

Oct. 29, 1935.

L. H. LYON

2,019,230

BUILDING CONSTRUCTION

Filed Sept. 14, 1932

4 Sheets-Sheet 1

FIG. 1.

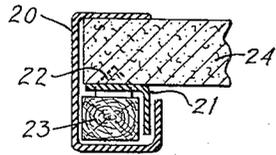


FIG. 3.

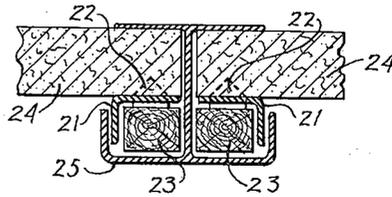


FIG. 4.

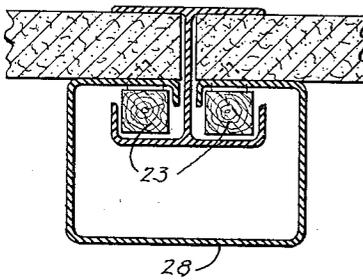


FIG. 2.

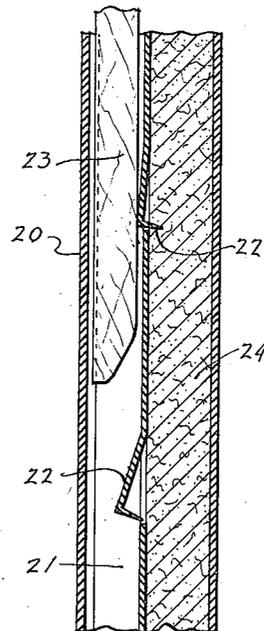


FIG. 12.

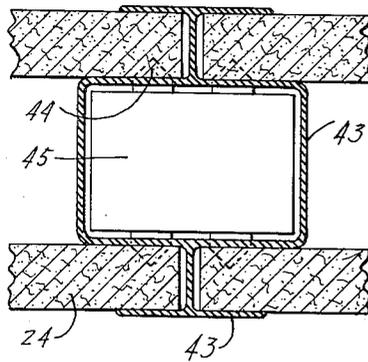
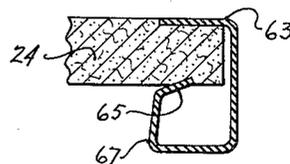


FIG. 34.



