July 8, 1941. R. L. HOHL 2,248,671

WALL CONSTRUCTION

Filed May 11, 1939 8 Sheets-Sheet 1

Fig. 1.

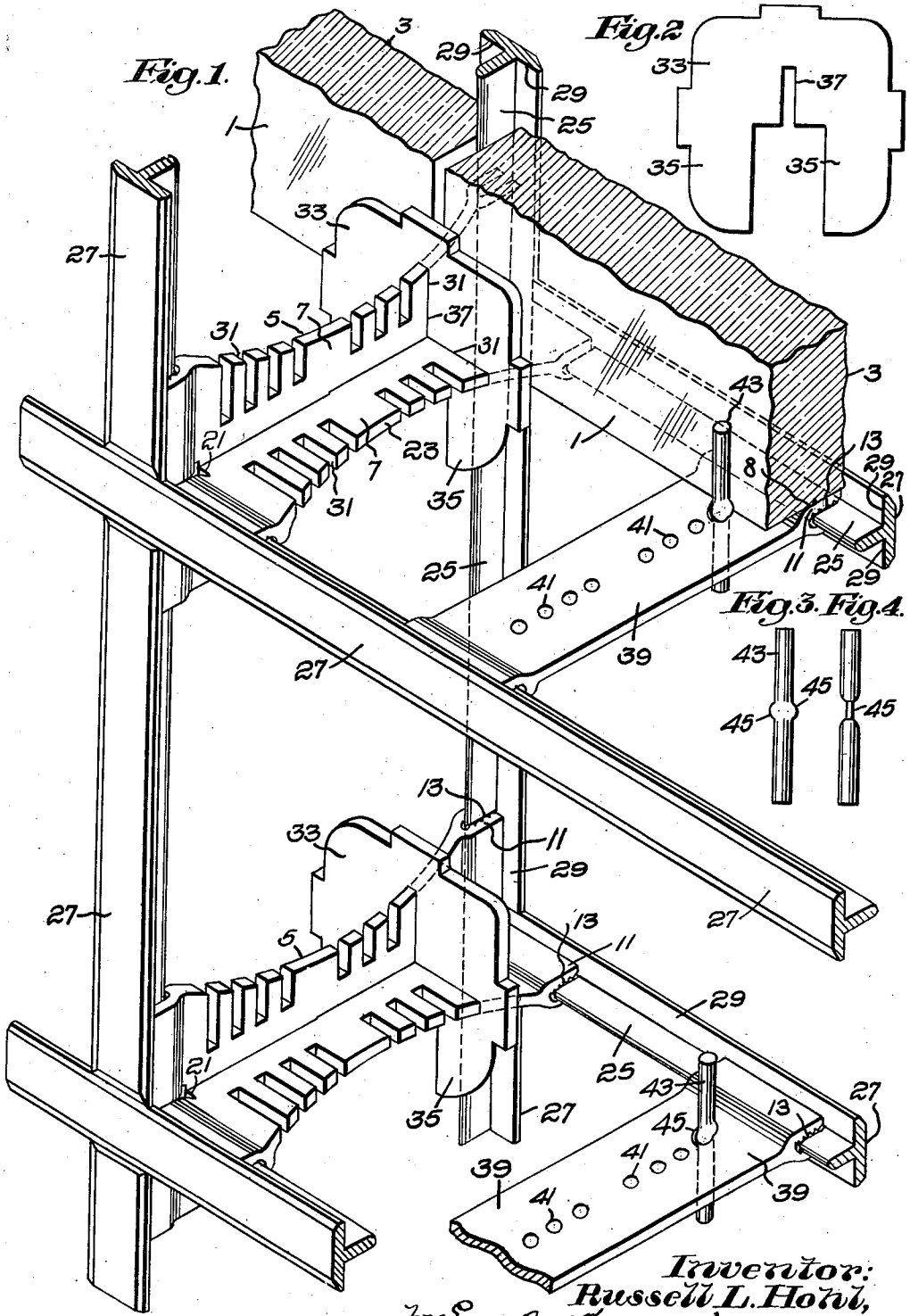


Fig. 2.

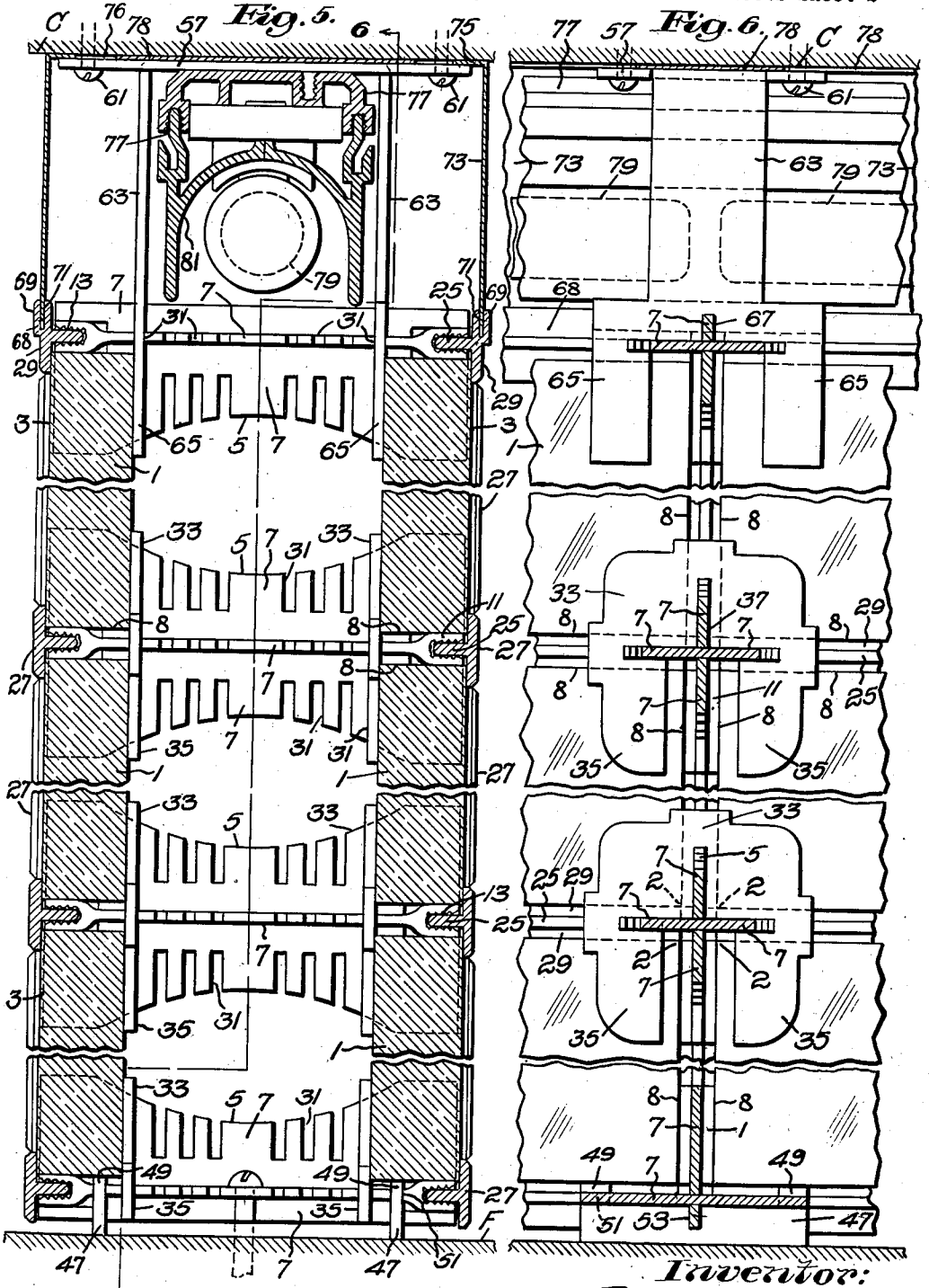
Fig. 3. Fig. 4.

