 5) positioned in the valley 23 formed by the lower rib recesses 6. The hip 17 of the roof provides a combination of angular shaped channels 24, and crown-strip 26 cooperating with a bottom tie-plate 28 to form a rigid, box truss when secured by suitable fastening means 25. A roof thus formed may be attached to a wall panel 30 (FIG. 4) preferably constructed with the panel 2 as herein disclosed in FIG. 2, but not limited thereto, by any suitable fastening devices 32 and a cooperating flange 33 and channel 34 utilized for connecting the wall panel and

roof truss. In FIG. 5 is depicted the attractive aspects of a building wherein the walls and roof thereof are made of panels constructed and assembled embodying the novel feature of the improved panel design. The flat ribs **10** also provide a surface upon which flat sheeting may be attached, if desired, either to one side or both, such as insulation material, finish material, or the like. In forming the angular shaped panels **2** of the type herein described, it has been found that certain dimensions or proportion are preferred. Important dimensions are both the horizontal and vertical distances between the ribs **10**, which dimensions are chosen so as to utilize the presently available standard materials in the most economical manner, and to achieve an overall coverage in units most commonly used in construction work of this kind.

As a practical matter, it has been found that an overall depth of four inches between ribs **10**, providing for a pitch of approximately 13.333 inches will provide a coverage of substantially forty inches from a standard forty-eight inch sheet of flat stock. Thus, three of the panels coupled together will cover substantially one hundred twenty inches, or ten feet, which is a common multiple widely used in construction work of all types.

It has been found that under practical test conditions that the pre-formed panels **2** of the present design provide an increased rigidity and strength that is very advantageous in building construction. The present panel is slightly heavier when formed in the same material than the ordinary industrial corrugated type sheet such as normally used in factory roofs and wall coverings in that it will weigh slightly more per square foot. However, it has also been found that the present panel described herein will support substantially four times the load per square foot when used as a roofing or wall panel than the ordinary type of corrugated sheet of the same type material. Furthermore, it can be used on spans substantially twice as wide and carry substantially the same weight as that used in standard corrugated sheets. This has a very practical advantage in that the present panel construction requires only about fifty percent of the braces or purlins that is now customary. Ordinarily, braces are disposed every five feet, however, with the present panel construction, the bracing span can be increased to ten feet for roofs and in many instances twelve feet for walls, thereby providing considerably less bracing with a substantial economy in materials and labor, as well as expediting the assembly or building time. Furthermore, the elimination of bracing members provides more working space within the building.

In roofing construction it is preferred to assemble the panels together in such a manner as to assure that the overlap joint is at the top rib instead of at the recessed rib so that any rain or other moisture will be directed downwardly away from the joint, thereby substantially eliminating any leakage of water at the joint.

From the foregoing, it will be apparent that the present design of panel provides a construction member of increased strength and rigidity which facilitates building construction, as well as considerable saving in materials and labor.

Changes may be made in the combination and arrangement of parts as heretofore set forth in the specification and shown in the drawings, it being understood that any modification in the precise embodiment of the invention may be made within the scope of the following claims without departing from the spirit of the invention.

I claim:

1. In a light weight, high strength panel construction comprising an angular shaped sheet, a plurality of up-set recess portions provided in the sheet, each of said up-set portions having a substantially square shaped recess providing a flat surface on the bottom side thereof, a pair of oppositely disposed wall members extending from said flat surface into connection with an angularly disposed portion of the panel, said alternate up-set portions arranged with the recess portions disposed in opposite directions.

2. In a light weight panel construction comprising an angular shaped sheet having a pre-determined constant pitch, a plurality of up-set recess portions provided in the sheet, said recess portions extending longitudinally of the sheet, each of said off-set portions being of a substantially rectangular configuration providing a flat surface on one side thereof, a pair of oppositely disposed wall members extending from the flat surface into connection with the angular portion of the panel, a portion of said up-set portions being of pre-determined dimension and having alternate up-set portions arranged with the open recessed portion thereof disposed in opposite directions.

References Cited in the file of this patent

UNITED STATES PATENTS

657,995	Voigtmann	Sept. 18, 1900
849,502	Rude	Apr. 9, 1907
948,733	Knutson	Feb. 8, 1910
1,000,758	Rude	Aug. 15, 1911
1,154,254	Lachman	Sept. 21, 1915
2,008,640	Fraser	July 16, 1935
2,147,719	Simons	Feb. 21, 1939
2,153,119	Kahn	Apr. 4, 1939
2,214,107	Montgomery	Sept. 10, 1940
2,233,592	Dunajeff	Mar. 4, 1941
2,254,629	Stine	Sept. 2, 1941
2,441,476	Ewald	May 11, 1948