

May 6, 1941.

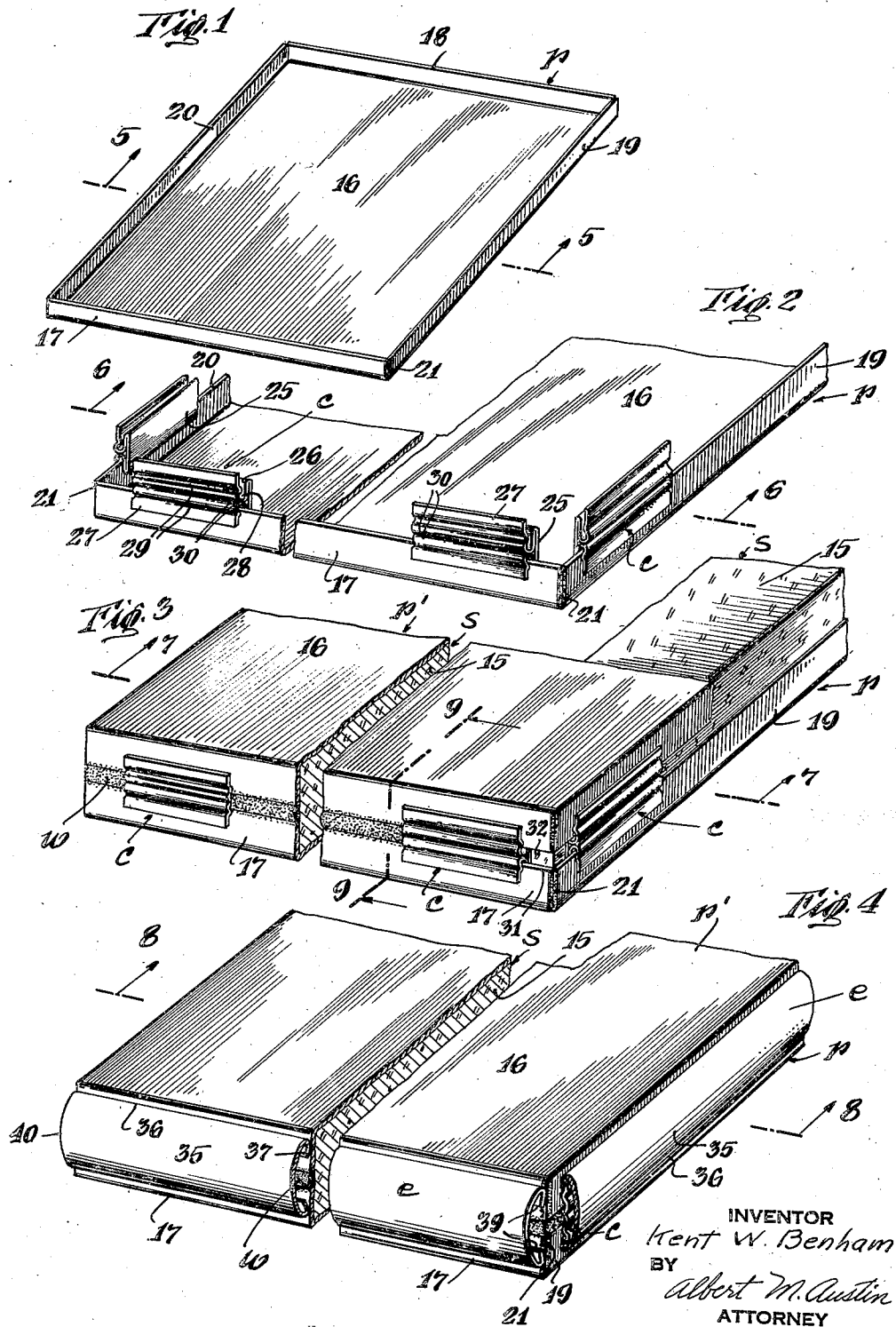
K. W. BENHAM

2,240,487

PANEL UNIT.