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Fig. 8

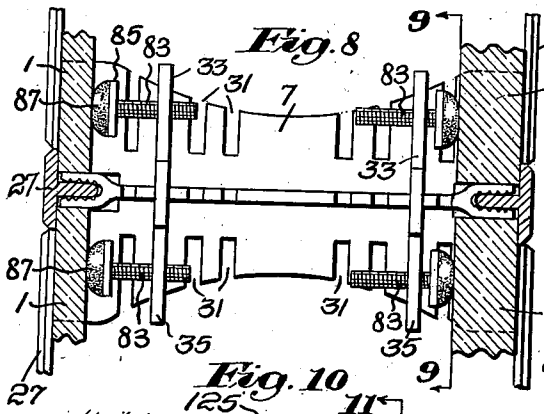


Fig. 9.

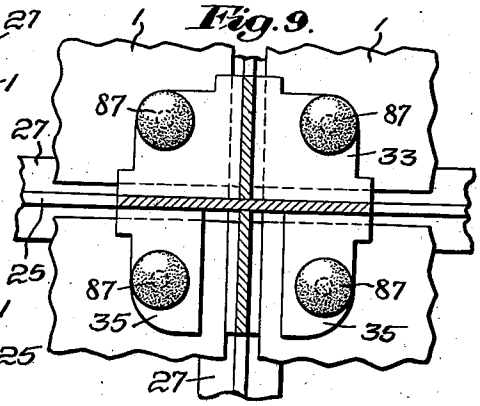


Fig. 10

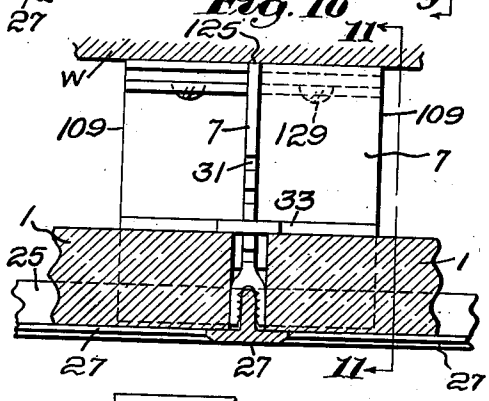


Fig. 11.

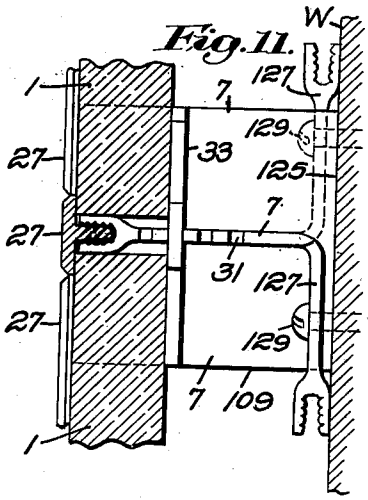


Fig. 12.

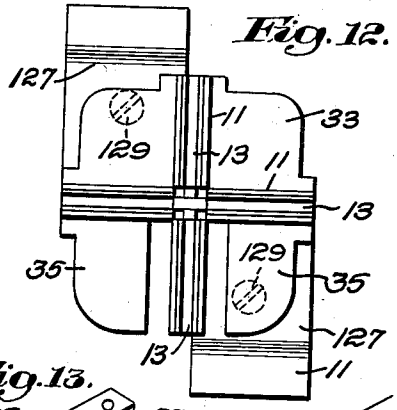


Fig. 7.

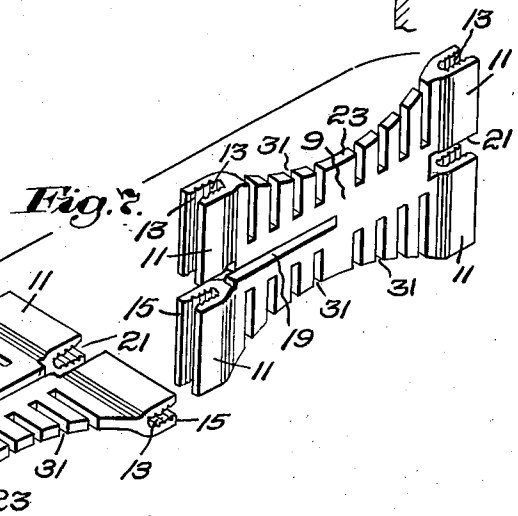
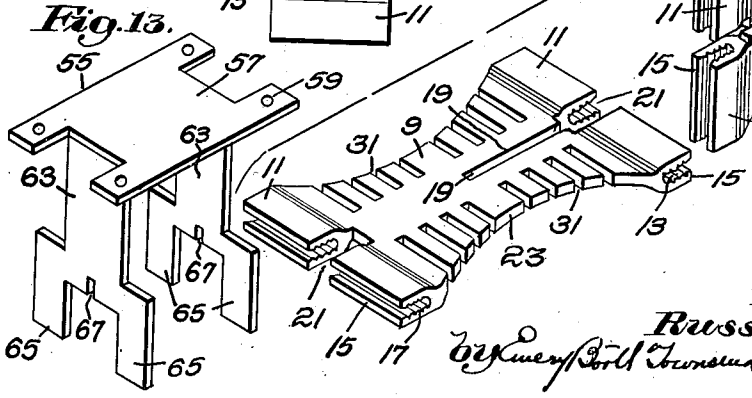


Fig. 13.

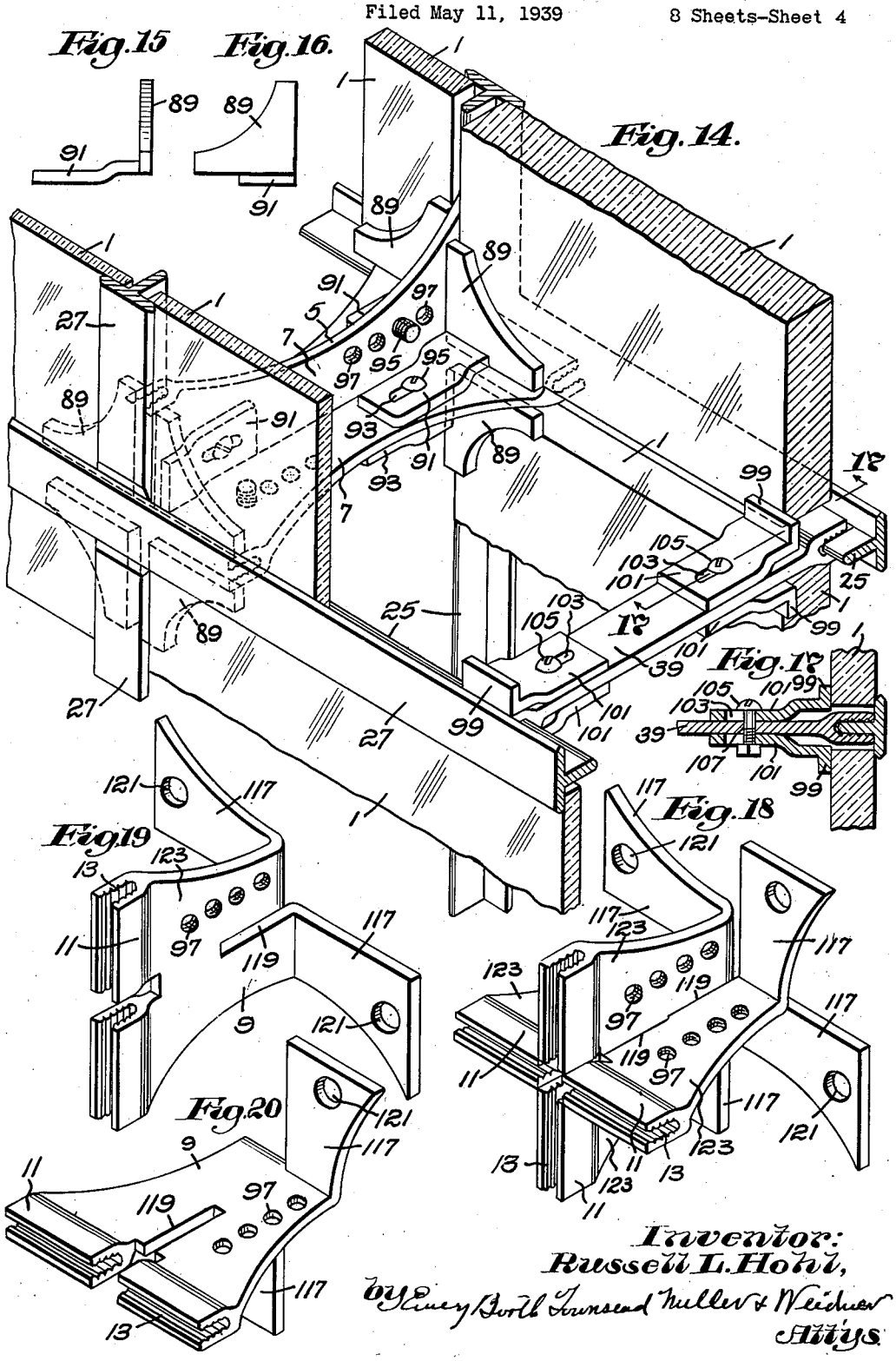


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WALL CONSTRUCTION

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Fig. 21.

