Sept. 21, 1937. E. H. McCLINTOCK 2,093,615

METALLIC FRAME WALL CONSTRUCTION

Filed Oct. 29, 1936 2 Sheets-Sheet 1

Fig. 1.

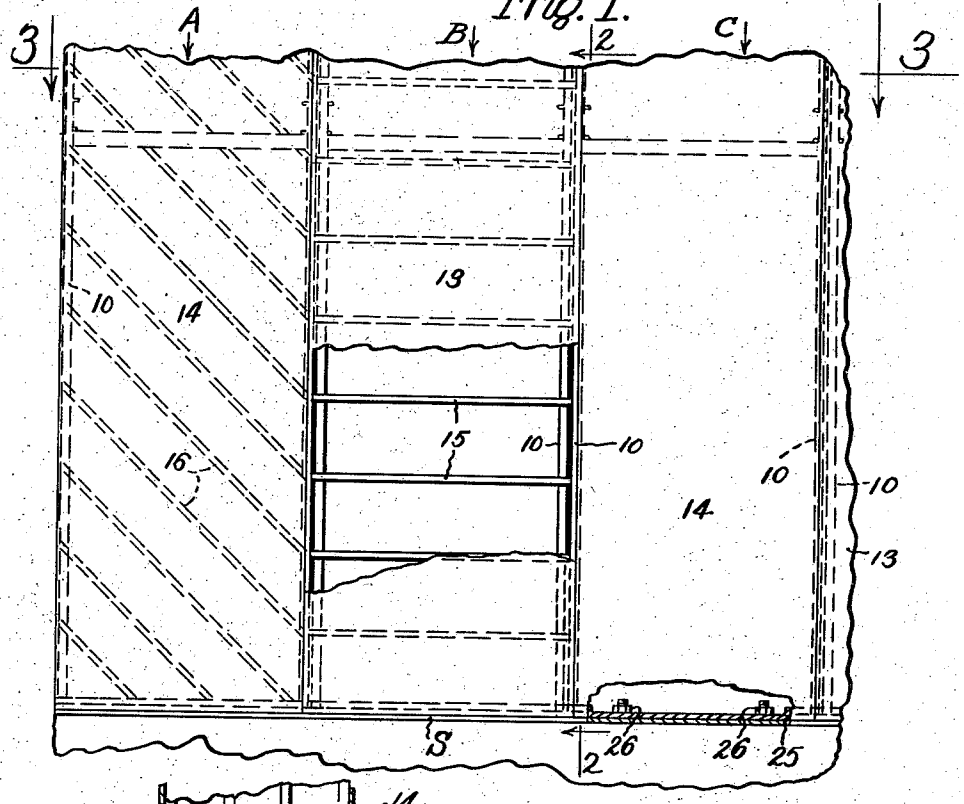
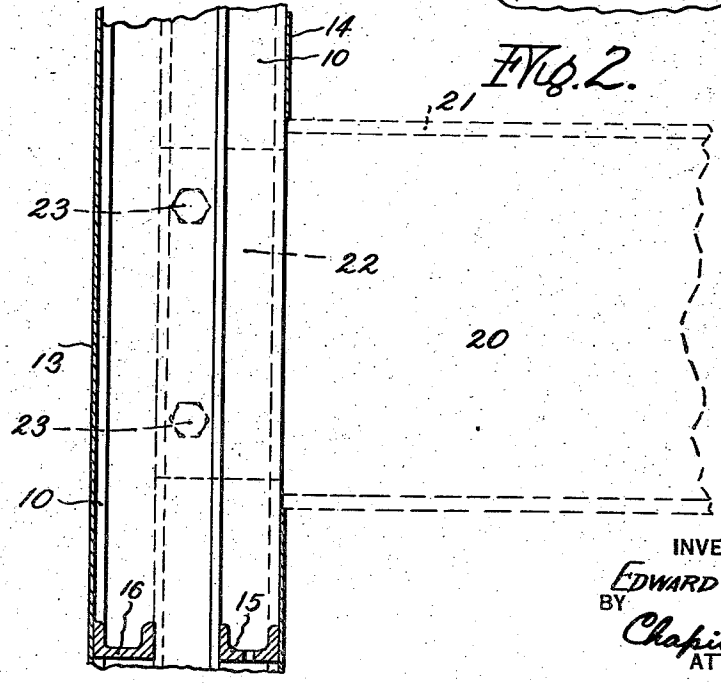


Fig. 2.