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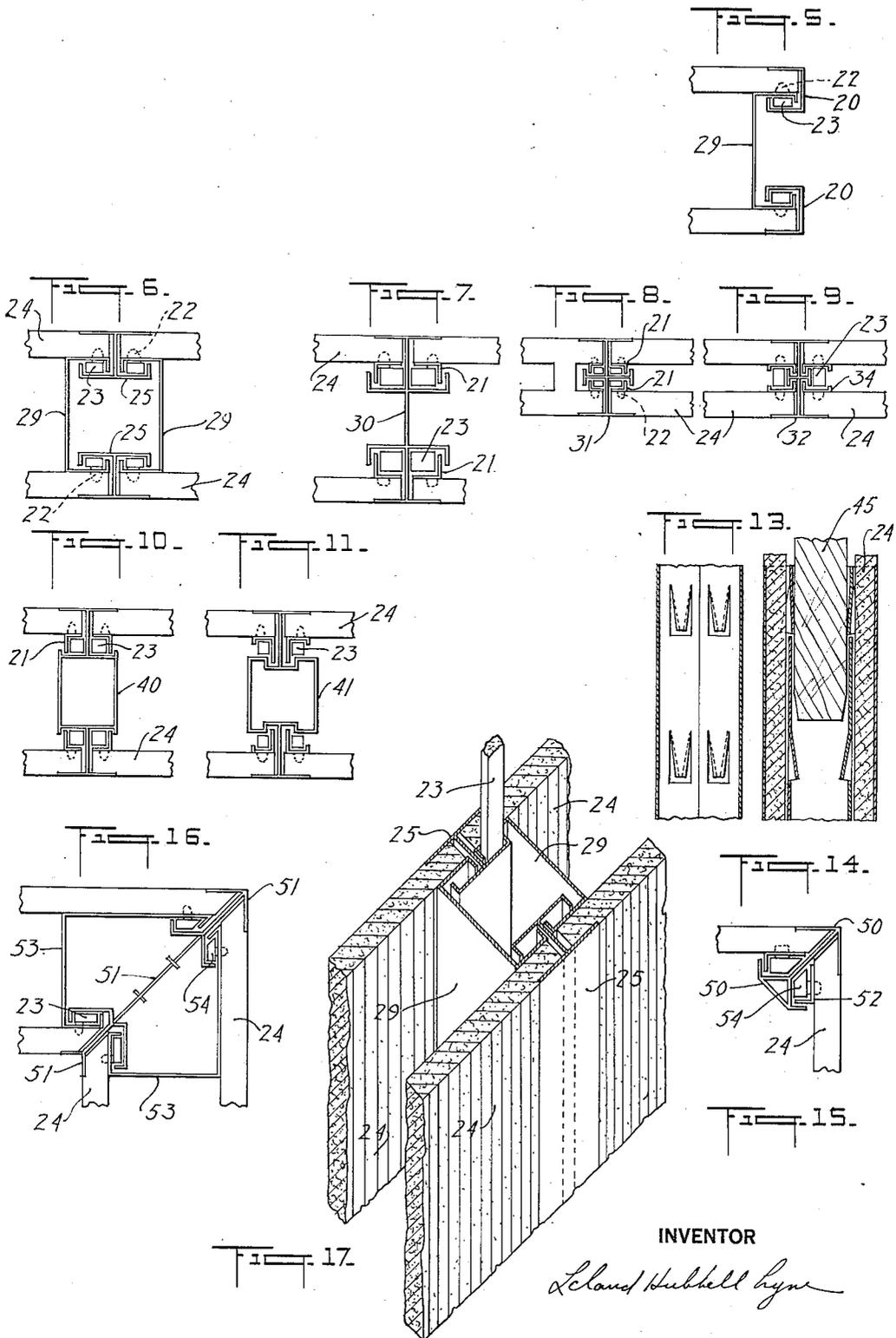
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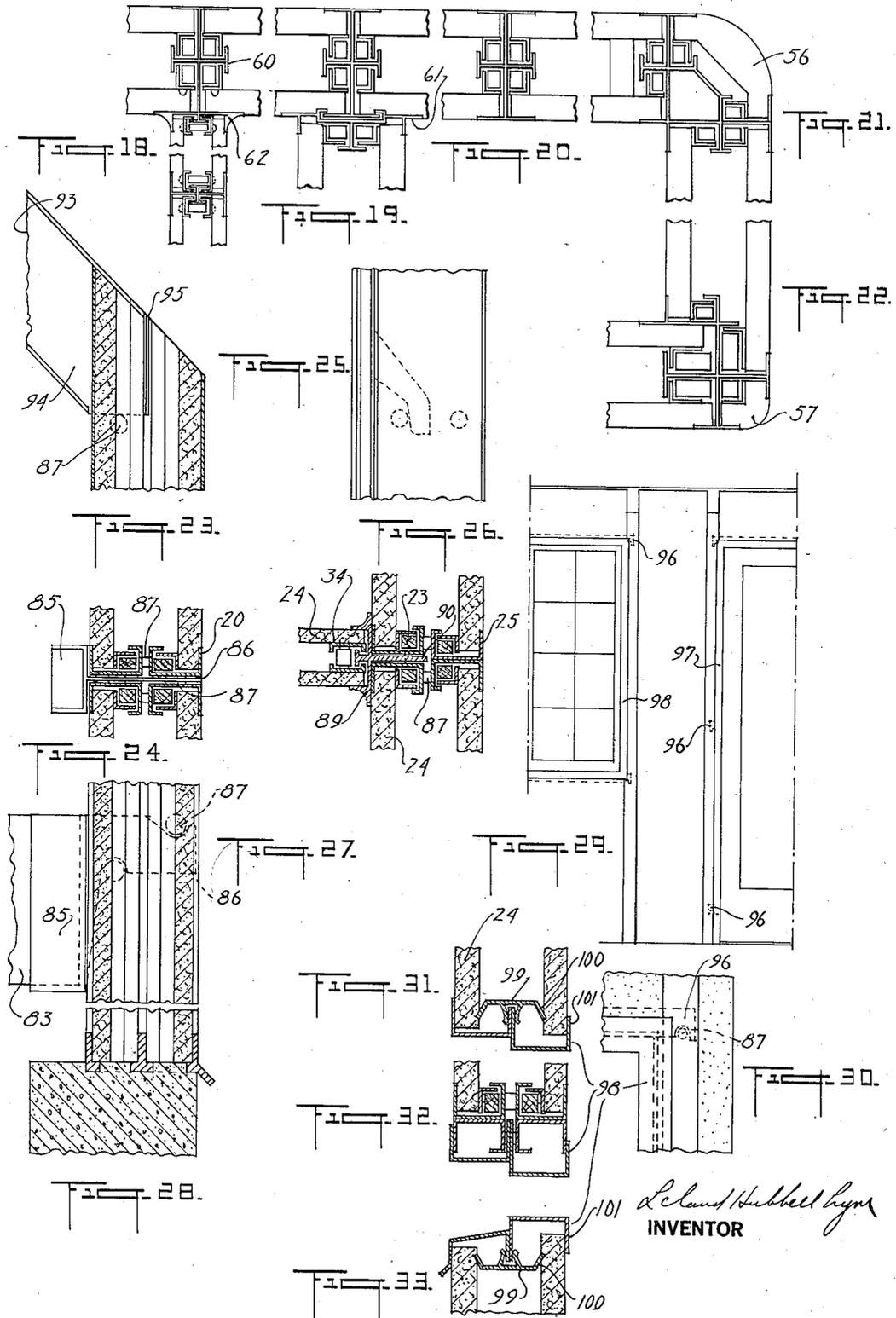