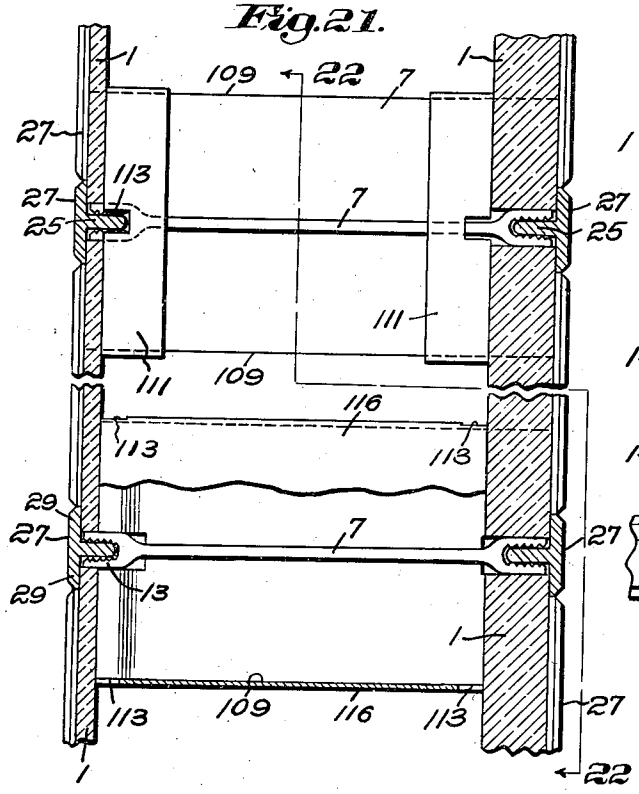


Fig. 22.

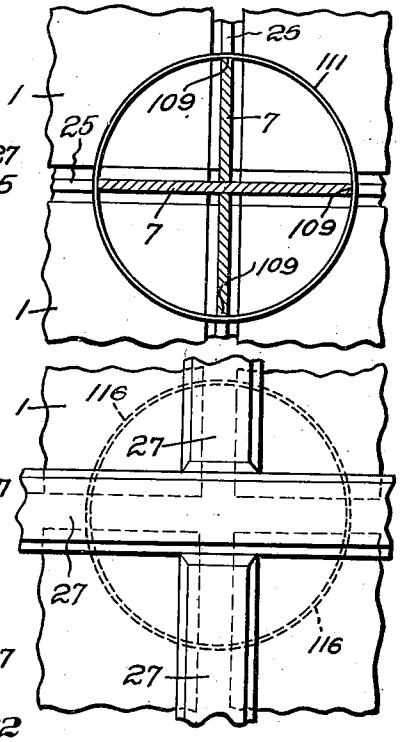


Fig. 25.

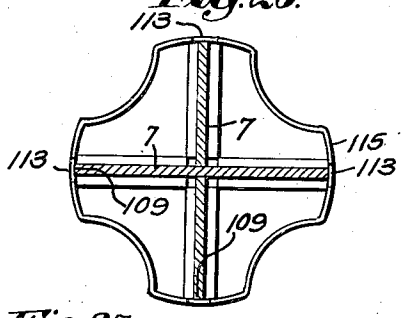


Fig. 24.

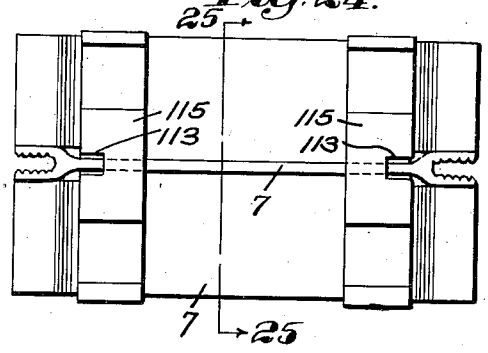
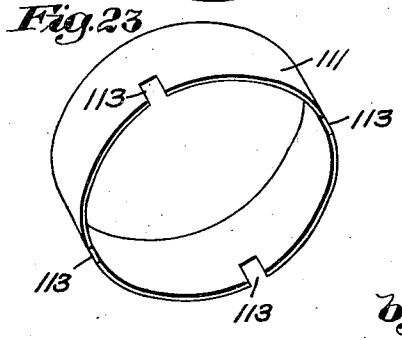


Fig. 23



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Fig. 26.

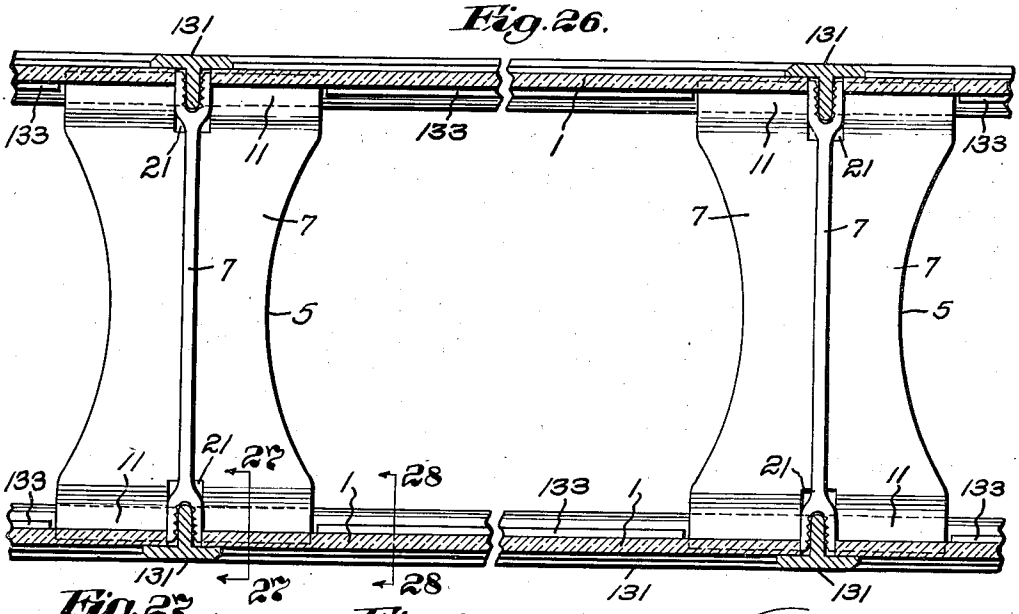


Fig. 27

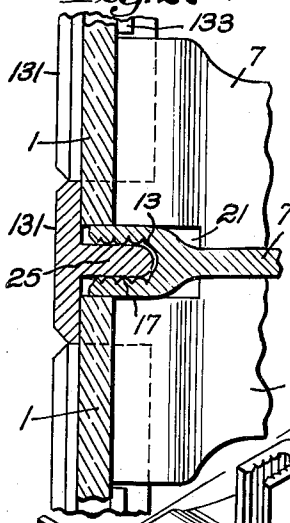


Fig. 28.