INVENTOR
EDWARD H. McCLINTOCK
BY
Chapin & Neal
ATTORNEYS

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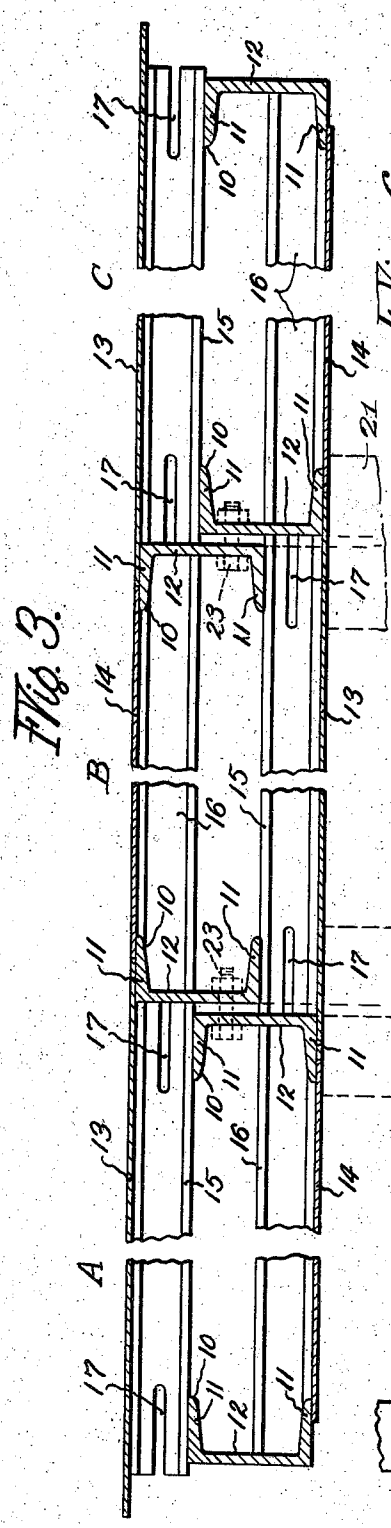


Fig. 3.

