

A. M. CARPENTER.
WALL STRUCTURE.
APPLICATION FILED JULY 7, 1913.

1,299,425.

Patented Apr. 8, 1919.

4 SHEETS—SHEET 1.

Fig. I.

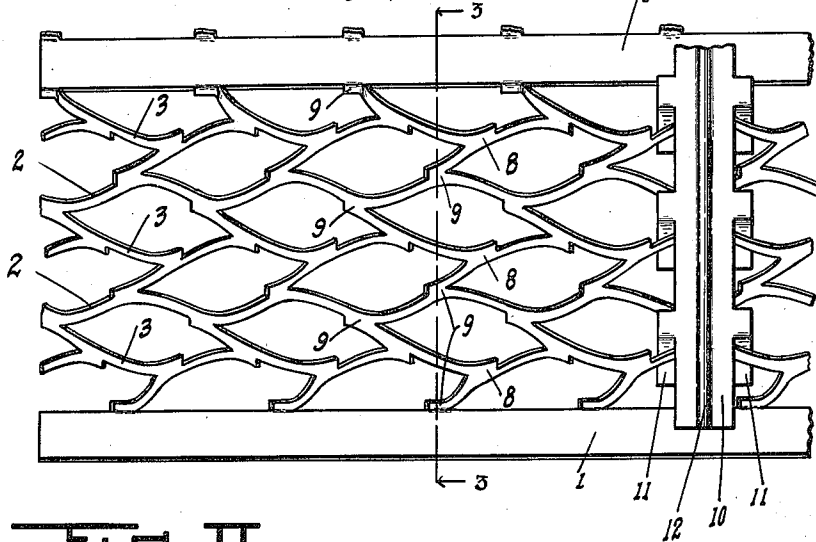
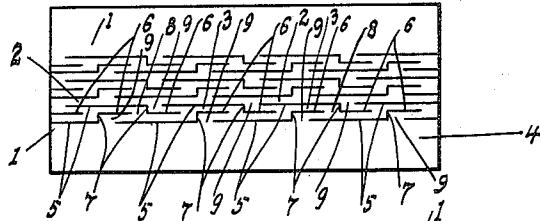


Fig. II.

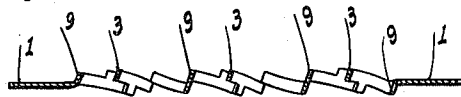


Fig. III.

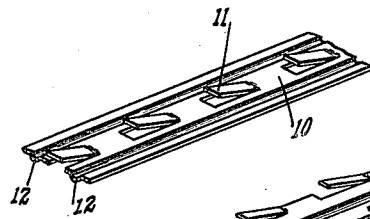


Fig. XIV.

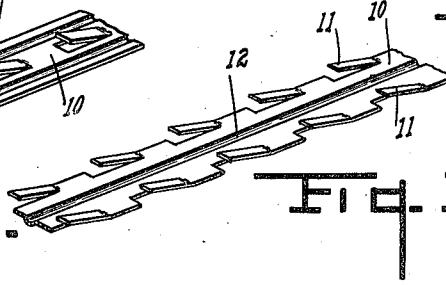


Fig. IV.

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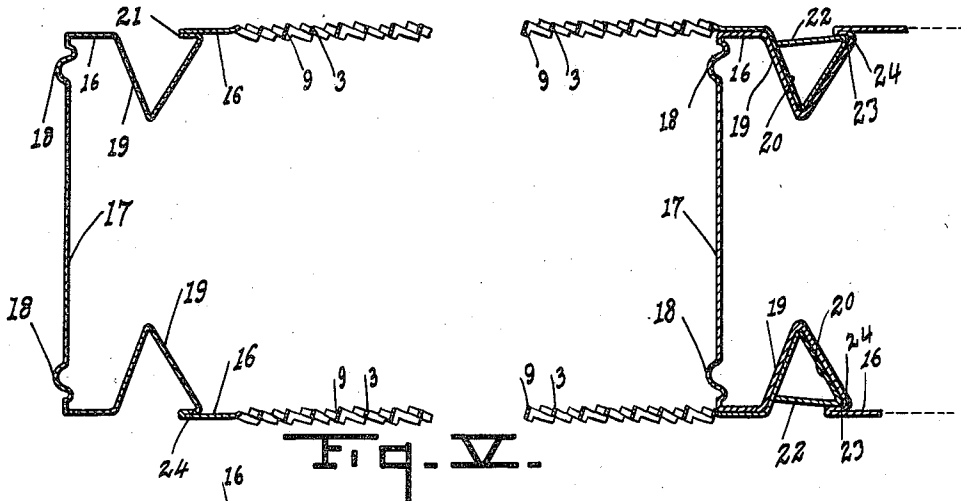


Fig. V.