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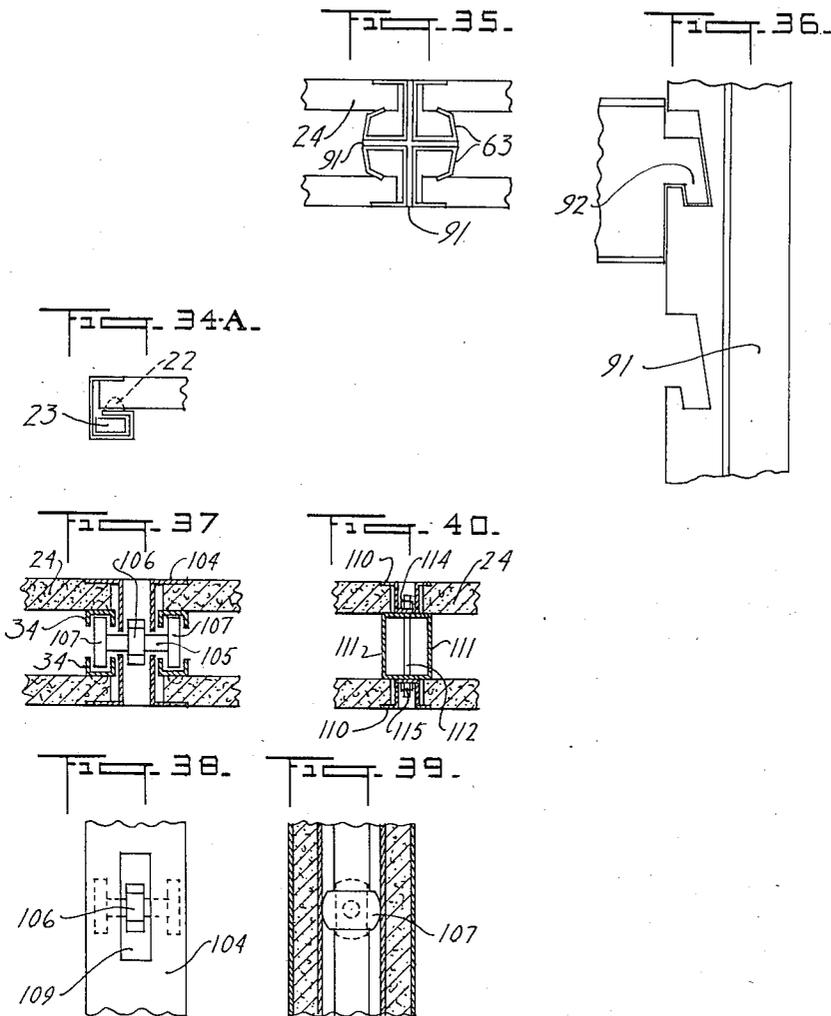
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BUILDING CONSTRUCTION