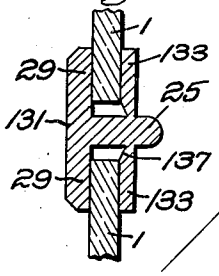


Fig. 29

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WALL CONSTRUCTION

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Fig. 30

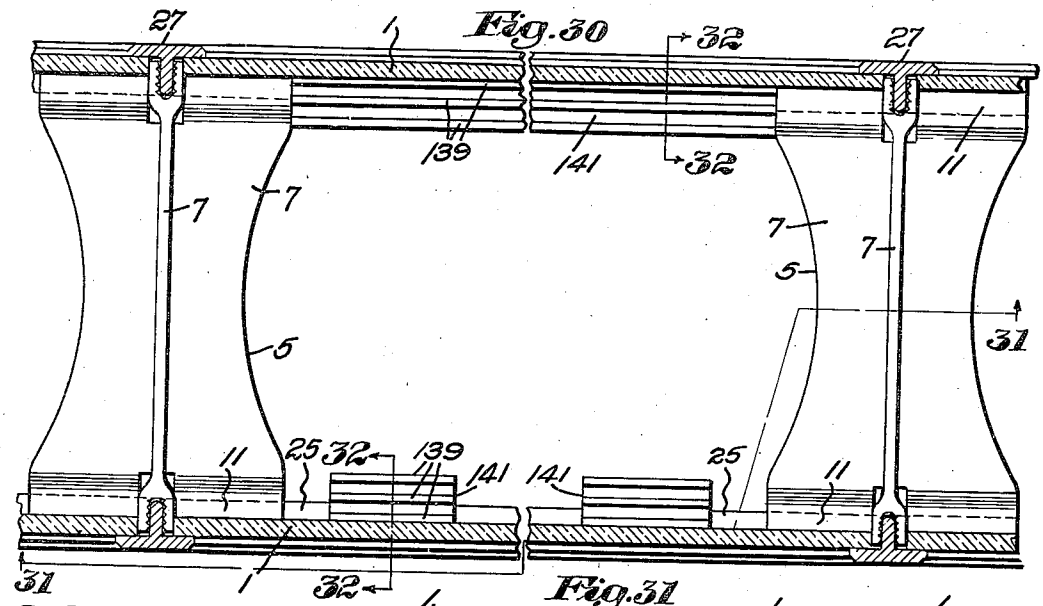


Fig. 31

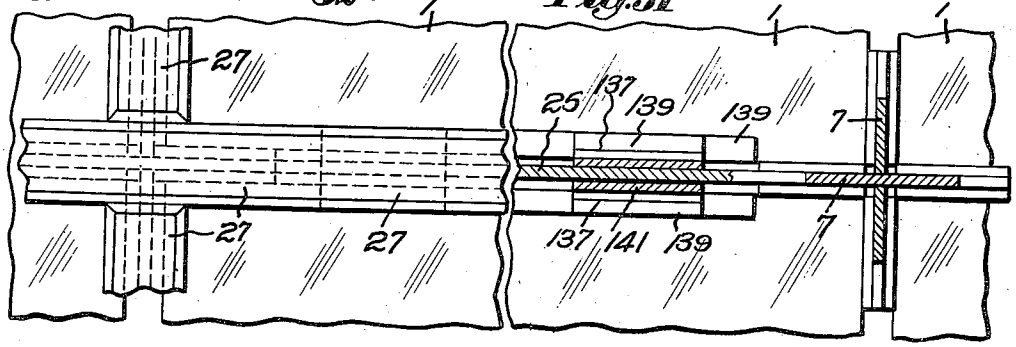


Fig. 32.

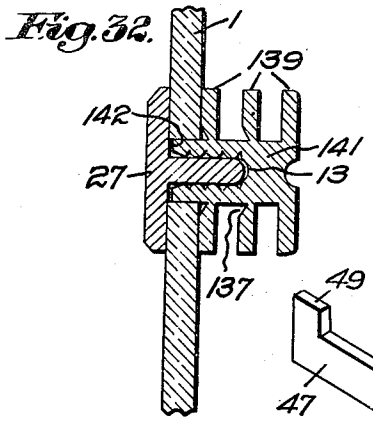


Fig. 33.

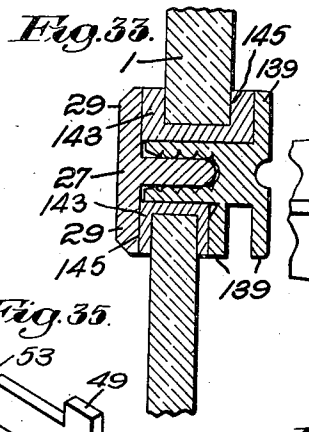


Fig. 34

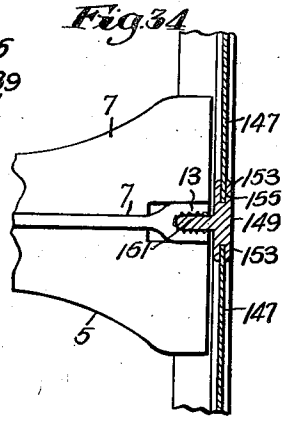
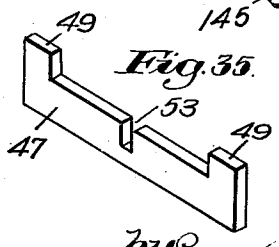


Fig. 35.



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WALL CONSTRUCTION

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Fig. 36.

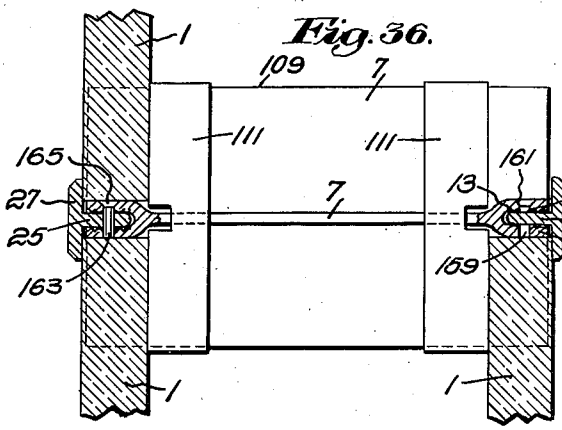


Fig. 37.



Fig. 38.

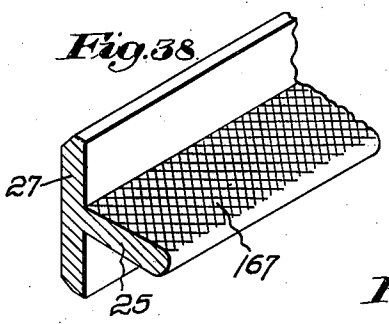


Fig. 39.

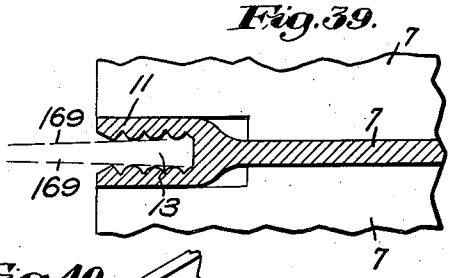


Fig. 40.

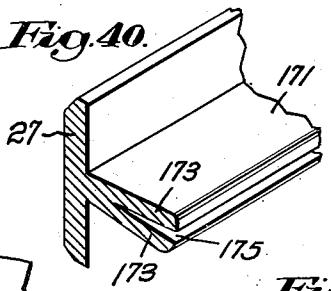


Fig. 41.

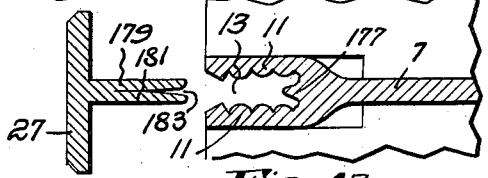


Fig. 42.

Fig. 43.