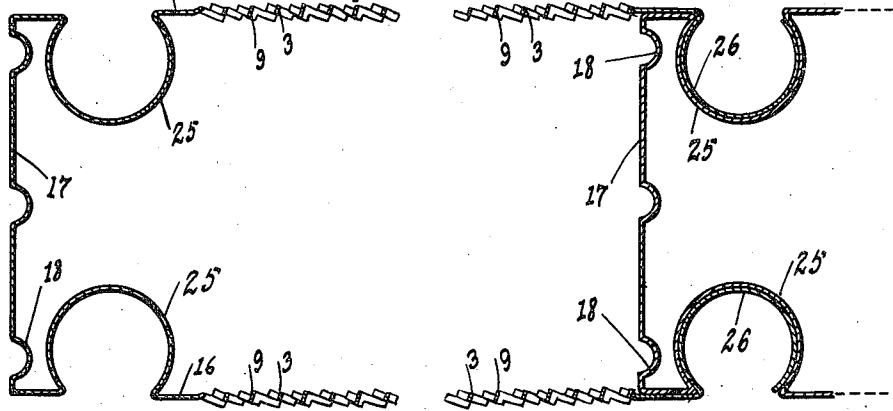


Fig. VI.

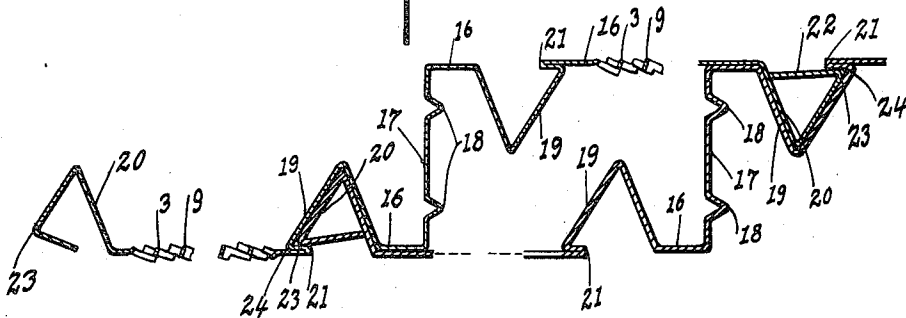


Fig. VII.

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4 SHEETS—SHEET 3.

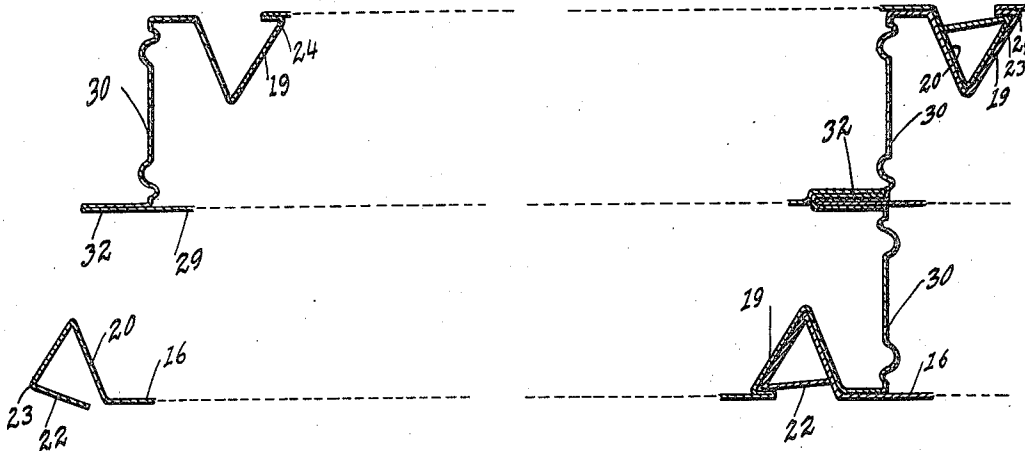


FIG. VIII.