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Application September 14, 1932, Serial No. 633,025

16 Claims. (Cl. 72—115)

The invention relates to building construction with particular reference to metal structural members.

An object of this invention is to provide a metal structural member to which boards, slabs, or panels of any material may be readily and securely attached.

A further object of this invention is to provide a metal structural member which may possess adequate strength to support a wall, floor, roof or other portion of a structure and which may also be light in weight and easily assembled in the field with other parts to form a building or other structure.

To these ends the invention comprises a structural member (as herein defined), which may be made of light gauge metal such as sheet iron, adapted to secure boards, slabs or panels (the word "panel" when used herein being intended to designate boards, slabs, panels, blocks or sheets) suitable for forming walls and other sections of buildings or other structures.

The term "structural member", as herein used, denotes the total combination of metal shapes and cooperating details going to make up that which when assembled might be described as a composite structural shape including the various devices functioning to secure parts thereto.

Various embodiments of the invention are illustrated in the drawings in which Fig. 1 is a plan of an elementary form of structural member; Fig. 2 is a vertical section of the form shown in Fig. 1; Figs. 3, 4, 5, 6 and 7 are plans of structural members developed from the elementary form shown in Fig. 1 and illustrating a variety of abutting metal shapes adapted to secure a plurality of panels; Figs. 8 and 9 are plans showing structural members particularly adapted to certain shallow wall structure; Figs. 10, 11 and 12 are plans illustrating modified arrangements of parts; Figs. 13 and 14 illustrate a type of locking means suitable for use in the construction shown in Fig. 12 and are respectively an elevation in section and a vertical section; Figs. 15 and 16 illustrate devices suitable for corner constructions for single and double walls respectively; Fig. 17 is an isometric view of a structural member showing it partially assembled and incorporated in a section of wall.

Figs. 18, 19, 20, 21 and 22 show, in plan, structural members in various forms as applied to wall sections including corners and joinder of walls; Fig. 23 is an elevation in section at the junction of a sloping roof member with a vertical structural member. Figs. 24, a plan sec-

tion, 25, an elevation, 26, a plan section, and 27, an elevation in section, show methods of making attachment to a structural member in order to secure other structural members or building units thereto; Fig. 28, an elevation in section, illustrates a method of securing a structural member to a foundation; Figs. 29, an elevation, 30, a detail in elevation, and 32, a plan section, illustrate the attachment of building units such as windows and doors and their frames to structural members incorporated in a wall; Figs. 31 and 33, vertical sections, show further embodiments of the invention suitable for window and door sills, jambs and heads and the like; Figs. 34 and 34A show, in plan, a simplified form of structural member. Figs. 35 and 36 are a plan and elevation respectively of a composite structural member in which metal plates with slotted edges are used as a separating means.

Figs. 37, a plan section, 38, an elevation, and 39, an elevation in section, illustrate the use of a shoe-bolt as a pressure element.

Fig. 40 is a plan section of a modified form of structural member in which a common bolt is used as a pressure element.

Again referring to the drawings, Fig. 1 shows a simple form of the structural member composed of a metal shape 20 with a floating locking member 21 out of which are punched prongs or projections 22 which may be forced into a panel 24 by the insertion of a pressure or wedging element 23 between the shape 20 and the locking member 21.

In the several drawings, which are intended to be purely illustrative, the spaces between elements are exaggerated for the sake of clarity and in practice the parts when assembled would be in close contact with one another.

The operation of the prongs 22 is explained by Fig. 2. When panel 24 is first placed in shape 20 the pressure element is not in place and the prongs 22 are in a position which does not interfere with the insertion of the panel as shown by the lower of the prongs 22 in Fig. 2. When the panel 24 has been placed in the position shown in Fig. 1, the prongs 22 are forced into it, as shown by the upper prong 22 in Fig. 2, by the passage of the pressure element 23 from top to bottom of the structural member. Infinite modifications may be made in the design of the prongs or projections, without changing the spirit of the invention.

Due to the design of the metal shape 20 and the locking member 21, it is impossible for the parts to be separated after the insertion of pres-

sure element 23. The form of the pressure element may also vary widely, for different forms of structural member and may be short or long and made of hollow metal tubing or wood or other materials.

Referring to Figs. 1 to 11, inclusive, and 15 to 22, inclusive, and Figs. 24 and 26, it will be apparent that the fundamental form of the structural member is depicted in Figs. 1 and 2 and that these figures show modifications and rearrangements of this fundamental form.

