

Sept. 16, 1941.

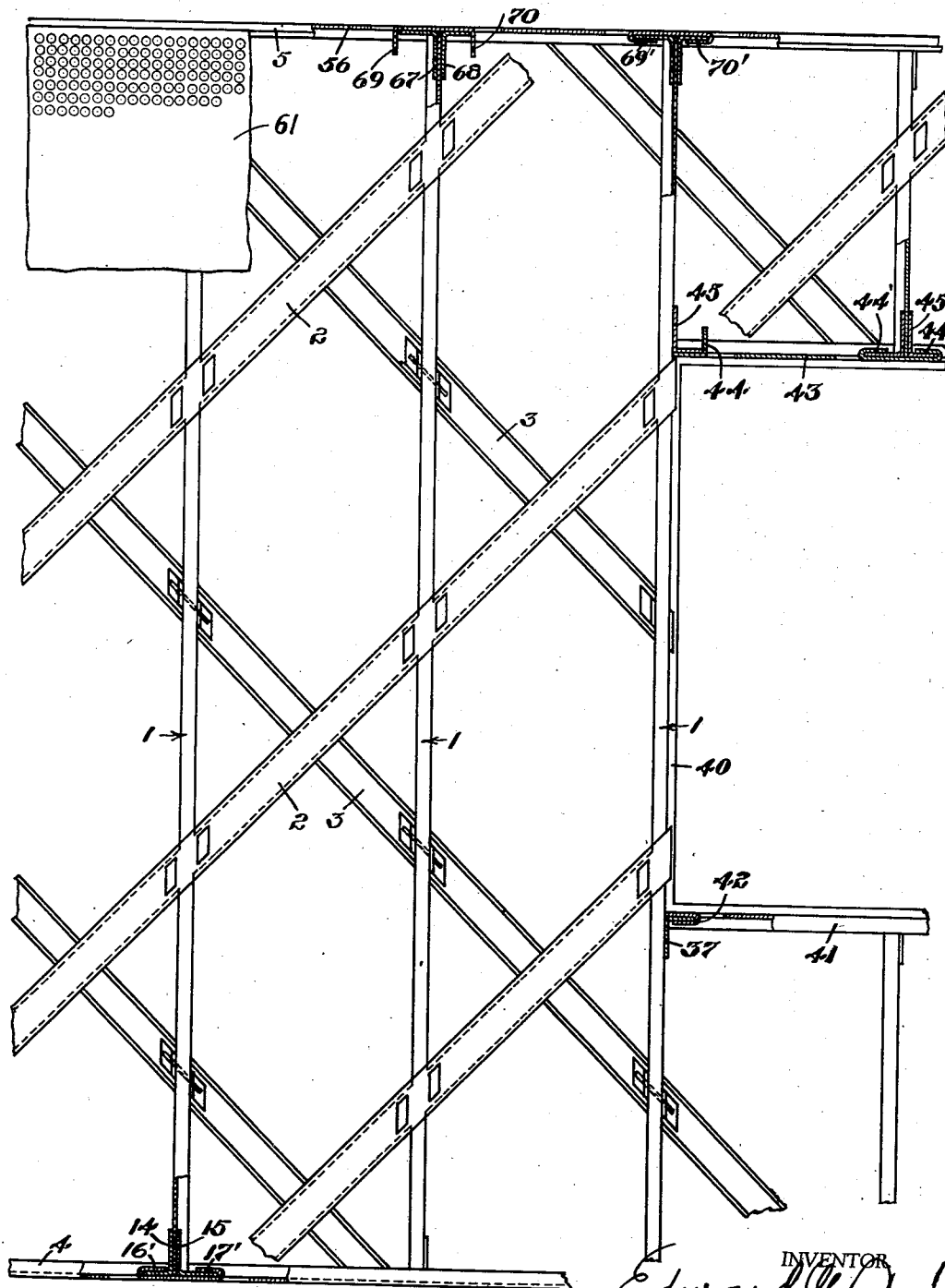
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2,256,394

FABRICATED METAL WALL

Original Filed Feb. 24, 1936

4 Sheets-Sheet 1



BY

INVENTOR
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ATTORNEY.

Sept. 16, 1941.