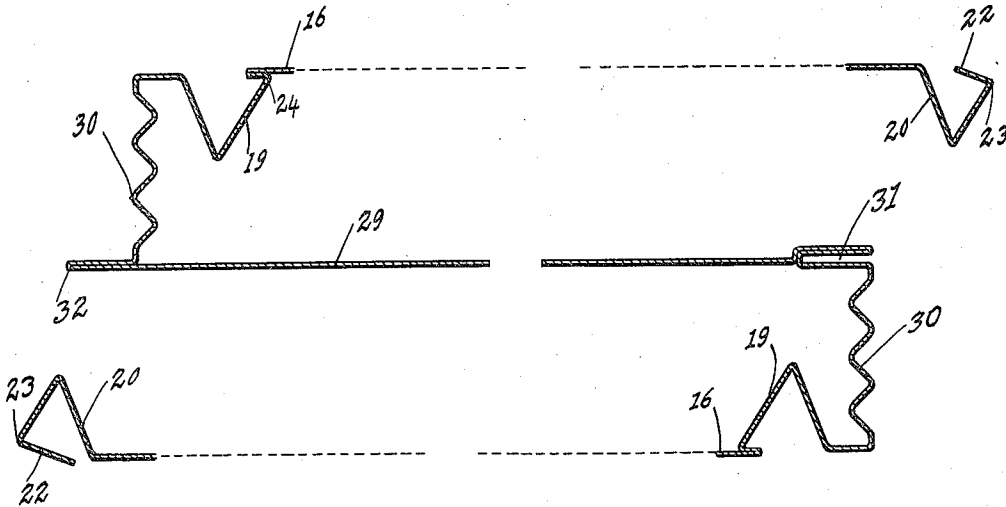


FIG. IX.

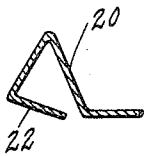


FIG. X.

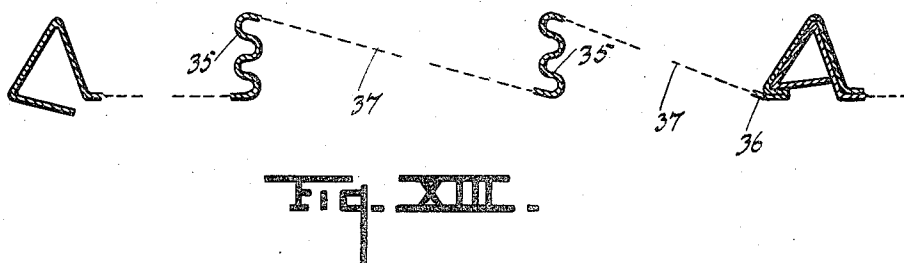
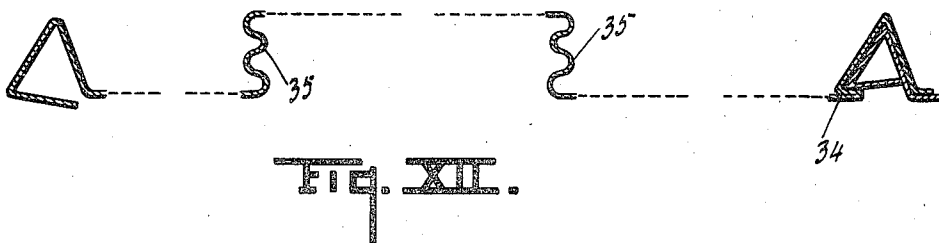
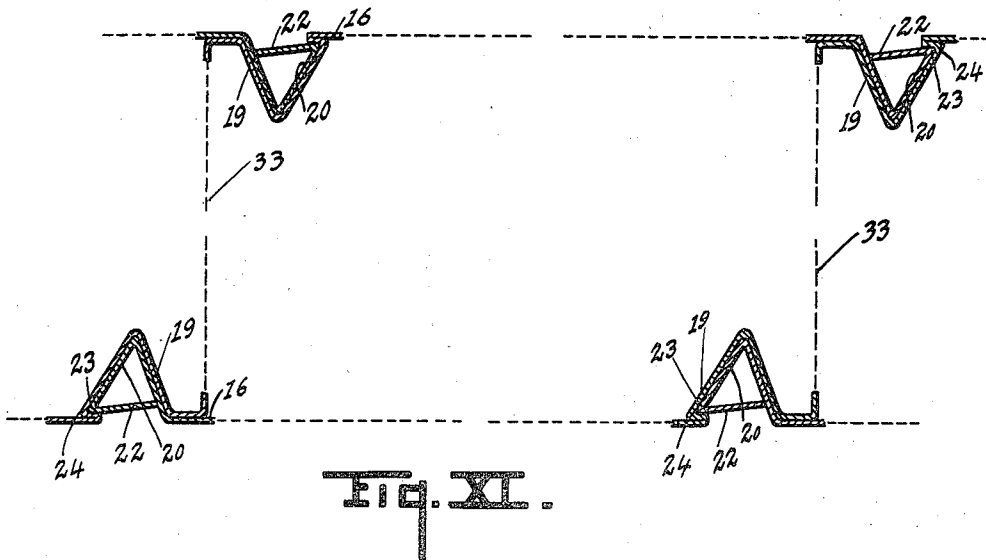
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4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