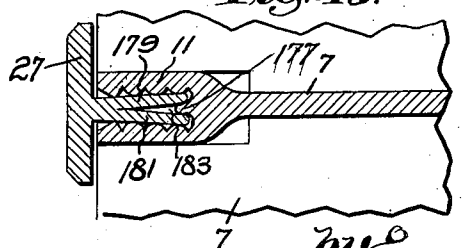
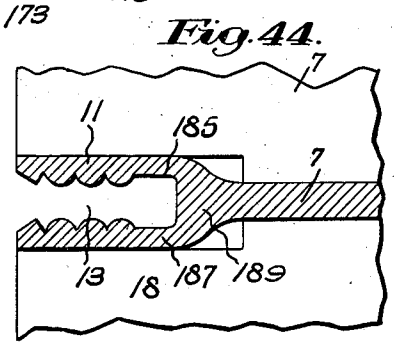


Fig. 44.



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Patented July 8, 1941 2,248,671

UNITED STATES PATENT OFFICE

2,248,671

WALL CONSTRUCTION

Russell L. Hohl, New York, N. Y.

Application May 11, 1939, Serial No. 272,975

24 Claims. (Cl. 72—42)

My invention relates to wall constructions, particularly, but not exclusively, those for buildings.

The invention, which has among its objects the provision of a wall the members of which may be readily assembled by use of prefabricated securing devices, will be best understood from the following description when read in the light of the accompanying drawings of several modifications of the invention, the scope of which latter will be more particularly pointed out in the appended claims.

In the drawings—

Figure 1 is a perspective of a fragment of the framework of one form of wall according to the invention, showing the manner of assembling the wall members;

Fig. 2 is an elevation of a detail of the wall according to Fig. 1;

Fig. 3 is an elevation of another detail of that wall;

Fig. 4 is an elevation of the detail according to Fig. 3 looking at Fig. 3 from the right;

Fig. 5 is a vertical transverse section of a wall employing the framework according to Fig. 1, with parts broken away and parts omitted;

Fig. 6 is a section on the line 6—6 of Fig. 5;

Fig. 7 is a perspective of the elements of the cruciform transverse wall members according to Figs. 1 to 6 in disassembled relation;

Fig. 8 is a vertical transverse cross-section of a fragment of a modified wall according to the invention;

Fig. 9 is a section on the line 9—9 of Fig. 8;

Fig. 10 is a horizontal transverse section of a fragment of a further modified wall according to the invention;

Fig. 11 is a section on the line 11—11 of Fig. 10;

Fig. 12 is an elevation of the transverse wall securing member according to Figs. 10 and 11;

Fig. 13 is a perspective of a detail of the wall according to Figs. 5 and 6;

Fig. 14 is a perspective of a fragment of a further form of wall according to the invention;

Fig. 15 is a side elevation, and Fig. 16 an end elevation, of a detail of the wall according to Fig. 14;

Fig. 17 is a section on the line 17—17 of Fig. 14;

Fig. 18 is a perspective of a wall securing member according to a still further form of the invention;

Figs. 19 and 20 are respectively perspectives of the elements of the wall securing member according to Fig. 18 in disassembled relation;

Fig. 21 is a vertical transverse section of another modified form of wall according to the invention, with parts broken away;

Fig. 22 is a section on the line 22—22 of Fig. 21;

Fig. 23 is a perspective of a detail of the wall according to Figs. 21 and 22;

Fig. 24 is an elevation of a modified form of the transverse wall element securing member of Figs. 21 and 22;

Fig. 25 is a section on the line 25—25 of Fig. 24;

Fig. 26 is a horizontal transverse section of a further modified form of wall according to the invention;

Figs. 27 and 28 are respectively sections on the lines 27—27 and 28—28 of Fig. 26 on an enlarged scale and with parts omitted;

Fig. 29 is a perspective of a fragment of the frame of the wall according to Fig. 26, with parts in disassembled relation and on an enlarged scale;

Fig. 30 is a horizontal transverse section of a fragment of a further modified form of wall according to the invention, with parts broken away;

Fig. 31 is a section on the line 31—31 of Fig. 30;

Fig. 32 is a section on the line 32—32 of Fig. 30 on an enlarged scale with parts omitted;

Fig. 33 is a section corresponding to Fig. 32 showing a further adaptation of the wall element securing members according to Figs. 30 and 31;

Fig. 34 is a vertical transverse section of a fragment of a wall showing a further modification of the invention;

Fig. 35 is a perspective of a detail of the wall according to Figs. 5 and 6;

Fig. 36 is a section through a partially completed wall corresponding to that shown at the upper portions of Figs. 21 and 22;

Fig. 37 is an elevation of a securing member used in connection with the construction shown by Fig. 36;

Fig. 38 is a perspective of a fragment of a modified form of cap according to the invention;

Fig. 39 is a cross-section of a fragment of a modified form of the member of cruciform cross-section according to the inention;

Fig. 40 is a perspective of a fragment of a further modified form of cap according to the invention;

Fig. 41 is a transverse cross-section of a further modified form of cap according to the invention;

Fig. 42 is a cross-section of a fragment of a further modified form of the member of cruciform cross-section according to the invention;

Fig. 43 is a cross-section showing the parts according to Figs. 41 and 42 in assembled relation; and

Fig. 44 is a transverse cross-section of a still further modified form of cap according to the invention.

The wall illustrated by Figs. 1 to 7 is formed of wall elements in the form of vertically positioned panels 1 arranged edge to edge at opposite sides of the wall. These panels present polygonal faces 3 at each side of the wall, each of which faces is opposite a like positioned face presented by a panel at the opposite side of the wall.

At each set of adjacent corners 2 of the panels is a transversely extending member indicated in its entirety by the reference numeral 5, which member, as viewed from the panel faces 3, is of cruciform cross-section, the flattened horizontal and vertical arms 7 of this member being placed between pairs of adjacent horizontal and vertical edges 8 respectively of the panels.

Referring more particularly to Fig. 7, the members 5 just referred to are formed of elongated extruded shapes cut transversely into short lengths. These extruded shapes have longitudinally extending webs corresponding to the portions 9 of the two elements shown by Fig. 7, at each of opposite edges of which webs are longitudinally extending thickened portions corresponding to the portions 11 of those elements. These thickened portions as extruded are provided with longitudinally extending slots 13 opening on the edge faces 15 thereof, the opposite side walls of the slots, as extruded, being provided with longitudinally extending raised parallel beads 17 or being otherwise deformed for augmenting the friction with which are gripped tongue members, hereinafter referred to, driven into said slots.

As shown in Fig. 7, each short length cut transversely from the elongated extruded shapes above referred to is slotted part way from one edge portion thereof, as indicated at 19 in Fig. 7, so that these lengths may be half-jointed to each other by moving them toward each other when in the relative position shown by Fig. 7 to form the members 5 of cruciform cross-section illustrated in Figs. 1, 5 and 6. As shown, the thickened portions 11 opposite the slots 19 are also slotted, as shown at 21, so as not to close the slot 13 in the thickened portion 11 which is transverse to it in the assembled member 5.

As illustrated, in the modification of the invention shown by Figs. 1 to 7 the outer edges of the arms 7 of the members 5 are cut away as indicated at 23 (Figs. 1 and 7) to reduce the weight of the members, and to render them less visible and less obstruct the passage of light in situations where the panels 1 are of transparent or translucent material.

As illustrated in Figs. 1, 5 and 6, the adjacent edges 8 of the panels 1 rest on the outer surfaces of the thickened portions 11 at opposite edges of the arms 7 of the transverse members 5. Driven in the slots 13 of these thickened portions are the elongated tongues 25 of elongated cap members 27. These members, as shown, are of T-shape cross-section, having flange portions 29 formed integrally with and projecting at opposite sides of the tongue at one edge thereof so as to overlap with the edge portions of the faces 3 of the panels and form finishing strips for the joints between the latter. These cap members are preferably cut from long lengths of extrusions having, as extruded, the same cross-section as the caps shown.

As shown in Figs. 1 and 5, the vertically extending cap members 27 are of short length and extend from one member 5 to the next adjacent member 5. The horizontally extending cap members may be of such length as to engage with a series of adjacent members 5. In this way the cap members 27 secure the members 5 to each other.