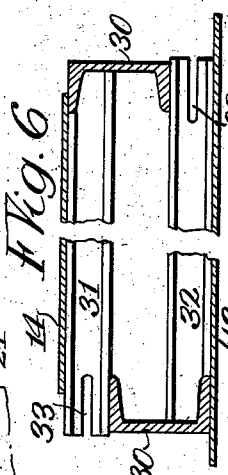


Fig. 6

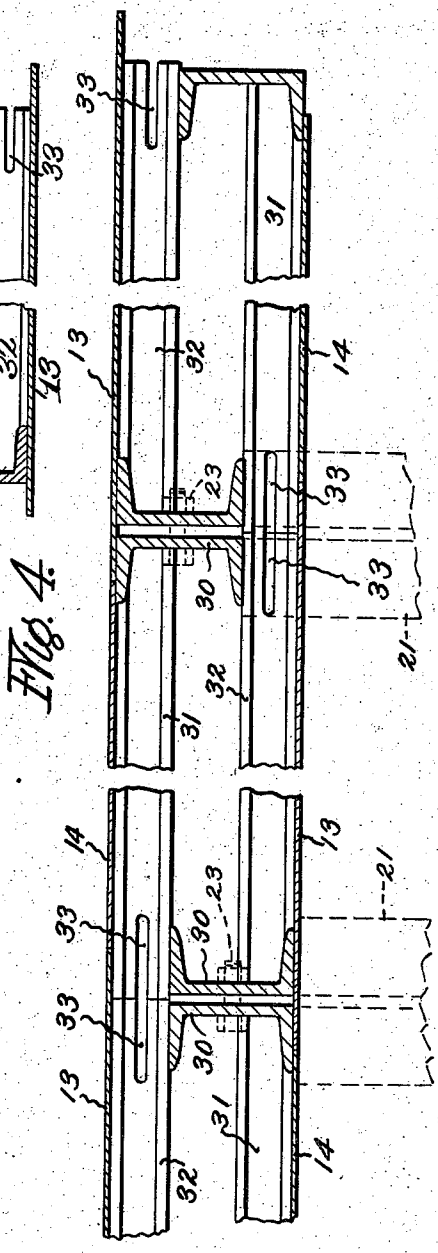


Fig. 4.

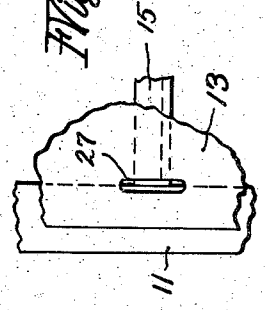


Fig. 5

INVENTOR
EDWARD H. McCLINTOCK
BY
Chapin & Neal
ATTORNEYS

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METALLIC FRAME WALL CONSTRUCTION

Edward H. McClintock, West Springfield, Mass.

Application October 29, 1936, Serial No. 108,171

13 Claims. (Cl. 189—34)

This invention relates to improvements in metallic-frame wall construction, preferably of the sectional type, for buildings.

The invention has for one object to provide in a metallic frame for the walls of buildings, an improved arrangement of the principal load-bearing members, such for example as the studs, calculated to substantially reduce the transmission of heat by direct conduction laterally through the wall.

Heretofore, so far as I am aware, the metallic studs or equivalent members used in wall construction of the class above set forth, extend laterally across the wall and engage the siding on both faces of the wall, thereby affording good heat conducting paths of ample cross section for the direct transfer of heat from the inside to the outside of the wall or vice versa.

According to the feature of invention above set forth, each stud or equivalent member is of less width than the thickness of the wall as measured between the inner surfaces of the inner and outer sidings, and the studs are staggered laterally so that some engage the inner siding only and others engage the outer siding only. In some cases, each stud is made up of a plurality of sections, one of which engages the inner siding and another of which engages the outer siding and these sections overlap laterally but are spaced apart in a longitudinal direction to avoid direct contact.

The invention also has for an object the provision of a wall section of rugged and relatively inexpensive form, which may be easily assembled with other like sections to form the frame of a wall.

The invention has for another object to provide a wall section involving two or more load-bearing members interconnected at intervals throughout their length by other and smaller members which not only act to tie together and brace the load-bearing members but also to space each member from one of the wall sidings and to space each load bearing member of one section from the adjacent load-bearing member of the adjacent section.

Other objects will best appear as the detailed description proceeds and will be pointed out in the appended claims.

The invention will be disclosed with reference to the accompanying drawings, in which:

Fig. 1 is a small scale elevational view showing a portion of a wall made up of wall sections embodying the invention;

Fig. 2 is a fragmentary sectional view taken on the line 2—2 of Fig. 1;

Fig. 3 is a sectional plan view taken on the line 3—3 of Fig. 1;

Fig. 4 is a view taken similarly to Fig. 3 and showing a modification;

Fig. 5 is a fragmentary elevational view illlustrative of a detail; and

Fig. 6 is a sectional plan view showing by itself one of the sections of Fig. 4.

In Fig. 1 of these drawings, I have shown in part a side wall of a building constructed from wall sections embodying my invention. These sections are designated generally as A, B and C. Each section extends from the sill S vertically upward to the top of the side wall and serves to support the floor beams and the plates from which the roof rafters are supported. The several sections are suitably secured together in side by side relation and each is suitably secured to the sill S. The width of each section may be varied, as desired, but sections of four feet in width are feasible and sections of such width have been illustrated herein.