AMOS M. CARPENTER, OF KALAMAZOO, MICHIGAN.

WALL STRUCTURE.

1,299,425.

Specification of Letters Patent.

Patented Apr. 8, 1919.

Application filed July 7, 1913. Serial No. 777,646.

To all whom it may concern:

Be it known that I, AMOS M. CARPENTER, a citizen of the United States, residing at Kalamazoo, Michigan, have invented certain new and useful Improvements in Wall Structures, of which the following is a specification.

This invention relates to improvements in wall structures.

The main objects of this invention are: First, to provide an improved expanded metal wall structure.

Second, to provide an improved structural wall adapted for use in constructing hollow walls.

Third, to provide an improved structural unit adapted for use in making hollow walls, in which the units are quickly and easily assembled and when assembled, are rigid and secure.

Further objects, and objects relating to details and economies of construction will definitely appear from the detailed description to follow.

I accomplish the objects of my invention by the devices and means described in the following specification. The invention is clearly defined and pointed out in the claims.

Structures constituting preferred embodiments of my invention are clearly illustrated in the accompanying drawing forming a part of this specification, in which:

Figure I is a blank slitted to show the first step of the process of producing my improved expanded metal structure.

Fig. II is a detail plan view of a section of an expanded metal structure of simple form embodying the feature of my invention.

Fig. III is a detail cross section on a line corresponding to line 3—3 of Fig. II.

Fig. IV is a detail inverted perspective view of the reinforcing member 10.

Fig. V is a horizontal section through a wall structure, showing two wall units embodying the features of my invention assembled.

Fig. VI is a sectional view similar to Fig. V, of a slight modification, the modification being in the form of the joint members, there also being a slight modification in the reinforcing ribs of the cross members 17.

Fig. VII is a detail horizontal section of another modification, the modification being

in the disposition of the side members 16 relative to the cross member 17.

Fig. VIII is a detail section showing still another modification, the modification being an adaptation to a double chambered wall, parts being shown in dotted lines.

Fig. IX is a detail section of a further modification, the structure there shown differing from that of Fig. VIII in the form of the cross members.

Fig. X is a detail section of a single side wall unit, the parts being indicated by dotted lines.

Fig. XI is a detail section of a modified form similar to that of Fig. VII, with the exception that the cross members 33 are expanded instead of being solid as indicated in the other views.

Fig. XII is a detail cross section of still another modification which is especially designed to be plastered on both sides.

Fig. XIII is a detail sectional view showing a slight modification of the form shown in Fig. XII.

Fig. XIV is a detail perspective of a modified form of the reinforcing member.

In the drawing, similar reference characters refer to similar parts throughout the several views, and the sectional views are taken looking in the direction of the little arrows at the ends of the section lines.

Referring to the lettered parts of the drawing, in the form shown in Fig. II, my improved expanded metal structure comprises spaced longitudinal bar members with open work between. The open work comprises a plurality of strand members 2 and the connecting tie members 3, each tie member being united at one end to one of the strand members 2 or to one of the bar members 1, and at the other to an adjacent tie member.

The tie members upon opposite sides of the strand members are arranged alternately, the points of union of the tie members to the strand members being substantially spaced. The other end of each tie member is united to an adjacent tie member at a point between and substantially spaced from its points of union to the tie member and strand to which it is in turn connected.