As shown, the four arms 7 in Figs. 1 to 7 of the cross members 5 are provided with spaced slots 31 extending inwardly from the outer edges of those arms. In these slots may be slipped plate members 33 of the profile shown in Fig. 2. As illustrated, these plate members have legs 35 spaced far enough apart to enter the aligned slots 31 of each of the horizontal arms 7 of a cross member 5, and are provided with slots 37 of width the thickness of the intermediate portions 9 (Fig. 7) of the arms 7 so that when the legs 35 are slipped into the slots 31 in the horizontal arms 7 the portions of the plates 33 between those legs will make half-joints with the upper vertical arms 7. As will be clear from the drawings, the upper portions of the plate members 33 engage with each of the two adjacent upper panels, while the legs 35 are long enough separately to engage with the two adjacent lower panels.

The plates 33 when so assembled form abutments engaging with the rearward faces of the panels, the latter being held against the plates when the tongues 25 of the cap members 27 are driven into the slots 13 of the cross members to cause the flanges 29 to press against the outer faces of the panels.

As illustrated in Fig. 1, when the panels are of such dimensions as to make it desirable, one or more short lengths 39 of the elongated extrusions of which the members 5 are formed may be positioned between adjacent members 5, the tongues 25 of the caps 27 being driven into the slots 13 of these members so as to tie opposite horizontal or vertical members 27 together.

As illustrated in Fig. 1, the members 39 are provided with through perforations 41 in which are placed pins 43 engaging with the inner faces of the panels. These pins may be formed as illustrated in Figs. 3 and 4 with opposite struck-up portions 45 intermediate their length readily to center them with the members 39, and to prevent them from falling through the perforations 41 when the pins are vertically positioned.

Along the bottom of the wall illustrated by Figs. 5 and 6 the lower vertical arms 7, and the legs 35 of the members 33, are cut away to clear the floor F. With this construction the wall may be supported by the members 47 resting on the floor and engaging with the lowermost members 5. As shown in Figs. 5, 6 and 35, these members 47 have upwardly projecting tabs 49 which fit into notches 51 in the edge portions of the horizontal arms 7 of the adjacent members 5 in the same way that the legs 35 of the members 33 fit into the slots 31. The members 47 also have notches 53 which receive the lower vertical shortened arms 7.

As illustrated in Figs. 5, 6 and 13, the wall at its upper portion is secured to the ceiling C by members 55 (Fig. 13) provided with bases 57 formed with openings 59 through which extend fastening members 61 (Figs. 5 and 6) extending into the ceiling. Integral with the bases 57 are downwardly extending arms 63 each of which at its lower end is provided with spaced legs 65 received by notches 31 in the horizontal arms of the adjacent transversely extending members 7, the arms 63 also being provided with the notches 67

which, by cooperation with notches 31 in the upper vertical shortened arms 7 of the upper members 5, make half-joints with those arms. As will be clear from the drawings, the legs 65 are long enough to engage with the adjacent upper panels 1 and thus, at the top of the wall, take the place of the plates 33.

For closing the joints between the ceiling and the upper edge of the panels the uppermost horizontal caps 68, as shown, have tongues 25, which latter are driven into the slots in the horizontal arms 7 of the adjacent cross members 5, and lower flanges 29 like those of the caps 27, and have thicker upper flanges 69, the latter being provided with longitudinally extending slots 71 which receive the lower edge portions of longitudinally extending sheet metal closure members 73. The upper edge of each member 73, as shown, is provided with an inturned flange 75 forced into the crack 76 between the bases 57 and the ceiling, the presence of this crack being assured by use of spacers 78 between the bases and ceiling. When the uppermost panels are placed in position, the lower edge portions of the sheet metal members 73 on account of their flexibility may be entered into the slots 71 after the tongues 25 are driven into the adjacent slots 13, whereupon the flanges 75 may be forced into the cracks 76.

When the panels of Figs. 5 and 6 are of transparent or translucent material, and it is desired to illuminate the wall, an elongated combined conduit and reflector assembly 77, having therein a row of elongated tubular lamps 79 arranged end to end, may be placed along the top edge of the wall between the members 73, so that the reflector portion 81 of the assembly will reflect the light downward between the panels and illuminate them. The detail of this assembly forms no part of the present invention, but may be like that disclosed in applicant's pending application Serial Number 93,852, filed August 1, 1936.

If desired, the members 55, the caps having the slotted flanges 69, and the members 73 may be employed for supporting and finishing the base of the wall, particularly when it is desired to provide a conduit along the base of the wall. In such cases the member 73 will act as "base-boards" along the bottom of the wall.

It will also be understood that the constructions described involving the use of the members 55 and 47, shown in Fig. 1 at the top and bottom, respectively, of the wall, may be employed in situations where the wall abuts with a vertical wall of the building.

If desired, adjustable abutments may be provided for the inner faces of the panels 1, for example as shown in Figs. 8 and 9. The construction here is the same as in Figs. 1 to 6 except that the plate members 33 do not directly engage with the inner faces of the panels but have screw-threaded into them shanks 83 which carry heads 85 preferably faced with relatively soft material 87 such as felt. The shanks may be turned to cause the heads 85 to project from the plates 33 the desired distance, the panels being held against those heads by the cap members 27.

Another form of adjustable means for engaging the inner faces of the panels is illustrated in Figs. 14 to 17. As shown here each cross arm 7 of the transversely extending member 5 adjustably carries at one side thereof a part comprising a head 89 to which is integrally joined a flattened shank 91. As shown, each shank 91 is provided with a slot 93 through which extends a headed set screw 95 screw-threaded into any suitable selected opening 97 in the adjacent arm 7. By means of the set screws the heads 89 may readily be adjusted to abut with panels 1 of different thicknesses, as shown in Fig. 14.

The intermediate cross pieces 39 may also adjustably carry members having heads 99 which engage the inner sides of the adjacent panels, these members being formed on the ends of shanks 101. As shown, the shanks 101 are provided with elongated slots 103 through which extend bolts 105, the bolts extending through perforations 107 in the members 39 so as to secure a shank 101 to that member at each of opposite sides thereof.

A further construction in which the cruciform transversely extending panel securing members adjustably carry a part for engaging the inner faces of the panels is shown by Figs. 21, 22 and 23. In this construction the arms 7 have straight outer edges 109 disposed in parallel relation. Surrounding these edges and frictionally engaging them are ring members 111 conveniently cut from a length of tubing, which ring members form abutments for the inner sides of the panels. These ring members when assembled with the arms 7 are slightly, but sufficiently, sprung from a truly circular shape strongly to grip the edges 109 of the arms 7, by reason of the inner diameters of the members being slightly less than the distance between opposite edges 109. As shown, the ring members are provided with notches 113 spaced in quartering relation to clear the tongues 25 on the cap members 27 when the same is necessary by reason of the employment of a thin panel 1 as shown at the upper left hand side of Fig. 21.

If desired, to secure additional resiliency the ring members referred to in the preceding paragraph may be of fluted cross-section as illustrated by the ring members 115 in Figs. 24 and 25.

As an alternative construction, instead of employing a separate ring member 111 or 115 at each of opposite ends of the cruciform transversely extending members of Figs. 21 to 25, there may be employed a single ring member, herein exemplified by the ring member 116 of Figs. 21 and 22, which is long enough to extend from a panel at one side of the wall to that at the opposite side so as to hold those panels in spaced relation. The ring members 116, which preferably are cut from lengths of tubing of circular of fluted cross-section, are, as shown, formed at each end with the notches 113 for providing clearance for the tongues 25 of the caps 27. When these tongues are driven into the slots 13 of the cruciform members the panels will be securely held between the flanges 29 of the caps and the end surfaces of the ring members 116. Preferably, but not necessarily, the members 116 also fit the edges of the arms of the cruciform members snugly so as to be frictionally held in assembled relation with the cruciform members, and, to that end, preferably are somewhat resilient, and of such diameter that they, like the ring members 111 and 115, must be sprung when forced over the cruciform members.