Referring to Fig. 3, a shape 25 having a T section has inserted in it panels 24, against which and inside the upturned ends 26 of shape 25 are placed the locking members 21 carrying the prongs 22. The pressure elements 23 are forced into the open spaces between the shape 25 and the locking members 21 resulting in the whole assembly being securely locked together. It will be noted that any force tending to separate the panels 24 from the shapes 25 will cause the members 21 to be drawn against the upturned ends 26, because the prongs 22 are imbedded in the panels 24, thus preventing their removal.

In Fig. 4 the construction is the same as in Fig. 3 except that in place of two separate locking members 21 there is a single locking member 28 which may also have great structural strength and be used as the principal support or load carrying member for a building or other structure.

In Fig. 5 a locking member 29 is shown which is useful as a spacer and may be used with wall boards to construct two-walled panels before delivery to the field. It is shown as used in conjunction with the shapes 20 illustrated also in Fig. 1.

Referring to Figs. 6 and 17, illustrating the same form of construction, a double wall section formed of inner and outer panels 24 is supported and locked in place by a structural member. This structural member is formed of two metal shapes 25 of T section and two load carrying members 29. Punched out of the latter are prongs 22. These shapes 29 serve the dual function of providing means for locking the panels 24 and of spacing the walls apart. To complete the structural member and cause the prongs 22 to be pressed into the panels 24 the pressure elements 23 are forced down into the spaces between the shapes 25 and the shapes 29. The locking function is performed in the same manner as in the arrangement illustrated in Figs. 1 and 2 by causing the prongs 22 to be forced into the panels 24 by the wedge action of the pressure element 23 pressing against the shape 25.

Figs. 7, 8 and 9 show embodiments in which modified metal shapes such as 30, 31 and 32 are used. In Figs. 7 and 8 the locking members 21 are the same as heretofore described. In Fig. 9 a modified locking member 34 is shown which has two angles instead of one and may be used with a modified shape 32 as illustrated. This is especially useful for shallow walls and makes it possible to reduce the number of necessary pressure elements.

Figs. 10 and 11 illustrate a modification in which a metal shape such as 40 or 41 is used and so formed as to provide the other elements for securing panels thereto already explained.

Figs. 15 and 16 illustrate how parts of the invention may be applied to form joints between panels set at an angle to one another, for forming the corners of buildings for example. Metal shapes such as shape 50 and shape 51 are so formed as to receive the panels in the desired position, locking members 52 or 53 adapted to co-

operate in the described manner are placed in position and pressure elements 23 and 54 of suitable shape to fit in the openings between the shapes are driven in after the insertion of the panels, thereby locking them.

Figs. 18 through 22 show modifications of devices already described all operating on the same principle and are arranged to show how a building may be assembled from the structural members and panels. Special moulded shapes may be used to give a rounded shape to corners, for example, the corner pieces 56 and 57. These may be clamped at their edges in the same manner as plain panels. Figs. 18 and 19 illustrate how partitions may be secured to the walls. In the case of Fig. 18 the metal shape 60 is so formed as to provide an integral external bracket 62 which is adapted to receive and hold the edges of partition panels in the same position as previously described. Fig. 19 shows the use of a separate external bracket 61 so formed as to operate in the previously described fashion in cooperation with panels and designed to grasp the outer web of the metal shape of the main structural member.

The operation of the various equivalents of 25 the locking member 21 and pressure element 23 with relation to the metal shape 20 and the panel 24, all as shown in Fig. 1, is similar in effect when use is made of any of the forms shown in Figs. 1 to 22, inclusive, and Figs. 24 and 26. In the case of the form depicted in Fig. 12 there is a condensation of design and the prongs 44 are part of and stamped from the metal shape 43 and are forced into the panel 24 by an internal pressure element 45, with the result that the separate locking members 21 shown elsewhere may be omitted and one pressure element can be made to force prongs into four panels simultaneously.

Figs. 34 and 34A show the same modified metal shape 63 which combines within itself an integral locking member 65 and integral pressure element 67. It will be observed that when the panel 24 is forced into the channel in the shape 63 the integral pressure element 67 will, by reason of its relation to locking member 65, force said locking member 65 against the panel 24. The pressure may be increased if desired by inserting a separate pressure element 23 in the channel behind the integral locking member 65 as shown in Fig. 34A and if desired prongs 22 may be punched out of the integral locking member 65 as in the other forms.

Fig. 24 illustrates a composite form of structural member consisting of a plurality of the simple form of member shown in Fig. 1 in which the shapes 20 composing the composite structural member are held together by pins 87 in such manner that a uniform space is preserved between the metal shapes 20.