The tie members and strand members in the structure illustrated are of uniform and of substantially the same width. This is

desirable where uniform openings in the open work are desired.

In the structure illustrated in Fig. II, the bars 1 are provided, the same being spaced but a short distance. These bars may be spaced as desired or may be omitted entirely.

If the strands 2 are made of a greater width than the ties 3, they will be less distorted by the expansion or if of sufficient width will remain straight or substantially straight.

In producing my improved expanded metal structure, the sheet metal is first slit as shown in the blank 4, see Fig. I, and consists of forming a plurality of double series of alined spaced slits 5, the slits of one series being alternately spaced with those of the other, as shown.

Between the double series of slits 5 is an intermediate series of shorter slits 6, one end of each intermediate slit being disposed opposite adjacent ends of alternate slits of the double series.

Cross slits 7 are formed connecting such opposed ends of the slits 5 and 6. The portions between the double rows of slits have no cross slits and constitute the strands 2.

The parts between the ends of the slits 5 and 6 constitute the union parts 8 for the ties, while the parts between the ends of the slits 5 constitute the union parts 9 for the tie members to the strand members or for the tie members to the bar members.

After slitting as shown in Fig. I, the expanding is effected by drawing laterally, which causes the slits to open and the ties and strands to assume an inclined position as indicated in Figs. II and III. The tie members and strand members being joined as described, causes the same to take a curved form and to swing edgewise to the plane of the sheet of which they are formed, as shown in the drawing. This form and position is highly desirable for receiving and retaining plaster.

Owing to the manner of joining the strands and tie members, the points of union of the same are not likely to tear or break during the expanding operation or when subjected to blows or bending or other stresses.

By this process, expanded metal structures may be very economically produced, and the parts are connected so as to be well adapted to receive the strains and stresses to which they are subjected during the process of manufacture or while being shipped and placed, and in use.

In Fig. IV, I show an improved reinforcing member 10 formed of sheet metal and having fingers 11 struck down from its edges and adapted to be engaged under the strand and tie members, as shown in Fig. II, the reinforcing member 10 being arranged trans-

versely of the bars 1 and in engagement therewith.

By means of these reinforcing members, I brace and support the open work portion so that it is very rigid and well adapted for the purposes for which it is intended. The reinforcing members are made more rigid by providing them with a longitudinal rib 12 between the fingers.

In the modified construction shown in Fig. XIV, the reinforcing member 10 is provided with a single row of fingers 11 and reinforcing ribs 12 at each side. The reinforcing member shown in Fig. XIV is somewhat more easily engaged or applied than the reinforcing member shown in Fig. IV, as there is only one series or row of fingers to be engaged with the members of the open work.

In Fig. V, I show my improvements embodied in improved hollow wall units which consist of side members 16 connected at one edge by cross members 17. The cross members are preferably ribbed or corrugated as at 18 to reinforce or make the same more rigid. Adjacent the cross members the side members are provided with outwardly-facing channel shaped female coupling members 19, while at their outer edges, the side members are provided with male coupling members 20. These coupling members 19 and 20 are preferably V-shaped in cross section as shown.

The female coupling members are provided with inwardly projecting parts or flanges 21 which are engaged by the male coupling members to effectively retain the coupling members together.

To facilitate the engaging of the coupling members, the male coupling members are provided with locking flanges 22 on their free edges which are driven or forced in, as shown in Fig. V, forcing the angles 23 of the male coupling members into the angles 24, formed by the flanges 21 of the female coupling members, effectively engaging and locking the parts in engagement.

The side members 16 are preferably expanded between the male and female coupling members thereof, as shown. Each unit comprising the side members, cross member, male and female coupling members is formed integrally of sheet metal. The coupling members serve to firmly and securely unite the unit, while the cross members serve as studding in the partition and reinforcing members, making a very rigid wall structure without the necessity of providing studding.

The cross members may, if desired, be expanded as shown in Fig. XI. Ordinarily, this is not necessary as a wall with a series of closed or substantially closed air spaces is generally deemed desirable.

In the modification shown in Fig. VI, the coupling members 25 and 26 are curved in

cross section. The form shown in Fig. V, however, is preferred on account of the greater convenience with which the coupling members may be engaged.

5 The reinforcing ribs 18 of the modification shown in Fig. VI, are disposed somewhat differently from those of the cross members of Fig. V.