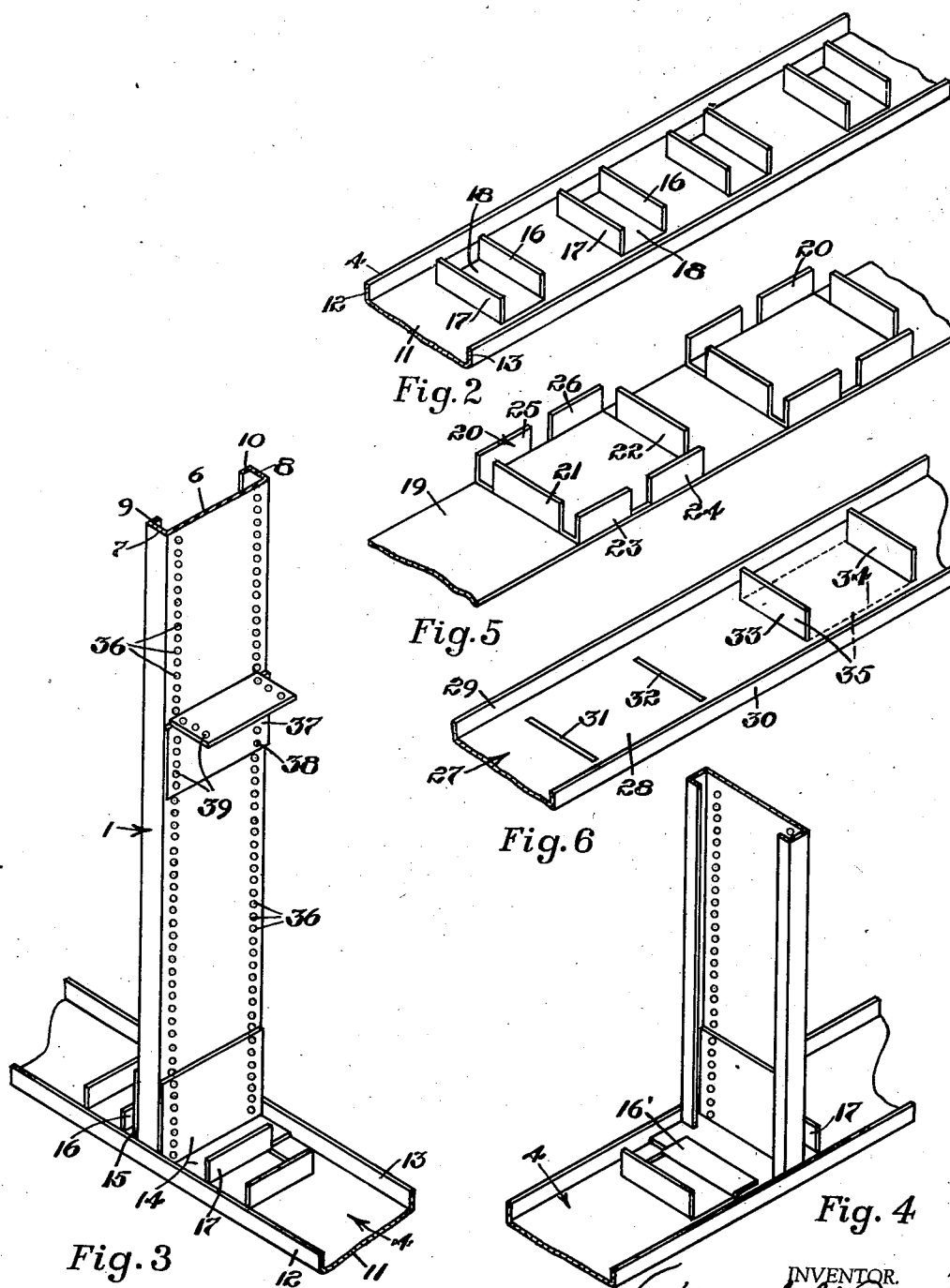
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FABRICATED METAL WALL