Figs. 35 and 36 illustrate the use of a metal plate 91 as a separating means in place of pins 87 to hold the metal shapes 63 in spaced relationship. Fig. 36 shows the slotted edges of the metal plate separating means 91 adapted to engage with projections 92 of abutting structural parts. The several webs may all or any of them be so slotted and any of the many structural parts may be provided with appropriate projections.

Figs. 24 and 27 illustrate how floor beams may be secured to upright structural members by suitable means such as the bracket 85 having the tongue 86 held by the pins 87. Pins 87 shown in Fig. 24 may be also utilized as the supporting pins 87 illustrated in Fig. 27. With pins 87 at

frequent intervals between opposing elements of a structural member of the type depicted in Fig. 24, brackets as 85 may be hooked into place at any point desired.

Partitions may be secured to walls as shown in Fig. 26 by placing the partition panels 24 in a fixture 89 which may be locked into structural members with tongues 90 which fit over pins 87. The panels 24 may be held within the fixture 89 by means of locking members 34 and the pressure element 23 as explained in connection with the fundamental form of the structural member shown in Figs. 1 and 2.

Fig. 23 shows how sloping roof member 93 may be joined to a vertical structural member of the form shown in Fig. 24 by means of web 94 which may be placed between opposing elements of the structural member and supported by a pin 87. The inner end 95 of the web 94 may be bent at an angle so as to engage the slot between the elements which runs parallel to the building wall.

Figs. 29, 30, 31, 32 and 33 show methods of attaching door and window frames to the form of structural member shown in Fig. 24. As shown in Figs. 29, 30 and 32 tongues 95 on the frames 97 and 98 engage the separating pins 87. Fig. 31 is a section through the head of the window frame 93; Fig. 32 is a plan section through the jamb of the same window frame 98 and Fig. 33 is a section through the sill of said window frame 98. The device 99 pictured in Figs. 31 and 33 when in place operates in conjunction with the adjoining portions of the window head and sill so as to hold panels between opposing portions 100 and 101 of the metal on the same principle as shown in Fig. 34 in which the locking member 65 corresponds to the portion 100 as shown in Figs. 31 and 33. The device 99 may be separate or manufactured as an integral part of the window frame or other structural part.

Figs. 37, 38 and 39 illustrate a form of modified structural member in which a metal shape 104 is used which in effect is an I section having two central webs in place of one. The shoe-bolt 105 is inserted through openings in the two webs so that a burr 106 occupies a position intermediate between said webs. The bolt is provided with shoes 107 on each end which are shown with their longest dimensions turned at right angles to the wall panels, but which may be rotated 90 degrees to a position as shown by the dotted lines in Figs. 38 and 39, so that the longest dimension is parallel to the wall panels. When the shoes of shoe-bolt 105 are rotated from a position parallel to the wall panels to a position at right angles as shown in Figs. 37 and 39, pressure is exerted upon the locking elements 34 so that they are forced out against the panels 24, so holding them between said locking means and the outer web of said metal shape 104. In Fig. 38, an elevation, the face of the metal shape 104 is shown provided with an opening 109 in the center of the outer web thereof, through which a wrench may be inserted to grasp the burr 106 and rotate said shoe-bolt as above described.

In Fig. 40 a form of structural member is shown in which metal shapes 110 are used in conjunction with another metal shape 111, acting as spacer and locking means as described in the form of locking means 29 shown in Figs. 6 and 17. The shapes 110 and 111 are separate parts which do not engage each other until drawn together by the bolt 112. The bolt 112 is used as a pressure element to propel the shapes 110 inward so

as to lock the panels 24 between their outer webs and the locking means 111. The outer webs of the shapes 110 may be provided with depressions as shown around the openings for the bolt 112, so that the head 115 and the burr 114 will not protrude outside of the faces of said shapes 110.

Spaces between fireproof panels may be filled with various available types of fireproof insulating material such as rock wool, to furnish a completely fireproof construction.

If nailing facilities or provision for hanging heavy fixtures, such as bathroom and kitchen fixtures, are desired in addition to the main structural members, supplemental structural members may be appropriately placed within the panels and fastening means may be used through the panels into such supplemental members.

While the application refers to metal structural members various other materials such as wood or highly compressed asbestos or paper may prove to be suitable for all or part of the structural members.