In the form or modification shown in Fig. VII, the side members 16 are disposed on opposite sides of the cross member 17. The female coupling members 19 and the male coupling members 20 are formed in the same relation on the side members and when assembled, a hollow wall is produced substantially the same as in the structure shown in Figs. V and VI.

In the modification shown in Figs. VIII and IX, double chambered walls are provided, there being an intermediate wall member 29 extending between the cross wall members 30. The side wall members 16 are provided with male and female joint members of the same form as shown in Fig. V. The intermediate wall 29 is folded at one end to provide a mortise-like slot 31, and at the other end to provide a tongue-like projection 32 adapted to engage the slots of the adjacent unit when the units are assembled, as shown in Fig. VIII. This provides a very rigid wall structure having a double series of chambers where the intermediate wall members 29 are left solid, or if they are expanded, a wall having a single series of chambers is provided. These structures are particularly desirable for floors and ceilings.

In Fig. X, I show a modification in which the simple unit, such as is shown in Fig. II, is provided with male and female joint members.

The modification of Fig. XI is substantially that of Fig. VII, with the exception that the cross walls 33 are expanded.

In the modification shown in Fig. XII, a simple unit 34 is provided with corrugated offsets 35 and with the male and female joint members at the edges, the parts between the offsets and the male and female joint members being shown by dotted lines, and it is intended in practice that these parts shall be expanded.

In Fig. XIII, the unit 36 is substantially that of Fig. XII, with the exception that the portions 37 are arranged diagonally. In these structures, these units 34 and 36 are intended to be plastered on both sides so that they are completely embedded.

I have illustrated and described these various modifications of my improvements in order that the general adaptability of the same might be fully understood.

My improved wall structure is comparatively economical to produce and is highly desirable in that it is well adapted to withstand strains and stresses to which it may be

subjected in forming and handling and applying, and also effectively supports and retains the plaster applied thereto.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a wall structure, the combination with a plurality of units, each comprising spaced side members united at one edge by a cross member, each side member having an outwardly facing channel-like female joint member adjacent the cross member, and male joint members at their outer edges engaging the female joint members of adjacent units, said joint members being V-shaped in cross section, the female joint members being provided with inwardly projecting flanges at one side and the male joint members being provided with locking flanges on their free edges, said locking flanges being forced inward to engage and retain the male joint members in engagement with the flanges of the female joint member, said unit side, cross and male and female joint members being formed integrally of sheet metal, the portions of the side members between the male and female joint members being suitably expanded, all coacting for the purpose specified.

2. In a wall structure, the combination with a plurality of units, each comprising spaced side members united at one edge by a cross member, each side member having an outwardly facing channel-like female joint member adjacent the cross member, and male joint members at their outer edges disposed in the female joint members of adjacent units, said joint members being V-shaped in cross section, the female joint members being provided with inwardly projecting flanges at one side behind which the free edge of the male joint members are sprung, said unit side, cross and male and female joint members being formed integrally of sheet metal, the portions of the side members between the male and female joint members being suitably expanded, all coacting for the purpose specified.

3. A sheet metal structural unit having a channel-like female joint member at one edge, and a male joint member at the other edge adapted to be engaged with the female joint member of an adjacent unit, said female joint member being provided with an inwardly projecting part at one side and the male joint member being provided with a locking flange on its free edge which when in locking position engages the opposite wall of the male member and holds its free edge in locking engagement with the inwardly projecting part of the female joint member.

4. A sheet metal structural unit having a female joint member V-shaped in cross section with a longitudinal flange at one edge and a male joint member with a free compressible edge, the female joint member of

one unit coacting with the male joint member of an adjacent member, the free edge of the male joint member being compressed and introduced into the female joint member and
5 expanded to engage behind the flange thereof.

5. In a wall structure, the combination with a plurality of sheet metal units each comprising spaced side members united at one edge by a cross member each side member having a female joint member adjacent
10 the cross member and a male joint member at its outer edge engaging the female joint members of adjacent units and whereby the

side members are supported in spaced relation with cross members at the joints thereof, the outer edges of the side members being
15 capable of being swung apart to permit the engaging of the joint members with a lateral movement.

In witness whereof, I have hereunto set
my hand and seal in the presence of two witnesses.
20

AMOS M. CARPENTER. [L. s.]

Witnesses:

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M. L. GLASGOW.