Original Filed Feb. 24, 1936

4 Sheets-Sheet 2



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4 Sheets-Sheet 3

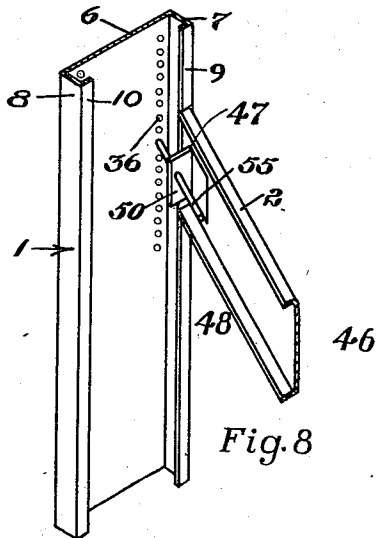


Fig. 8

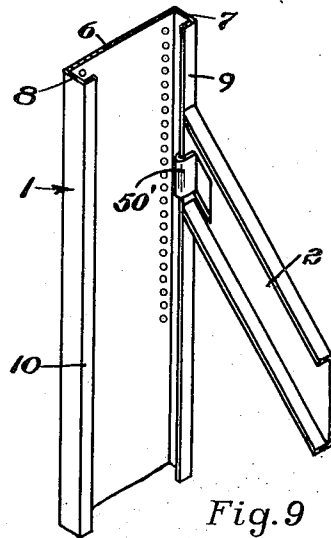


Fig. 9

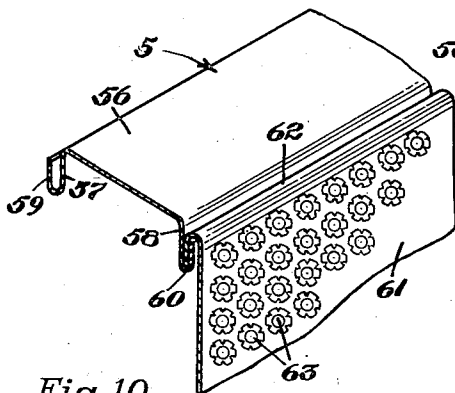


Fig. 10

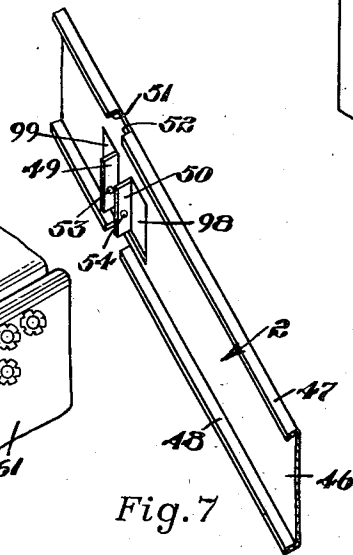


Fig. 7

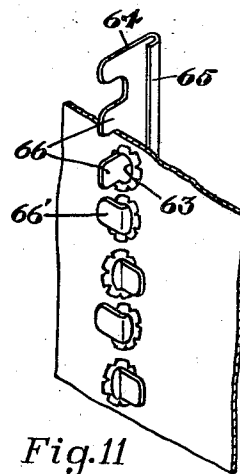


Fig. 11

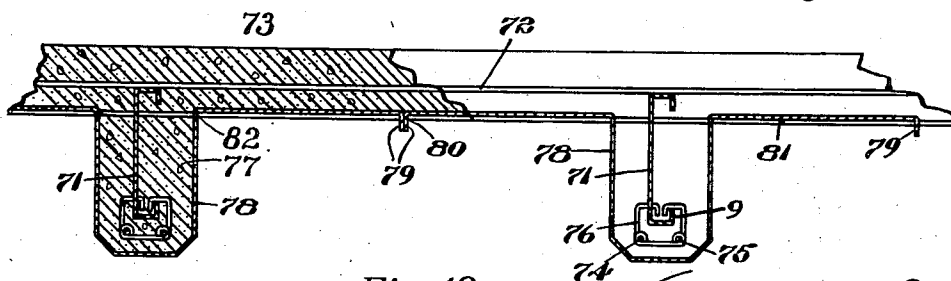


Fig. 12

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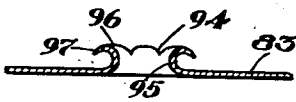
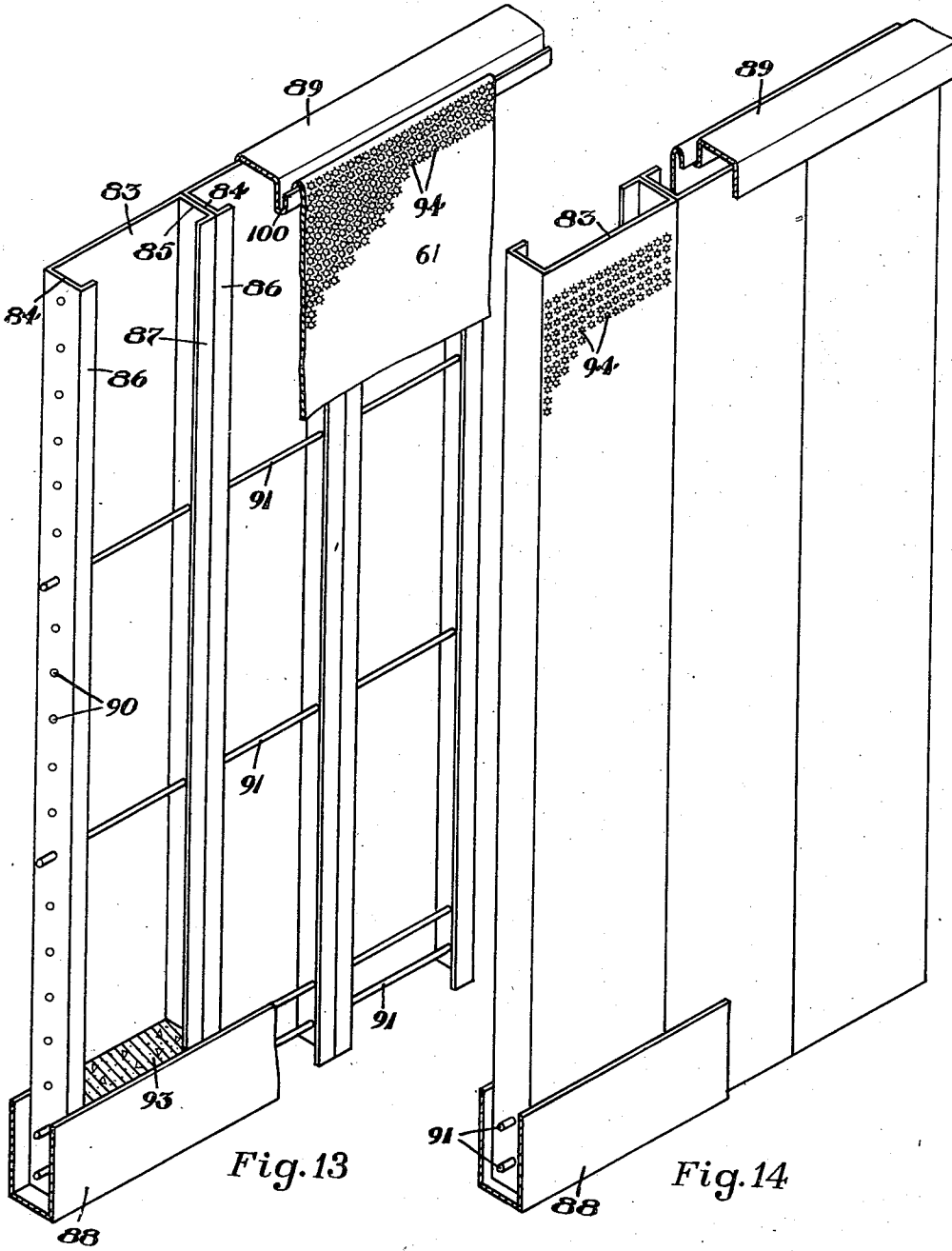