Filed April 19, 1940

2 Sheets-Sheet 1



INVENTOR
Kent W. Benham
BY
Albert M. Austin
ATTORNEY

May 6, 1941.

K. W. BENHAM

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2 Sheets-Sheet 2

Fig. 5

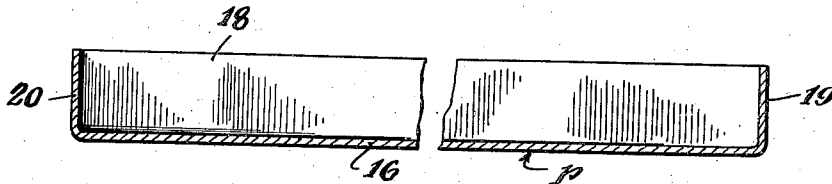


Fig. 6

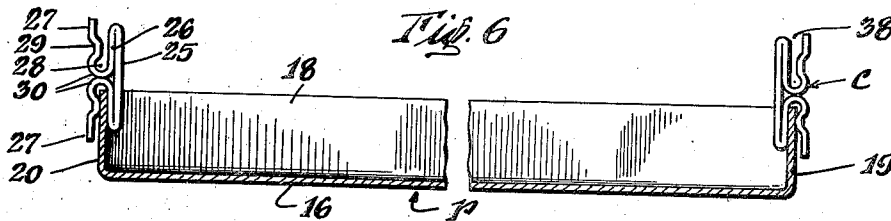


Fig. 7

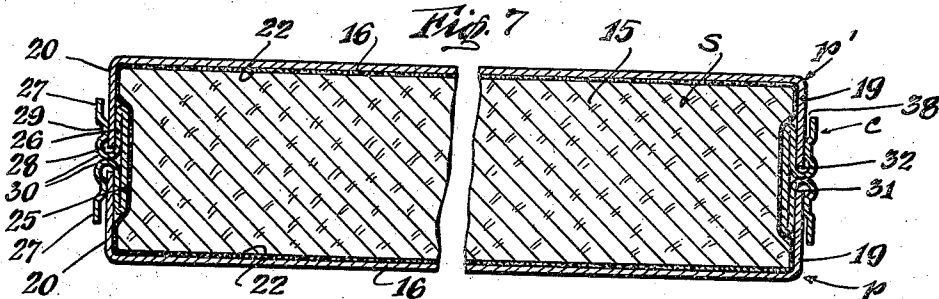


Fig. 8

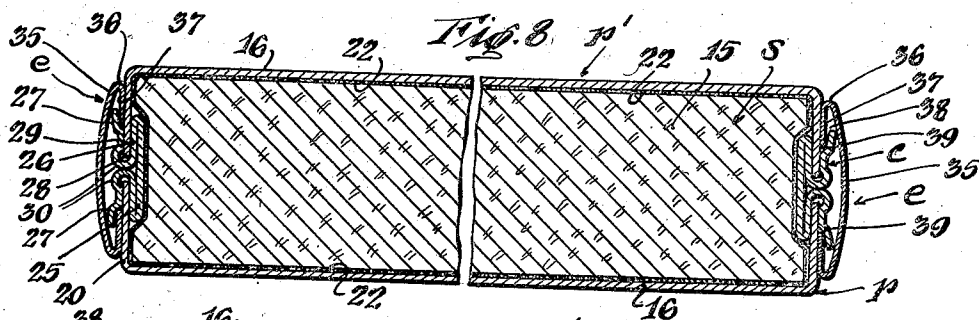
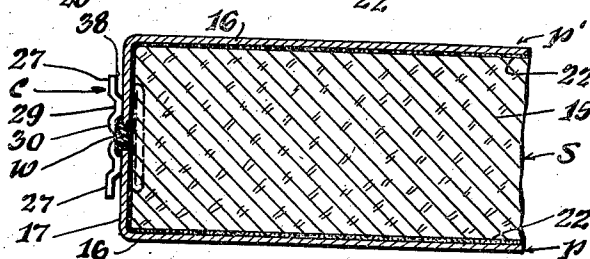