Further, if desired, the extrusions for forming the transversely extending cruciform panel securing members hereinbefore described may be employed for facing with panels a vertically extending or otherwise disposed foundation part. For this purpose short lengths of extrusion similar to those illustrated in Fig. 7 may be cut and formed to provide the elements illustrated in Figs. 19 and 20, the thickened portions 11 at one end

of each of these elements being removed, or, if desired, the extrusions for this purpose may be formed with one of the thickened portions 11 omitted. The web portion 9 of each member of Figs. 19 and 20 may be sufficiently slotted from its end opposite the thickened portion 11 thereof to permit oppositely extending ears 117 to be bent up, the further slots 119 formed in the two members permitting the members to be half-jointed together to form the member according to Fig. 18.

The ears 117 of the member according to Fig. 18 may be placed against a wall or other foundation and be secured thereto by suitable fastening members extending through perforations 121 in the ears. As will be clear from Fig. 18, the member thus formed when viewed from the end opposite the ears is of cruciform cross-section having arms 123, the end faces of the arms being provided with thickened portions 11 and slots 13 like those heretofore described in connection with Fig. 7.

Instead of constructing the members of Fig. 18 as there shown, they may be formed as shown by Figs. 10 and 11. According to this latter construction the short lengths of extrusion from which the cruciform panel retaining members are formed have parallel opposite edges 109 like the members according to Figs. 21 and 22. As clearly shown in Fig. 11, the members forming the vertical arms are cut off transversely at 125 so as to abut against the wall or other foundation W, while the lengths forming the opposite horizontal arms 7 are split, as in Fig. 20, and bent in opposite directions respectively so as to form ears 127 which are perforated and secured to the foundation by suitable headed fasteners 129.

As illustrated in Figs. 10 and 11, the panel securing members carry the rear panel face abutment plates 33, being slotted for that purpose in the manner shown by Fig. 1. As shown in Fig. 18, the arms 123, corresponding to the arms 7 of Fig. 14, are provided with the screw-threaded perforations 97, so that the members 89, 91 of Figs. 14 to 16 may be adjustably secured to the arms 123 for forming abutments for the rearward faces of the panels.

In the modification of the invention shown by Figs. 26 to 29, for the cap members 27 are substituted elongated members 131 having the tongues 25 and flanges 29 of the members 27, but being provided with additional flanges 133 carried by the tongues in parallel spaced relation to the flanges 29. The pairs of flanges 29 and 133 form grooves 135 (Fig. 29) for receiving the edge portions of the panels, the portions of the flanges 133 adjacent the arms 7 of the transversely extending members 5 being cut away so as to clear those arms and permit the tongues 25 to be inserted in the grooves 13. As shown, each flange 133 adjacent its juncture with the tongue 25 is formed on one side with a V-shaped notch 137, one side of which notch is formed by the adjacent surface of the flange 25, or is otherwise of reduced cross-section at that portion to permit it to be readily broken away from the flange 25 by bending it relative to the latter. In preparing the members 131 for assembly, saw cuts may be made in the flanges 133 transversely thereof and the portions between the saw cuts, or the ends of the members 131, as the case may be, may then be readily broken off by reason of the presence of the notches 137. By reason of the construction shown the material of the flange 25 will break away when the flange 133 is bent, with the result that no residual portion of the flange 133 is left at the break.

In the construction shown by Figs. 30 to 33 the rearward faces of the panels 1 are engaged by flanges 139 integrally carried by bar-like members 141. Each member 141 is formed with a longitudinally extending slot 13 opening on its end face 142, the slot having beaded side walls like the slots 13 in the arms 7 of the transversely extending members 5. These slots receive the flanges 25 of the caps 27 so as to secure the members 141 to those caps.

The members 141 are placed between adjacent members 5, a plurality of them of short length being employed as shown at the lower side of Fig. 30, or an elongated one of sufficient length to extend the entire distance between adjacent members 5, as shown at the upper side of Fig. 30.

As clearly shown in Fig. 32, the intermediate flanges 139 of the member 141 are provided adjacent their juncture with the body of that member with longitudinally extending V-shaped notches 137, like those described in connection with Fig. 28, so that either or both of these flanges having the notches may be readily broken away to accommodate panels of different thicknesses, as is clear from Figs. 32 and 33. Where the thickness of the panel so requires, a longitudinally extending strip 143 provided with a groove 145 for receiving the edge portion of the panel may be employed for filling the space between the flanges 29 of the caps 27 and the flanges 139, which strip is preferably of resilient material such as rubber.

The members 131 and 141, like the cap members 27, may be formed as long extrusions of the cross-sections shown.

Where the panels are extremey thin, as illustrated by the sheet metal panels 147 of Fig. 34, in place of the caps 27 of Figs. 1 to 6 caps 149 may be employed. As shown, these caps have longitudinally extending tongues 151 adapted to be received and frictionally secured in the grooves 13 of the arms 7 of the members 5, to which tongues are integrally joined oppositely projecting longitudinally extending flanges 153, each of the latter flanges having a narrow slot 155 extending throughout its length for receiving the edge portions of the panels 147. The caps 149, like the caps 27 and 68, may comprise lengths cut from elongated extrusions of the same cross-section as those caps.

The caps 27 may be further secured in the grooves 13 of the members of cruciform cross-section by positive means, as illustrated in Figs. 36 and 37, which, for convenience, shows a construction otherwise the same as at the upper portions according to Figs. 21 and 22. As shown by Fig. 36, the thickened portions 11 of the horizontal arms 7 of the members of cruciform cross-section are each formed with a drilled hole 157 at one side of the groove 13 and with an aligned drilled hole 159 at the opposite side of the groove, the outer portion of the hole 157 being countersunk, as illustrated at 161. When the wall is being built up the cap 27 may be forced into the groove 13 before the upper panel 1 is placed in position, as shown at the right-hand side of Fig. 36. Then, by using the hole 157 as a center, a hole may be drilled in the tongue 25 of the cap, after which the pin 163 having the flat head 165 may be pushed into the aligned holes in the thickened portions 11 and tongue 25, after which the upper panel 1 may be placed in position, as

shown at the left-hand side of Fig. 36, the upper panel preventing withdrawal of the pin.

If desired, the opposite sides of the tongues 25 of the caps 27 may be roughened by knurling 167, as shown in Fig. 38, for causing a better grip of the tongue on the opposite walls of the grooves 13 of the members of cruciform cross-section.

Also for insuring a better grip of the tongues 25 on the opposite walls of the grooves 13 in the members of cruciform cross-section, those grooves may be of progressively increasing width as they extend inwardly, as illustrated in Fig. 39, the grooves in this sense being tapered as indicated by the lines 169 (Fig. 39). With the tapered grooves according to Fig. 39, caps having tongues 25 of uniform thickness may be employed, the spring of the thickened portions 11 at opposite sides of the grooves by reason of the taper causing the walls of the grooves to conform to the surfaces of the tongues, under which circumstances the width of the grooves adjacent their rearward positions preferably are of the thicknesses of the tongues. However, with tapered grooves caps 27 having the split tongues 171 of Fig. 40 are preferably employed. As shown in Fig. 40, the portions 173 of the tongues at opposite sides of the split 175 are so disposed that the opposite surfaces of the tongues are of slightly greater relative inclination than the opposite sides of the grooves 13.

If desired, the grooves 13 may be slightly tapered in the same way as in Fig. 39, and may be formed at the bottom of the grooves with longitudinally extending beads 177 which are triangular in transverse cross-section with their apexes directed toward the open ends of the grooves. In such a case the caps having split tongues 179 (Fig. 41) may be employed, the splits 181 of the tongues being slightly flared, as shown at 183, for receiving the beads 177 when the tongues are forced into the grooves, thus spreading the portions of the tongues at opposite sides of the splits into contact with the opposite walls of the grooves.

Although the grooves 13 in the thickened portions 11 of the members 7 may be of the shape illustrated in any of the preceding figures, they are preferably formed with rather wide deep recesses 185 at their inner portions so as to form relatively thin connecting portions 187 joining the body portions 189 of the members. These connecting portions afford sufficient spring to prevent the parts at opposite sides of the grooves from spreading when the tongues are driven into the grooves, and therefore they cause the walls of the grooves to conform to the tongues.

It will be understood that, within the scope of the appended claims, wide deviations may be made from the forms of the invention described without departing from the spirit of the invention.