Fig. 15

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UNITED STATES PATENT OFFICE

2,256,394

FABRICATED METAL WALL

Edward G. Lamel, Los Angeles, Calif.

Application February 24, 1936, Serial No. 65,369

Renewed May 22, 1939

15 Claims. (Cl. 189-34)

This invention relates to fabricated steel structures and more particularly to structures in which the walls and floors may be fabricated from steel shapes, particularly provided for the purpose.

It is one of the objects of this invention to provide a fabricated structure in which a minimum of cutting and fitting must be done during erection of the structure.

It is still another object of this invention to provide a fabricated structure in which a minimum of stress is placed upon the joints joining the various members of the construction.

It is still another object of this invention to provide a fabricated structure in which the members forming the joints are so formed that the stresses are directly transmitted by the adjoining members from one to the other and not through the fastening means.

It is still another object of this invention to provide a fabricated structure which may be constructed from standard shapes provided for the purpose and without the necessity of employing special forms for each individual dual structure.

It is still another object of this invention to provide a fabricated structure which may be assembled during the erection of the structure at a minimum expense and without the necessity of employing skilled labor for the purpose.

It is still another object of this invention to provide a fabricated structure in which the same forms may be employed for both the construction of the walls and the floors.

It is still another object of this invention to provide a fabricated structure in which means are provided for supporting the reinforcement sheet upon which plaster or other wall-forming material may be applied.

It is still another object of this invention to provide a fabricated structure in which window frames or other wall openings may be optionally located in any desired position without the necessity of employing special forms for the purpose.

It is still another object of this invention to provide a fabricated structure in which the walls may be constructed in panels and set up and joined in the desired manner at the time of erection.

This invention possess other objects and has other applications which will become more easily apparent from a consideration of several forms embodying the invention, which are illustrated by the drawings forming a part of the present specification. These forms will now be described

in detail, illustrating the general principles of the invention; but it is to be understood that this detailed description is not to be taken in a limiting sense, since the scope of the invention is best defined by the appended claims.

Referring to the drawings:

Figure 1 is a side elevation of a section of wall, embodying the invention;

Figure 2 is a fragmentary view of a section of the channel which supports the vertical columns or studs of the wall of Figure 1;

Figure 3 is a fragmentary view illustrating the manner in which the vertical columns of Figure 1 are supported by the channel of Figure 2;

Figure 4 is a fragmentary view illustrating the manner in which the vertical columns of Figure 1 are secured to the channel of Figure 2;

Figure 5 is a fragmentary view of another form of the channel illustrated by Figure 2;

Figure 6 is a fragmentary view of still another form of the channel illustrated by Figure 2;

Figure 7 is a fragmentary view of one of the diagonal or sway braces of Figure 1;

Figure 8 is a fragmentary view illustrating one way in which the sway brace of Figure 7 may be secured to the vertical columns of Figure 1;

Figure 9 is a fragmentary view illustrating another way in which the sway brace of Figure 7 may be secured to the vertical columns of Figure 1;

Figure 10 is a fragmentary view of the channel forming the plate of the wall panel of Figure 1, illustrating the manner in which the structure reinforcement sheet is supported by the plate;

Figure 11 illustrates the means provided for securing the reinforcement sheet to the columns and sway braces of Figure 1;

Figure 12 is a fragmentary view of a section of flooring illustrating the manner in which the channel section of Figure 3 may be employed in the construction of a reinforced concrete floor;

Figure 13 is a side elevation of a section of wall, embodying another form of the invention;

Figure 14 is a side elevation taken from the opposite side of the wall of Figure 13; and

Figure 15 is a sectional view of one of the tubular members formed in the reinforcement sheet of Figures 13 and 14, for engaging the applied reinforced material.

Referring more particularly to Figure 1, the wall of the fabricated structure is formed by a plurality of vertical columns or studs 1, which are joined by a plurality of angularly extending diagonal or sway braces 2 on one side of the

columns and a like number of sway braces 3 on the opposite side of the column. The vertical columns 1 are supported within the horizontal channel 4, forming the sill, and the tops of the columns are held within the channel 5, which forms the plate extending along the length of the wall. As illustrated by Figure 3, the vertical channels are formed by a web section 6 and the flange sections 7 and 8, having the inwardly projecting web portions 9 and 10.