Fig. 9



INVENTOR

Kent W. Benham

BY

Albert M. Austin

ATTORNEY

UNITED STATES PATENT OFFICE

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PANEL UNIT

Kent W. Benham, Cleveland Heights, Ohio, assignor to The Sanymetal Products Co., Inc., Cleveland, Ohio, a corporation of Ohio

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11 Claims. (Cl. 189—34)

This invention relates to an improved fabricated sheet metal panel unit formed as an integral assembly which may be used to provide walls, partitions, doors, cubicles or screens, and for other purposes where space is to be partitioned or divided off in the interior of buildings.

Panel units have heretofore been provided each unit comprising a pair of panel-forming pans or sections wherein the base portion of the pan forms the wall surfaces and the inturned flanges thereof form the peripheral edges of the panel unit. In such prior constructions the pan flanges have been provided with inturned or outturned locking lips or tongues which cooperate with locking lips or tongues provided on the edging strip which extends over the pan flanges. Special dies and metal-forming machines are required to shape and form the lips and tongues on the panel flanges and the edging strip, all of which must be formed with the greatest precision and accuracy if proper interlocking action between the parts is to be effected. Due to the accuracy and precision required in the formation of the lips or tongues on the panel pan flanges and locking strips, production output is relatively low and high skill is required in their formation. Even with the greatest care, defectively shaped pans and edging strips will be formed, resulting in considerable material and labor loss.

In panel units wherein the edging strip provides the sole means for holding the paired panel-forming pans together in rigid assembly, considerable strain is imposed upon the edging strip and the locking lips or tongues on the pan flanges, so that these parts must be formed of a steel or metal of substantial gauge and strength, so that the choice of edging strip material which can be used is definitely restricted. When these prior art panels are subjected to rough handling and to vibration encountered in use, the edging strips often loosen, permitting the panel-forming pans to shift out of true alignment which decidedly detracts from the appearance of the panel unit and results in rattle or noise when the panel unit is subjected to shock or vibration.

In internally lapped panel-forming pans as now constructed, difficulty is further encountered in applying the edging strip due to obstruction from the sound insulation placed within the panel pan. This difficulty can only be avoided by spacing the sound insulation a considerable distance inwardly from the inner peripheral edges of the inner faces of the pan flanges, which obviously reduces the sound insulating effectiveness of the panel. In such constructions it is necessary to

cut away the pan flanges at the corners of the panel to permit the application of the edging strip, thus weakening the panel unit at the corner where maximum strength is most desired.

It is the purpose and object of my invention to improve upon panel units as now constructed and to provide a panel unit free from the difficulties above enumerated. In accordance with this invention, a pair of panel-forming pans are provided, each cut and formed from a single piece of suitable sheet metal to provide a panel unit of the requisite size and dimension. The edges of the panel sheets are bent at an angle to the base-forming portion thereof, generally approximately at right angles thereto, so as to provide flanges extending around one or more sides or edges of the base-forming portion. The flanges may be made any desired depth. This flange-forming operation may be quickly and expeditiously performed on a metal-stamping press or brake. The adjacent corner edges of the flanges may be integrally secured together by a seam weld which is then suitably ground or buffed off to provide a smooth corner. No locking lips or tongues are formed on these pans and precision accuracy in the formation of the panel pans is not required.

Suitable sound insulation is then packed into one of the pans as it lies on a work bench, the insulation occupying the full interior space in the pan to a depth slightly greater than twice the depth of the pan. A plurality of previously formed clips are then telescoped over the flanges of the pan which has been previously packed with insulation. These clips may be from one half to twelve inches or more in length and are arranged in conveniently spaced relationship around the flanges of the packed pan. These clips serve to securely retain the edging strips to the paired panel-forming pans. Each clip comprises a base portion which seats against the inside face of the pan flange and a pair of outturned wing portions each of which provides a pocket into which the pan flange is telescoped.