The structural members may be fabricated in a variety of different manners. The metal shapes which make up the various structural members may be bent and stamped from sheet metal or drawn or rolled. The separate metal shapes may be permanently combined where appropriate by means of welding, seaming, riveting, etc. The shapes for small building construction will be of sufficient strength when made of relatively light weight metal and when so fabricated will be easily altered in the field with ordinary metal workers' tools. The principles of the invention may be appropriately employed however in heavy construction.

The hollow portions of the various forms of structural members may be filled with concrete after erected where great strength is desired.

When structures have been assembled by the use of the invention additional rigidity may be obtained to the extent desired by the use of spot-welding at points where metal touches metal.

It is to be understood that it is not intended to confine the invention to the specific forms disclosed as the foregoing illustrations show only several of the many possible embodiments of the invention, and many possible variations of the embodiments illustrated may be within the spirit of this invention.

I claim:

1. A structural member having spaced portions defining, a channel adapted to receive the edge of a panel, a movable member disposed within the channel for securing said panel thereto, and means slidable longitudinally of the channel for moving said locking member into engagement with the panel.

2. A structural member having spaced portions defining, a channel adapted to receive the edge of a panel, means integral with one of said portions for securing said panel in said channel, and means slidable longitudinally of the channel for causing said first named means to engage the panel.

3. A structural member including spaced portions defining, a channel adapted to receive the edge of a panel, a locking member disposed within said channel, prongs on said locking member, and means for forcing said prongs against said panel.

4. A structural member including channels adapted to respectively receive panels, means involving a plurality of prongs associated with each of said channels, and means for causing

said prongs and panels to be forced one against the other, whereby said panels may be secured in said channels.

5 A structural member including spaced portions defining a channel adapted to receive a panel, and means disposed within the channel in overlapping relation to one face of the panel, said means having prongs engageable with said face of the panel for securing the panel within
10 the channel.

6. A structural member including spaced portions defining a channel adapted to receive a panel, and means adapted to be interposed between one of said portions and the panel for securing the panel within the channel, said means
15 having offset portions adapted to be forcibly moved into engagement with the panel.

7. A structural member including spaced portions defining a channel adapted to receive a panel, and means disposed within and extending longitudinally of the channel having portions engageable with the panel for securing the latter within the channel, said channel having portions
20 cooperable with said means for preventing lateral movement thereof.

8. A structural member having a channel adapted to receive a panel, said channel including spaced walls and a web connecting said walls, one of said walls having an offset portion spaced
30 from the web and means disposed between said offset portion and the web having portions engageable with the panel for securing the latter within the channel.

9. A structural member having a channel adapted to receive a panel, said channel including spaced walls and a web connecting said walls, and means disposed within the channel for securing the panel thereto, said means involving
35 an angularly shaped member having a portion adapted to overlap one face of the panel and a portion extending outwardly therefrom, one of said walls having an offset portion adapted to be disposed in overlapping relation to the outer face of the outwardly extending portion of said
40 member.

10. A structural member including a load carrying member, and a plurality of channel-shaped members respectively adapted to receive panels, said load carrying member having portions re-

spectively extending into said channels, each of said portions having means engageable with the adjacent panel for securing the latter within the channel.

11. A structural member including oppositely
5 arranged channels for respectively receiving panels, and a load carrying member having portions respectively extending into said channels adapted to cooperate with the panels for securing the latter within the channels.
10

12. A structural member including laterally spaced channels for respectively receiving panels, and a load carrying member extending between said channels for maintaining the latter in spaced relation, said load carrying member having
15 portions respectively extending into said channels adapted to cooperate with the panels for securing the latter therein.

13. A structural member having spaced portions adapted to receive a panel and to be disposed in overlapping relation with opposite sides
20 of the panel, said member also having means movable into engagement with one of said sides of the panel for securing the latter within said spaced portions.
25

14. A structural member including spaced portions defining a channel adapted to receive a panel, prongs associated with the channel for securing the panel within the channel, and means
30 movable longitudinally of the channel for moving said prongs into engagement with the panel.

15. A structural member including laterally spaced portions defining a channel adapted to receive a panel, one of said portions being integrally provided with offset prongs adapted to be
35 moved into engagement with the panel after the latter has been disposed within the channel for securing the panel therein.

16. A structural member comprising two laterally spaced rigidly connected channels respectively adapted to receive panels, said structural
40 member being provided with prongs for securing the panels within the channel, and means movable longitudinally of the channels in the space between the latter for moving said prongs into
45 engagement with the panels to secure the panels within the channels.

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