The bottom channel 4 of Figure 1, is illustrated in detail by Figure 2. The channel 4 has a web section 11, which may rest upon any suitable foundation, and the upwardly extending flanges 12 and 13. As illustrated by Figure 3, the vertical column 1 is held between the upwardly extending flanges 12 and 13, which contact the flanges 7 and 8 of the vertical column. As illustrated by Figures 1, 3 and 4, the vertical column 1 has secured thereto the angle plates 14 and 15 which form a foot, by means of which the column 1 is supported on the web 11 of the channel 4. In order to provide means for securing the angle plates 14 and 15 to the channel 4, the channel has formed thereon a plurality of upwardly extending lips 16 and 17, which may be spaced at appropriate intervals for locating successive vertical columns. As illustrated by Figure 3, the column 1 is placed with the angle plates 14 and 15 between the upwardly extending lips 16 and 17.

The flanges 12 and 13 together with the lips 16 and 17 provide means for accurately positioning the foot of the vertical column 1. With the column 1 positioned as illustrated by Figure 3, the foot of the column may be secured to the channel 4 by bending the lips 16 and 17 over the edges of the angle plates 14 and 15 as illustrated by Figures 1 and 4. By means of this construction the vertical columns are securely locked to the bottom channel and positively held against movement in any direction. The lips 16 and 17 may be suitably bent into the position illustrated by 16' and 17', Figures 1 and 4, by striking the lips a blow by means of a hammer or some other suitable implement.

As illustrated by Figure 2 the lips 16 and 17 are formed by punching a plurality of apertures 18 into the channel 4 and folding the metal adjacent to the apertures in an upward direction to form the lips.

Figure 5 illustrates another form of the bottom channel or sill of Figure 2. In this form the web plate 19 has the plates 20 suitably secured thereto by welding or other means. The plates 20 have the upwardly extending lips 21 and 22 formed thereon in a direction transverse to the length of the web 19 and the upwardly extending lips 23, 24, 25 and 26 projecting in a direction parallel to the length of the web plate 19. As in the construction of Figures 3 and 4, the vertical column 1 may be set upon the web plate 19 with the flange plates 14 and 15 between the upwardly extending lips 21 and 22, and the lips 23, 24, 25 and 26. With the column in this position the upwardly extending lips may be bent over the horizontally projecting portions of the angle plates 14 and 15 to lock the vertical column to the web-plate.

Figure 6 illustrates still another form of the bottom channel or sill illustrated by Figure 2. In this form the channel 27 is formed by the web plate 28 and the upwardly extending flanges 29 and 30. The web plate has a plurality of incisions 31 and 32 formed therein through which the upwardly extending lips 33 and 34 of the U-shaped plate 35 project. As in the construc-

tion of Figure 2, column 1 is supported by the channel 27 with the foot formed by the angle plates 14 and 15 between the lips 33 and 34 and the flanges 29 and 30. With the column in this position the lips 33 and 34 may be bent over the horizontal portion of the angle plates 14 and 15 in the manner illustrated by Figures 1 and 4.

The vertical columns 1 may be provided with a plurality of equally spaced apertures 36 which are arranged in parallel rows at either side of the web plate 6 adjacent to the flanges 7 and 9. The apertures 36 provide convenient means for securing the angle 14 and 15 to the vertical columns and for supporting window frames or any other desired structures within the wall panel. For the purpose of supporting window frames, the columns 1 may have suitable angle plates 37 secured thereto by means of the bolts 38 which pass through the apertures 36 formed in the column 1 and the apertures 39 formed in the angle plates. The apertures 39 formed in the angle plates may be spaced at the same intervals as the apertures 36 formed in the column 1. In this way the angle plates 37 can be secured to the vertical column at any desired elevation. Figure 1 illustrates an embodiment of the invention in which the angle plates 37 are employed for supporting the window frame 40. In this form the window frame 40 is held between adjacent vertical columns 1 and is supported by means of the channel 41, which may be of the same form as the channel 4 and which in turn is supported on a plurality of the angle plates 37. In order to provide means for securing the channel 41 to the angle plates 37, the channel 41 may be provided with a plurality of projecting lips 42, similar to the lips 16 and 17 and which may be bent over the horizontally projecting portions of the angle plates 37. The top of the window frame may be held beneath the horizontally extending channel 43, which may also be of the same form as the channel 4 and which may be provided with extending lips 44 which may be bent over the horizontally extending portions of the angle plates 45, as illustrated by 44'. The angle plates 45 may be similar in every way to the angle plates 37, but are secured to the vertical columns 1 in the opposite position.

By means of this construction a window frame or wall opening of any desired size may be formed in the wall panel by securing the angle plates 37 and 45 to the vertical column at the desired elevation.

Figure 7 illustrates in detail the sway braces 2 and 3 employed in the construction of Figure 1. The sway brace 2 is in the form of a channel having the web section 46 and the flanges 47 and 48. The web section 46 has the projecting lips 49 and 50 formed thereon which project from the web section 46 and which are suitably spaced to engage opposite sides of the column 1. In order to provide means whereby the web section 46 may rest flush against the flange section 7 or 8 of the column, the web sections 47 and 48 of the sway brace 2 are cut away adjacent to the lips 49 and 50 to form the shoulders 51 and 52 between which the column projects. In order to provide means for securing the sway braces to the columns the lips 49 and 50 have the apertures 53 and 54 formed therein, through which a suitable pin 55 may be inserted which also passes through the appropriate aperture 36 formed in the column 1. In order to assemble the sway braces it is only necessary to place the sway brace 2 at the proper elevation, with the

vertical column 1 between the shoulders 51 and 52 and the lips 49 and 50, after which, the pin 55 may be inserted through the apertures 53 and 54 and the desired aperture 36 in the column.