The second pan is then telescoped over the packed pan above described, the second pan being preferably identical in shape, form and dimensions with the first pan above described. The flanges of the second pan are telescoped into the outwardly facing pockets formed by the wings and base portions of the clips already applied to the first pan. The wing portions of the clips are so formed as to firmly grip the flanges of the pan, so that when the flanges of the pan are pressed together into full seating position within the pockets formed in the clips, the neck portion of

each clip will extend between the free edges of the paired pan flanges. When the pans are thus assembled, the sound insulating material should occupy the full interior space within the paired pans, except for space reserved for conduits or framing. The free edges of the adjacent flanges of the paired pans are then rigidly secured together as by welds applied to join the flanges between the spaced clips by electric arc or acetylene welding. Thus the paired pans are firmly, rigidly and integrally connected together wholly independent of the edging strips and clips.

The clip themselves may be cut from a long strip of metal which may be formed in the desired cross-section by means of a series of extruding dies. Any inaccuracies in the formation of any part or section of the strip from which the clips are cut result in little loss of labor or material since the inaccurately formed section of the strip may be cut away so that only accurately formed sections need be used. Inaccuracies in the formation of the cross-section of the clip-forming strip will, however, seldom occur when drawn through a suitable extruding die or dies. The edging strip is simple in cross-sectional formation and comprises merely a facing portion having intumed lips which are telescoped under the outturned wing portions of the clips previously applied to the panel-forming pans. The ends of the edging strips where they meet in a corner may be cut on a miter so as to provide a smooth and attractive joint. The exposed surface portions of the edging strip may be rounded or otherwise attractively formed and is securely held in fixed position by the outturned wings of the retaining clips. It will be noted in the construction which I have provided that no strain or stress whatever is imposed upon the edging strips so that they need not be formed with the same accuracy and precision otherwise required and, further, they may be formed of a wide selection of materials of relatively thin gauge. Due to the fact that the panel-forming pans are integrally welded together, it is impossible for the panel-forming pans to be moved out of alignment.

The completed panel unit possesses full strength at the corners where the strain is greatest and the sound insulation occupies the entire interior space within the assembled panel. Since precision accuracy in the formation of the panel-forming pans is not required, little or no waste resulting from defectively formed panel pans results. The only parts of the assembly which should be formed with reasonable precision accuracy is the edging strip retaining clips and precision accuracy in the formation of these clips can easily be obtained substantially without waste of material when the strip from which the clips are cut is formed and shaped on an extruding die or dies common in the art.

An object of this invention is to provide an improved panel unit which may be used to provide a door, partition, wall panel or supporting upright used to divide space, which is unusually economical to manufacture, strong and lasting in construction, which possesses maximum sound insulation, and which is attractive and appealing in appearance.

Another object of my invention is to provide an improved panel unit formed from a pair of panel-forming pans which do not rely upon the edging strip to retain the pans in fixed assembled position.

Another object of my invention is to provide

an improved panel unit formed from a pair of panel-forming pans free from locking lips or tongues formed therewith for securing the edging strips thereto, and which panel-forming pans may be made and manufactured substantially without material or labor loss resulting from slight inaccuracies in their formation.

Another object of this invention is to provide an improved panel unit which may be made of almost any desired size or thickness, which is free from noise and rattle when subjected to shock and vibration, and which possesses full corner strength.

Another object of this invention is to provide an improved method for forming and assembling panel units which can be carried out quickly and expeditiously on a mass production basis with relatively unskilled labor and in a more economical manner than can be achieved by methods heretofore employed.

Other objects of this invention will become apparent as the disclosure proceeds.

Various other features and advantages of the invention will be apparent from the following particular description and from an inspection of the accompanying drawings.