I claim:

1. A device for securing the elements of a wall comprising a member having longitudinally extending flattened parts arranged to present a cross when said member is viewed from at least one end thereof, the end faces of said parts being formed with outwardly facing slots extending in the direction of the arms of said cross and adapted to receive cooperating wall element securing means, and a ring member surrounding the first mentioned member in engagement with the edges of said parts for engagement with the wall elements.

2. A device for securing the elements of a wall comprising a member having longitudinally extending flattened parts arranged to present a cross when said member is viewed from at least one end thereof, the end faces of said parts being formed with outwardly facing slots extending in the direction of the arms of said cross and adapted to receive cooperating wall element securing means, and a resilient ring member surrounding the first mentioned member in frictional engagement with the edges of said parts for engagement with the wall elements.

3. A device according to claim 2 in which the ring member is provided with longitudinally extending flutes.

4. A device for securing the elements of a wall comprising a member having longitudinally extending flattened parts arranged to present a cross when said member is viewed from at least one end thereof, the end faces of said parts being formed with outwardly facing slots extending in the direction of the arms of said cross and adapted to receive cooperating wall elements securing means, said parts having their outer longitudinal edges transversely slotted, a member received by the slots of a plurality of said parts, and wall element engaging means adjustably projecting from the last mentioned member.

5. A wall structure having, in combination, a plurality of panels at each of opposite sides of the wall; means securing the panels in assembled relation, with those at one side of the wall in spaced relation to those at the other side, comprising a member extending transversely of the wall at the corners of adjacent panels, which member at each end face thereof is provided with slots severally extending in the direction of the edge of each panel at said corner; and panel securing means engaging the edge portions of each of said panels having tongues entering said slots and secured therein.

6. A wall structure having, in combination, a plurality of panels arranged edge to edge in a plurality of rows at each of opposite sides of the wall; means securing the panels in assembled relation, with those at one side of the wall in spaced relation to those at the other side, comprising means extending transversely of the wall formed to provide, at each set of adjacent panel corners, outwardly facing slots extending in the direction of the panel edges at said corners; and panel securing means engaging the edge portions of said panels and extending in the direction of each of said edges from one to the other of said means which extends transversely of the wall, said panel securing means having tongue portions entering said slots and secured therein.

7. A wall structure having, in combination, a plurality of panels arranged edge to edge in a plurality of rows at each of opposite sides of the wall; means securing the panels in assembled relation, with those at one side of the wall in spaced relation to those at the other side, comprising members of cruciform cross-section extending transversely of the wall at each set of adjacent panel corners with the arms of the cross represented by said cross-section extending in the direction of the several panel edges defining said corners; the end faces of each arm of said members being provided with an outwardly facing slot; panel securing means engaging the edge portions of said panels and extending in the direction of each of said edges from one to the other of adjacent ones of said members, said panel securing means having tongue portions entering said slots and secured therein.

8. A wall structure having, in combination, a plurality of panels arranged edge to edge, members at each set of adjacent corners of said panels comprising parts in quartering relation arranged between the panels transversely thereof, said parts having slots in their end faces extending in the direction of the panel edges defining said corners, panel retaining means extending from each of said parts to the adjacent part of the adjacent member for tying said members together, which panel retaining means is formed to present longitudinally extending grooves for receiving the adjacent panel edges and tongues which are received by and secured in said slots.

9. A wall structure according to claim 8 in which the panel retaining means is formed of two elongated complementary members, one of which latter comprises the tongue received by said slots and has flange portions for engaging one of the faces of said panels, and the other of which is positioned between said transversely arranged parts and has a slot in which said tongue also is received and secured and has flange portions for engaging the opposite faces of said panels.

10. An elongated panel retaining member comprising a longitudinally extending body portion having a plurality of spaced parallel longitudinally extending projecting flanges at one side thereof formed integrally therewith, one at least of said flanges being so formed adjacent its juncture with said body portion as to be readily broken away from it.

11. An elongated member according to claim 10 having a longitudinally extending groove opening on one of its edge faces adapted to receive the tongue of an associated part.

12. Panel retaining means comprising an elongated member of T-shape cross-section having longitudinally extending flanges integral with and projecting from opposite sides of the leg of such T, which flanges at their juncture with said leg are so formed as to be readily broken away from it.

13. Panel retaining means comprising an elongated bar-like member having at opposite sides thereof a plurality of spaced longitudinally extending projecting flanges integral therewith, at least one of said flanges at each side of said member being so formed adjacent its juncture with said member as to be readily broken away from it, said member having on one edge a longitudinally extending groove, and a cooperating longitudinally extending member having a longitudinally extending portion adapted to be received in said groove, the last mentioned member having at opposite sides thereof longitudinally extending projecting flanges.

14. A wall structure comprising a plurality of adjacent panels presenting polygonal faces; members extending transversely of said panels at their corners, which members adjacent said faces are of such cross-section as to present four arms respectively positioned between each pair of panel edges at adjacent corners of adjacent panels, said arms being formed with slots extending in the direction of the panel edges, longitudinally extending members having tongues received and secured in said slots of adjacent transversely extending members for tying the latter together, said longitudinally extending members also having flanges engaging with the adjacent edge portions of the outer faces of pairs of said panels, and means carried by said arms engaging with the inner sides of said panels adjacent said corners.

15. A wall structure comprising a plurality of panels presenting polygonal faces; members extending transversely of said faces, which members adjacent said faces are of such cross-section as to present arms positioned between each pair of panel edges at adjacent corners of said faces, the panel edges abutting with said arms, and the latter being formed with slots extending in the direction of the panel edges, longitudinally extending members having tongues received and secured in said slots of adjacent transversely extending members for tying the latter together, said longitudinally extending members also having flanges engaging with the adjacent edge portions of the outer faces of pairs of said panels, and ring members surrounding said arms and carried thereby for engaging the inner sides of said panels adjacent said corners.

16. In a device of the character described, a wall securing member having an outwardly facing slot which is of progressively increasing width as it extends inward; and a wall engaging member having a split tongue adapted to be driven into said slot; said wall securing member having, within said slot, means for spreading the portions of said tongue at opposite sides of the split.

17. A frame for supporting the elements of a wall or the like comprising a plurality of members having flattened parts extending transversely of the wall, which parts of each member are arranged to present a cross when said member is viewed endwise and are adapted to lie at the corner portions of the adjacent transverse faces of the elements of the wall, the end faces of said parts being formed with outwardly facing slots extending in the directions of the arms of said cross, and longitudinally extending members spanning the spaces in both directions between the first mentioned members and having tongues received in said slots for tying the first mentioned members together, said longitudinally extending members having means acting to secure the wall elements in assembled relation with said frame.

18. A frame according to claim 17 in which the flattened parts of the first mentioned members thereof have their adjacent end faces in the same plane at each end thereof, each of which faces is formed with an outwardly facing slot extending in the direction of the arms of the cross, the frame having the second mentioned members of claim 17 at each side thereof.

19. A frame according to claim 17 in which the first mentioned members thereof have means at their ends opposite their slots for securing said members to a support.

20. A frame according to claim 17 in which the first mentioned members thereof have means for attachment thereto of wall element engaging means in inwardly spaced relation to the second mentioned members thereof.

21. A frame according to claim 17 in which the first mentioned members thereof are each formed of a pair of flattened elements half-jointed together.

22. A frame according to claim 17 in which the first mentioned members thereof are each formed of a pair of flattened elements half-jointed together, the end faces of said first mentioned members being in the same plane at each end thereof, each of which faces is formed with an outwardly facing slot extending in the direction of the arms of the cross, the frame having

the second mentioned members of claim 17 at each side thereof.

23. A frame member for a wall built up of preformed wall elements comprising flattened arms in quartering relation, which member is adapted to extend transversely through the wall with said arms positioned between the corner portions of the transverse faces of a set of adjacent wall elements, the end faces of said arms at each of opposite ends of said member being substantially in the same plane and having outwardly opening slots extending throughout the lengths of said arms, the slot in each arm being in alignment with that of the aligned arm.

24. A frame member according to claim 23 in which the flattened arms in quartering relation are formed by two flattened parts half-jointed to each other.

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