It is to be noted that all of the stress between the column and the sway brace is carried by the engagement of the shoulders 51 and 52 and the lips 49 and 50 with the web 6 and the lip 9 or 10. In this way no material strain is placed upon the connecting pin 55, the sole purpose of the pin being to hold the sway brace in position.

The lips 49 and 50 may be formed by punching the web 46 to form the apertures 98 and 99 and then bending the metal outward to form the lips 49 and 50.

Figure 9 illustrates another way in which the sway brace 2 of Figure 7 may be secured to the vertical column 1. In this form the lips 49 and 50 are made of a suitable thickness so that they may be bent around the lips 9 and 10 of the column 1 to lock the sway brace in position as illustrated by 50'.

The channel 5, forming the plate extending along the top of the columns 1 is formed with the web section 56 and the flanges 57 and 58, as illustrated in detail in Figure 10. The flanges 57 and 58 may be bent to form the channels 59 and 60 extending along either side of the channel 5. The channels 59 and 60 provide means for supporting the reinforcement sheet 61, which is provided with the folded edge 62 which projects into the channel 59 or 60. The reinforcement sheet may be of the form described in my copending application Serial No. 702,180, filed December 13, 1933, and may be provided with a plurality of projecting tubular members 63 which provide means for engaging the reinforced plaster material.

In order to provide means for securing the reinforcement sheet 61 to the vertical columns 1 and the sway braces 2 or 3, the fastening members 64 are provided which have the folded edge 65 formed on one side thereof, and a plurality of extending fingers 66 on the opposite edge. The fastening member 64 may be secured to the sway braces 2 by the engagement of the folded edge 65 with the flange 47 or 48. The fingers 66 may then be passed through the appropriate apertures 63 formed in the reinforcement sheet, after which, the fingers 66 may be bent over to lock the reinforcement sheet to the sway braces, as illustrated by 66'. Similarly, the fastening member 64 may be secured to the vertical columns 1 by the engagement of the folded edge 65 with the lip 9 and 10, after which the reinforcement sheet may be secured to the fastening member 64 by means of fingers 66.

In order to provide means for securing the vertical columns 1 to the channel 5 forming the plate the vertical columns are provided with the angle plates 67 and 68, which may be of the same form as the angle plates 14 and 15 and which may be suitably secured to the vertical column, and held between the flanges 57 and 58 and the downwardly projecting lips 69 and 70. With the vertical columns in this position lips 69 and 70 may be bent over the horizontally projecting parts of the angle plates 67 and 68 to lock the vertical column to the channel member 5 as illustrated by 69' and 70'. The lips 69 and 70 may be formed at suitably spaced intervals to conform with the usual spacing of the vertical columns 1.

The present construction provides means whereby a building of any shape may be readily constructed from forms of standard shape and

dimension. The vertical columns 1 may be supplied in lengths to conform with the standard heights of ceilings and if desired may be cut to any desired length when working around doors or windows. The equally spaced apertures 36 providing means whereby the angle plates 14 and 15, 67 and 68, or 37 and 45 may be secured to the vertical column in any desired positions. Channels 4 and 5 may also be furnished in standard forms, as the spacing between the adjacent vertical columns 1 is well established by the building codes of the various communities. The sway braces 2 and 3 may also be supplied in standard lengths to conform with the usual heights of ceilings. It is thus obvious that by means of the present construction a fabricated structure is provided which may be rapidly assembled out of standard shapes, with a minimum of cutting and fitting on the job.

Figure 12 illustrates the manner in which the shape employed for the vertical columns of Figure 1, may be employed as a beam reinforcement for a concrete floor. In this form the shapes employed for the columns of Figure 1 are horizontally positioned and suitably supported to form the beam reinforcing members 71. The structural reinforcement rod 72 employed for reinforcing the concrete slab 73 may then be laid on one side of the beams 71. Suitable reinforcing rods 74 and 75 extending lengthwise of the beam may be secured to the member 71 by wire hooks 76 which pass through the apertures 36, and which hook over the lip 9 or 10. The members 71 also provide means whereby the molds 78 for the concrete beams 77 may be supported. For this purpose the molds 78 may be provided with the abutting flanges 79, having the apertures 80 formed therein. In order to support the molds 78 during the pouring of the concrete, the supporting bars 81 may be passed through the apertures 36 formed in the members 71, the apertures 80 formed in the flanges 79 and the apertures 82 formed in the molds 78 adjacent to the beams 77. It is obvious from the construction that the mold as well as the reinforcing rods for the concrete are entirely supported by the members 71, and without the necessity of any additional supporting structure. After the concrete has set the molds 78 may be stripped from the concrete by cutting the supporting rods 81 adjacent to the apertures 80 and 82 and by removing that portion of the rod projecting exteriorly of the concrete. By means of this construction the same molds may be used repeatedly and no supporting false work is necessary.