Although the novel features which are believed to be characteristic of this invention will be particularly pointed out in the claims appended hereto, the invention itself, as to its objects and advantages and the manner in which it may be carried out, may be better understood by referring to the following description taken in connection with the accompanying drawings forming a part thereof, in which—

Fig. 1 is a perspective view of the sheet metal panel-forming pan, two such pans being used in the formation of a single panel unit;

Fig. 2 is a fragmentary perspective view of the panel-forming pan showing the spaced clips as they appear when telescoped over the flanges thereof;

Fig. 3 is a fragmentary perspective view of a pair of assembled panel-forming pans with the spaced clips applied to the flanges thereof as shown in Fig. 2, this figure showing particularly the sound insulation packed within the paired pans, this view further showing the manner in which the paired flanges of the panel pans are rigidly secured together as by welding;

Fig. 4 is a fragmentary perspective view of the paired panel-forming pans having the edging strips applied thereto, the edging strips being partly broken away to illustrate certain structural details;

Fig. 5 is an enlarged cross-sectional view through one of the panel-forming pans as it appears when looking in the direction of the arrow 5—5 of Fig. 1;

Fig. 6 is an enlarged cross-sectional view through one of the pans with the clips applied to the flanges thereof, this view being taken along line 6—6 of Fig. 2;

Fig. 7 is an enlarged cross-sectional view through a pair of assembled pans having insulation packed therebetween and the clips applied to the flanges thereof, this view being taken along line 7—7 of Fig. 3;

Fig. 8 is an enlarged cross-sectional view through the completed panel as it appears when looking in the direction of the arrows 8—8 of Fig. 4; and

Fig. 9 is an enlarged fragmentary cross-sectional view through the panel as it appears when

looking in the direction of the arrows 9—9 of Fig. 3.

Similar reference characters refer to similar parts throughout the several views of the drawings and specification.

Referring to the drawings, my improved panel unit is formed from a pair of sheet metal panel-forming pans *p* and *p'*. Edging strip retaining clips *c* are arranged in spaced relationship between the adjacent flanges of the panel-forming pans to provide means for securing the edging strips to the panel unit. The adjacent flanges of the paired panel-forming pans are rigidly secured together as by spot or seam welds *w* which may be applied to the panel flanges between the clips *c*. Suitable sound insulating material *s* is contained within the paired panel-forming pans, which is placed in one of the pans prior to the application of the second pan. An edging strip *e* is applied to each of the selected edges of the paired assembled pans by telescoping the edging strip into locking engagement with the retaining clips previously applied to the assembled pan.

Referring more particularly to Fig. 1, each pan is formed or shaped from a suitable sheet of metal, such as steel, of the desired gauge. The panel-forming surface *16* is made to correspond to the desired dimensions of the panel unit and is generally rectangular in form, although it will be understood that the panel surface *16* of each pan which forms the completed panel unit, may be made of any shape, size or dimensions. One or more of the edges of the panel sheet are bent at an angle to the facing portion *16* so as to provide one or more flanges which surround the facing portion *16*. These flanges form a part of the edge of the completed panel unit. Where it is desired to provide a panel unit with a finished edge extending completely around the periphery, a flange is provided at each end of the pan. For ease in illustration there is shown in Fig. 1 a pan having a facing portion *16* of substantially rectangular form, with flanges *17*, *18*, *19* and *20* extending from each side edge thereof, although it will be understood that any desired number of flanges may be provided depending upon the location in which the panel unit is to be placed. The adjacent abutting ends of the flanges may be fixedly secured together as by a seam weld *21*. The pan flanges may extend at a true right angle to the facing portion *16* or at a lesser or greater angle to produce the desired edge contour.

One of the paired panel pans *p* is then placed upon a table or conveyor and insulating filling *15* positioned therein. This insulating filling may comprise any of the numerous types of packing material used for the purpose of making what is known as "packed panels." Among materials commonly used are corrugated paperboard, fiberboard, insulating board, and other fibrous materials which are resistant to the passage of heat or sound, such as glass fiber. The insulating layer *15* is preferably cut or shaped to closely conform to the interior area of the pan *p* and is of such thickness as to occupy the full cubical space when the two paired panel pans *p* and *p'* are assembled together. From an insulating and sound deadening standpoint it is desirable that the insulating material *15* occupy the entire cubical space between the assembled panel pans *p* and *p'* except only where it may be necessary to provide additional framing for the panel units when used as a supporting upright or where space should be provided for the passage of wires or conduits. As shown in Figs. 7 and 8, a layer of ad-

hesive *22* is preferably applied either to the interior surface of the pan *p* or to the outside surface of the insulating material *15* so as to securely hold the same in place.