Figure 13 illustrates another form of wall. In this form the wall is formed of a plurality of reinforcement sheets 83, having the opposite flanges 84 and 85 as well as the lips 86 and 87. The adjacent flanges 84 and 85 and the lips 86 and 87, form in effect an I section, which forms a vertical column for supporting the wall. To provide additional strength the flange sections 84 and 85 and the lips 86 and 87 may be formed with a thickness greater than that of the remaining part of the sheet 83. The sheets may be supported between the bottom channel 88 and the top channel 89. To provide means for locking the sheets against relative movement the flanges 84 and 85 may have a plurality of equally spaced apertures 90 formed therein. Suitably spaced rods 91 may then be passed through the apertures formed in the adjacent sheets, after which, the bottom channel 88 may be poured full of concrete as illustrated by 93 to firmly lock the

sheets with respect to each other and to the channel. To provide additional means for securing the adjacent sheets together, the adjacent flanges 84 and 85 may be spot welded together at spaced intervals.

In order to provide means for supporting plaster or other wall forming materials, the sheets 83 have a plurality of projecting tubular members 94 formed thereon. As illustrated by Figure 15, the tubular members 94 have the neck portion 95 and the flared portion 96, the edges 97, of which are curved back toward the main body of the sheet. The plaster may be suitably applied to the raised surface formed by the tubular members 94. The other side of the wall may be formed by reinforcing sheets suitably secured to the flanges 86 and 87.

The sheets 83 may be formed in suitable lengths to conform with the heights commonly employed for ceilings and may be supplied in widths in accordance with the spacing required between adjacent vertical columns by the building codes of the various communities.

To provide means whereby a finished wall may be formed on both sides of the vertical columns, formed by the adjacent flanges 84 and 85, the channel 89 may be provided with the channel 100, for supporting a structure reinforcement sheet 98, similar to that illustrated by Figure 10.

It is obvious from the construction that a wall may be quickly assembled by positioning the sheets 83 within the channels 88 and 89, after which the sheets may be locked in position by the rods 91 and 92 and the pouring of the cement portions 93.

I claim:

1. In a wall section, a sill member having a web section and a pair of upwardly projecting flange sections on each edge of the web section, said flange sections and said web section forming a trough, a plurality of column members supported within the trough formed by said sill member, each of said column members having a web section, a pair of flange sections on each edge of the web section and a pair of lips respectively carried by each of the flange sections and projecting toward the center of the web section, and each of said column members having a plurality of spaced apart apertures formed therein, means passing through certain of said apertures for locking said column members against relative movement, a plate member having a web section, a pair of downwardly projecting flange sections respectively on each edge of the web section, as well as, an upwardly turned lip carried by one of said flange sections, said plate member being placed over the top ends of said column members so that they are held in place by said downwardly projecting flange sections, and a structural reinforcement sheet having a downwardly folded edge for engaging said upturned lip to support the sheet on the wall section.

2. In a wall section, a sill member having a web section and a pair of upwardly projecting flange sections respectively on each edge of the web section, whereby said flange sections and said web section form a trough, a plurality of structural panel members supported within the trough formed by said sill member, each of said panel members having a web section, a pair of flange sections on each edge of the web section and a pair of lips respectively carried by each of the flange sections and projecting toward the center of the web section, said web section having perforations formed therein to provide means

for engaging a plastic material to be applied to one side of the wall section, and said flange sections having a plurality of spaced apart apertures formed therein, locking means within said trough and passing through certain of said apertures, whereby the filling of said trough with a cementing medium locks said panel members in position, a plate member having a web section, a pair of downwardly projecting flange sections on each edge of the web section, as well as, an upwardly turned lip carried by one of said downwardly projecting flange sections, said plate member being placed over the top ends of said panel members so that they are held in position by said downwardly projecting flange sections, and a perforated structural reinforcement sheet having a downwardly folded edge for engaging said upturned lip to support the sheet on the wall section.

3. In a wall section, a sill member having a web section and an upwardly projecting flange section on each edge of the web section, said flange sections and said web section forming a trough, a plurality of columns supported within the trough formed by said sill member, each of said columns having a web section, a flange section on each edge of the web section and a lip on each of the flange sections projecting toward the center of the web section, reinforcing members connected to a plurality of said columns and having aperture engaging means, a plate member having a web section, a downwardly projecting flange section on each edge of the web section, one of said flange sections having an upwardly turned lip, said plate member being placed over the top ends of said columns so that they are held in place by said downwardly projecting flange sections, and a structural reinforcement sheet having a downwardly folded edge for engaging said upturned lip to support the sheet on the wall section.

4. In a wall section, a sill member having a web section and an upwardly projecting flange section on each edge of the web section, said flange sections and said web section forming a trough, a plurality of columns supported within the trough formed by said sill member, each of said columns having a web section and a lip on each of the flange sections projecting toward the center of the web section, each of said columns having a plurality of spaced apertures, means passing through certain of said apertures for locking said column members against relative movement, a plate member having a web section, a downwardly projecting flange section on each edge of the web section, one of said flange sections having an upwardly turned lip, said plate member being placed over the top ends of said columns so that they are held in place by said downwardly projecting flange sections, and a structural reinforcement sheet having a downwardly folded edge for engaging said upturned lip to support the sheet on the wall section.