Clips *c* are telescoped over the upstanding flanges *17*, *18*, *19* and *20* of the panel *p* either before or after the insulating material *15* has been placed in position. It is generally more convenient to apply the clips *c* after the insulating material *15* has been laid. Each clip *c* may comprise a base portion *25* and a pair of return bend portions *26* pressed flat against the base portion *25*. The return bend portions *26* terminate in a rounded edge portion *30*, the two rounded edge portions thus provided being substantially in abutment to provide a neck portion of limited thickness, as illustrated more particularly in Figs. 6, 7 and 8. Each rounded edge portion *30* terminates in an outwardly extending wing portion *27*, which is spaced from the adjacent rebent portion *26* so as to provide a narrow groove *28* into which the flange of the pan is adapted to extend. In order that the pan flanges may be securely gripped by the clips, it is desirable to provide each outturned wing portion *27* thereof with an internal rib *29* formed by pressing an external groove in the wing portion. The ribs *29* serve to securely grip the pan flanges so that each clip is rigidly held in position between the pan flanges.

The clips *c* may be of any desired length but preferably are short sections which may be from $\frac{1}{2}$ inch to 12 inches or more in length. The clips are cut from a continuous piece of drawn metal which is produced by taking a flat strip of steel and drawing or otherwise forcing it through a plurality of extruding dies which gives it the desired cross-sectional contour. The drawn metal so formed is usually several feet long and the clips are then made by cutting off desired lengths of the drawn metal with substantially no waste of material. The clips produced in this manner are very accurate in shape, contour and proportions, and can be produced at relatively low cost.

The clips *c* thus formed are telescoped over the upstanding flanges *17*, *18*, *19* and *20* of the panel pan *p* in the manner shown in Fig. 2. These panel flanges are securely gripped by one of the rebent portions *26* of each clip and the adjacent outturned wing portion *27* of each clip, firm frictional engagement being obtained by the internal rib *29* formed in the wing portion. If the packing material *15* has not been previously located in the pan *p*, it is then inserted. A coating of adhesive *22* is then applied either to the exposed surfaces of the insulating material *15* or to the interior surfaces of the panel pan *p'*. The panel pan *p'* is then telescoped over the insulating material *15* and its flanges *17*, *18*, *19* and *20* are driven into seating position within the other pocket *28* of each clip so that these flanges are firmly gripped by the other adjacent rebent portion *26* and the outturned wing portion *27* of each clip, rigid frictional contact being obtained by the internal rib *29* formed therein.

As thus assembled, the panel unit would appear as illustrated in Figs. 3 and 7, wherein the clips *c* extend around the desired edges of the unit in convenient spaced relationship. The adjacent free edges *31* and *32* of the paired pans at points not enclosed within the clips *c*, are rigidly secured together by the application of welds *w* at these points, an operation which can be quickly and effectively performed by electric

arc or acetylene welding equipment in general use. It will be appreciated that in the actual construction the adjacent edges 31 and 32 of the paired pan flanges are not spaced apart substantially greater than $\frac{1}{8}$ or $\frac{1}{16}$ of an inch, which an electric arc or acetylene weld will easily span. It will therefore be appreciated that the spacing of the flange edges 31 and 32 of the pan flanges illustrated in the drawings is not accurate to scale, but these edges are shown separated a greater distance than they would be in actual practice in order that the structural details of the securing clips may be more readily understood. The gauge of the strip metal from which these clips are formed and the gauge of the panel-forming sheets is also substantially less than that illustrated in the drawings, as will be readily apparent to the worker in the art. It will be appreciated that the edges 31 and 32 of the pan flanges may, if desired, be brought substantially into contact by providing a slight notch in the edges 31 and 32 of the pan flanges at points where they are to receive the clips, so that the neck portions of the clips extend through the paired notches so formed.

The welds *w* serve to rigidly and integrally bond the adjacent flanges of the paired panel pans together so that it is impossible for the paired pans to shift, move or rattle. Each corner of the panel unit is welded both by the transverse corner weld 21 and the longitudinal weld *w*, producing a panel unit which is of unusual strength at the corners where strength is most desired. The clips *c* need not perform the function of holding the paired panel pans together, but are used solely to hold the edging strips *e* in place. Comparatively little strain is thus placed upon the clips *c* so that they may be made of relatively light gauge metal and may be spaced a substantial distance apart, sufficient clips being provided only to properly secure the edging strips in fixed position.

An edging strip *e* covers and conceals the welds *w*, the clips *c*, and such portions of the pan flanges as it is desired to conceal. Each edging strip *e* may be formed from a single strip of almost any desired sheet metal or other material and need not possess great strength inasmuch as it performs no pan-holding function. Each strip comprises an outer molding or facing portion 35 which may be given a rounded or any desired contour to produce an attractive and artistic edge for the panel unit. The molding portion 35 terminates at each edge thereof in inturned lip portions 37, which lip portions form with the molding portion 35 rounded edges 36. When the edging strip is in position, each of its lip portions 37 is snugly clamped in a pocket 38 formed between the adjacent flange of the panel pan and the outturned wing portion 27 of each clip. The free edge 39 of each lip portion is so shaped and formed that when in locking position it will substantially seat against the internal rib 29 of the clip.

Each edging strip is applied by telescoping the same endwise across the edge of the panel unit so that the inturned lip portions 37 thereof slide in the grooves 38 formed as above described. An edging strip *e* extends along each side edge of the panel unit so to be covered and the ends of two adjacent edging strips may be cut so as to form a mitered joint 40 at the corner. When the edging strips have been thus placed in position the mitered ends of the strips at the corner may be integrally united as by welding, which

may be later ground or buffed off to form a smooth joint.

Where the term "panel unit" is herein used, it is intended to cover and embrace any built-up section which may be used either as a wall-forming surface, door, or supporting upright. These panel units or sections are admirably adapted for use in erecting so-called knockdown or sectional partitions, toilet compartments, hospital cubicles, and other types of walls used to divide off space in the interior of buildings. Where the panel unit is to be suspended from two wall surfaces, it may be desirable to provide an edging strip along only the top and bottom horizontal edges thereof or along only one vertical edge, so that the other vertical edge which is to abut another wall surface is free of an edging strip, at which edge the panel pans may be connected together by a channel, well known in the art. Where the panel unit is also to serve the purpose of a supporting upright, edging strips may be provided to extend along the vertical edges thereof and the top horizontal edge, the lower edge of the panel pans being connected together by a channel or other connecting means. It will also be appreciated that reinforcing framing may be inserted between the panel pans when the panel unit or upright is to be subjected to severe strain. Space may be provided within the panel unit, if desired, for running conduits and wiring therethrough, which can easily be done since the panel pans offer no obstruction, space therefor being provided by cutting out so much of the insulating material *s* as may be necessary. It will thus be appreciated that this invention is directed to the formation of a rigid and sturdy panel unit or upright comprising paired pans which present one or more pairs of inturned flanges integrally connected together as above described and covered by an edging strip held in place by a single clip or a plurality of spaced clips.

While certain novel features of the invention have been disclosed and are pointed out in the annexed claims, it will be understood that various omissions, substitutions and changes may be made by those skilled in the art without departing from the spirit of the invention.