5. In a wall section, a sill member having a web section and an upwardly projecting flange section respectively on each edge of the web section, whereby said flange sections and said web section form a trough, a plurality of structural panel members supported within the trough formed by said sill member, each of said panel members having a web section, a flange section on each edge of the web section and a lip on each of the flange sections and projecting toward the center of the web section, said web

sections having perforations formed therein to provide means for engaging a plastic material to be applied to one side of the wall section, and said flange sections having a plurality of spaced apertures, locking means within said trough extending through certain of said apertures, whereby the filling of said trough with a cementing medium locks said panel members in position, a plate member having a web section, a downwardly projecting flange section on each edge of the web section, one of said downwardly projecting flange sections having an upwardly turned lip, said plate member being placed over the top ends of said panel members so that they are held in position by said downwardly projecting flange sections, and a perforated structural reinforcement sheet having a downwardly folded edge for engaging said upturned lip to support the sheet on the wall section.

6. A wall section which includes a plurality of vertical columns, each of said columns having a row of spaced apertures, and a plurality of diagonal braces secured to each of said vertical columns, each of said diagonal braces comprising a web section having a flange section on each edge of the web section, said web section having a plurality of pairs of lips projecting therefrom, each pair of lips providing means for engaging the opposite sides of a vertical column and having an aperture, and engaging means extending through the apertures formed in each pair of adjacent lips as well as through one of the apertures formed in the vertical column.

7. A wall structure including a plurality of columns, a sill member mounting the lower ends of said columns, a plate member mounted at the upper ends of said columns, said sill and column members having means for anchoring the lower ends of said columns, said plate having an upwardly extending lip on at least one side thereof, and a reinforcing sheet having a downwardly folded portion for engaging said upturned lip to support the sheet on the plate member.

8. In a wall section, a channel-shaped sill member, a plurality of columns supported within the channel, reinforcing members connected to a plurality of said columns and having aperture engaging means, a channel-shaped plate member having the flanges thereof projecting downwardly over the upper ends of the columns, one of the flanges having an upwardly turned lip, and a structural reinforcement sheet having a downwardly folded portion for engaging said upwardly turned lip to support the sheet on the wall section.

9. In a wall section, a channel-shaped sill member, a plurality of columns supported within said channel member, each of said columns having a plurality of spaced apertures, means passing through certain of said apertures for locking said column members against relative movement, a channel-shaped plate member having the flanges thereof extending downwardly over the column members, one of said flanges having an upwardly turned lip, and a structural reinforcement sheet having a downwardly folded portion for engaging said upturned lip to support the sheet on the wall section.

10. In a wall section, a channel-shaped sill member, a plurality of structural panel members supported within the channel member, each of said panel members being channel-shaped in

configuration, and having perforations formed in the web thereof for engaging a plastic material applied to one side of the wall section, the flanges thereof having a plurality of spaced apertures, locking means within the channel sill member extending through certain of said apertures, whereby filling of said channel sill member with a cementing medium locks said panel members in position, a channel-shaped plate member having the flanges thereof extending downwardly over the ends of said panel members, one of said flanges having an upwardly extending lip and a perforated structural reinforcement sheet having a downwardly folded portion for engaging said upturned lip to support the sheet on the wall section.

11. A wall section which includes a plurality of vertical columns, each of said columns having a row of spaced apertures and a plurality of diagonal braces secured to each of said vertical columns, each brace having a plurality of pairs of lips projecting therefrom, each pair of lips providing means for engaging the opposite sides of a vertical column and having an aperture, and engaging means extending through the apertures formed in each pair of adjacent lips as well as through one of the apertures formed in the vertical column.

12. A wall section which includes a plurality of vertical columns, each of said columns having a web section, a flange section on each edge of said web section and a lip on each of said flange sections projecting towards the center of the web section, a plurality of braces secured to each of said vertical columns, each of said braces being channel-shaped, said braces having cut-out portions in the flanges thereof at spaced intervals opposite said columns, whereby shoulders formed by said cut-out portions abut against the web and lip of each of said column members.

13. A wall section which includes a plurality of vertical columns, each of said columns having a web section, a flange section on each edge of said web section and a lip on each of said flange sections projecting towards the center of the web section, a plurality of braces secured to said columns, said braces being channel-shaped and having cut-out portions in the flanges thereof forming shoulders for engaging the web and lip of each of said columns and having a lip projecting from the web, said lip being adapted to be extended behind the lip of the column, whereby to lock the brace to the column against displacement.

14. In a wall section, a window opening comprising a plurality of vertical columns having horizontally extending flanges thereon, a plurality of horizontal channel members having lips extending outwardly from their web portions, said horizontal flanges extending between the flanges of said horizontal channel members, and said lips being adapted to engage the flanges, whereby said channel members are secured to said vertical columns.

15. The combination of claim 14, in which the horizontally extending flanges on the columns engage the flanges of the horizontal channel members, whereby said horizontal channel members are held against displacement from said horizontal flanges by said lips and said channel flanges.

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