What is claimed is:

1. In wall construction, a panel unit comprising a pair of sheet metal wall-forming pans each having an inturned flange along an edge thereof, a separable clip having an interior portion seating against the inside faces of said paired flanges, a neck portion extending between the free edges of said paired flanges, and a pair of wing portions overlying the exterior of said paired flanges, means exterior to said clip for securing the free edges of said paired flanges rigidly together, and an edging strip having inturned lip portions seating under said wing portions retaining said edging strip in position.

2. In wall construction, a panel unit comprising a pair of sheet metal panel-forming pans presenting a pair of inturned flanges along an edge of said panel unit, a plurality of spaced clips having portions telescoping over said paired flanges, means between said clips for securing said paired flanges in fixed assembly, and an edging strip seating over said paired flanges, said edging strip and said clips having cooperating means for securing said edging strip in fixed position.

3. A fabricated building unit comprising in combination, a pair of metal panel members presenting paired flanges extending inwardly, spaced

clips having portions extending between the adjacent edges of said paired flanges and portions overlapping the interior surfaces and the exterior surfaces of said paired flanges, means positioned between said clips for rigidly joining said paired flanges, and an edging strip retained in position by said clips.

4. A fabricated building unit comprising in combination, a pair of panel-forming sheets presenting a pair of inwardly extending complementary flanges, spaced clips telescoping over the edges of said paired flanges, means positioned between said clips for rigidly joining said paired flanges, and an edging strip retained in position by said clips.

5. A fabricated building unit comprising in combination, a pair of metal panel-forming sheets presenting a pair of inwardly extending complementary flanges, a clip having a pair of grooves into which said paired flanges extend, means exterior to said clip for rigidly joining said paired flanges, and an edging strip retained in position by said clip.

6. A fabricated building unit comprising in combination, a pair of metal panel-forming sheets presenting a pair of inwardly extending complementary flanges, spaced clips held in position by said flanges, means positioned between said clips for rigidly joining said paired flanges, and an edging strip retained in position by said clips.

7. A fabricated building unit comprising in combination, a pair of metal panel-forming sheets presenting a pair of inwardly extending complementary flanges, insulating material positioned between said panel-forming sheets, spaced clips held in position by said flanges, welds positioned between said clips for rigidly joining said paired flanges in integral assembly, and an edging strip retained in position by said clips.

8. A fabricated building unit comprising in combination, a pair of metal panel-forming sheets presenting a pair of inwardly extending complementary flanges, insulating material positioned between said panel-forming sheets, spaced clips held in position by said flanges, welds integrally joining the free edges of said paired

flanges at points between said spaced clips, and an edging strip retained in position by said clips.

9. A fabricated building unit comprising in combination, a pair of metal panel-forming sheets presenting a pair of inwardly extending complementary flanges, spaced clips held in position by said flanges, each of said clips having portions overlapping the inside face of said flanges and portions overlapping the outside face of said flanges, means positioned between said clips for rigidly joining said paired flanges in integral assembly, and an edging strip retained in position by said clips.

10. A fabricated building unit comprising in combination, a pair of metal panel-forming sheets presenting a pair of inwardly extending complementary flanges, spaced clips held in position by said flanges, each of said clips having an interior portion overlapping the inside face of each of said flanges, an exterior portion overlapping the exterior face of each of said flanges, and a neck portion connecting said interior and exterior portions, means positioned between said clips for rigidly joining said paired flanges in integral assembly, and an edging strip covering and concealing said clips, said edging strip having inturned lip portions seating under the exterior portions of said clips to thereby retain said edging strip in fixed position.

11. A fabricated building unit comprising in combination, a pair of metal panel-forming sheets presenting a pair of inwardly extending complementary flanges, spaced clips held in position by said flanges, each of said clips having an interior portion overlapping and seating against the inside face of each of said flanges, an exterior portion overlapping the exterior face of each of said flanges, a neck portion connecting said interior and exterior portions, and a rib portion formed in each of said exterior portions abutting the outside face of the adjacent flange, means positioned between said clips for rigidly joining said paired flanges in integral assembly, and an edging strip retained in position by said clips.

KENT W. BENHAM.