The invention, while shown in Fig. 1 in connection with a side wall of a building, is not necessarily confined to such use and is capable of use in partition walls and also in roofs,—the term "wall" as used hereinafter being intended to cover any wall, exterior or interior as well as roofs.

Referring now to Fig. 3, each wall section comprises at least two principal load-bearing members which in a side wall would act as studs and in a roof would act as rafters. These members are mounted in longitudinally spaced and usually parallel relation, as herein shown. They are also interconnected by cross members as will later appear. The particular form of these load-bearing members may vary and the form to be used is generally a matter of engineering choice. Most any of the structural steel shapes available in the market may be used for the purpose. In the present case I have chosen to use channel irons 10. The two channel irons are mounted in opposed relation with the flanges 11 of one extending toward the corresponding flanges of the other and their smooth webs 12 facing outwardly and forming the sides of the wall section. These channels are of less width than the thickness of the wall, as measured between the inner surfaces of the sidings, indicated at 13 and 14. For example, for a three inch wall, two-inch channels may be used and the channels are built out to the desired wall thickness by small channel irons 15 which interconnect the flange 11 of one channel 10 to the corresponding flange of the other channel 10, being applied to the outer faces of such flanges and thus

outside the width of the channel. The two channels 10 are also interconnected by another set of small channel irons 16 which are applied to the inner faces of the other flanges 11 and thus inside the width of the channels 10. The channels 15 and 16 may be secured to the channels 10 by welding, as in the illustrated example, or in any other suitable way.

There may be as many of these cross members 15 and 16 as is necessary, or desired. I have, for illustrative purposes, shown them applied at intervals of one foot throughout the length of the channels 10. These cross members 15 and 16 need not necessarily be located at right angles to the channels 10. They may extend diagonally of the sections and at any desired angle to the channels 10, and in Fig. 1 some of the cross members have been thus shown. In end sections, it is desirable in order to secure wind bracing to have the cross members or stringers extend at about an angle of 45 degrees, as shown.

The wall sections may carry sidings, such as the metal plate sidings shown at 13 and 14, which are secured by welding. In this case the siding 13 is applied to the cross members 15 and the siding 14 is applied to the outer faces of the adjacent flanges 11 of the channels 10. The sidings used may, however, be otherwise formed and may be of any kind and material desired. Moreover, the sidings may be applied after assembly of the sections into wall form and need not necessarily be applied prior to such assembly, although the metal sidings shown are well adapted to application prior to such assembly.

It will be noted that the cross channels 15 project beyond the outer face or web 11 of each channel 10. In assembling the several sections to form a wall, adjoining sections are reversed as shown in Fig. 3, so that the channels 10 of one section are laterally offset or staggered with respect to the channels 10 of the other section. When the sections are thus assembled, the projecting ends of the channels 15 of one section abut the outer faces of the webs 12 of the channels 10 of the two adjacent sections, thus definitely locating the two adjacent channels 10 of adjoining sections and spacing them apart. Actually, the stud which is the principal load-bearing member in this case, is composed of two sections which are mounted in opposed relation and laterally offset or staggered,—one section being the end channel 10 of one wall section and the other being the adjacent channel 10 of the adjoining wall section. These sections are spaced apart by the channels 15 and thus isolated one from the other. The spacing between the two channels 10 of one stud is preferably that of the thickness of the web 20 of the I-beam 21 or other member used for a floor beam. Thus, a portion 22 of such web may enter between the two channel sections of each stud (Fig. 2) and be suitably fastened thereto as by bolts 23 or welding or the like. The main purpose of spacing apart the two sections of each stud is, however, to assist in minimizing the conduction of heat from the inner to the outer wall and vice versa, as will later be explained. The channels 15 are slotted at 17 near each end for a similar reason.

The wall sections, when assembled as described, are fastened together in any suitable way and one simple and satisfactory way is to weld the sections together. For example, each end of each channel 15 may be welded to the outer face of the channel 10, which it abuts. Each section at its lower end may be provided with an angle iron 25 (Fig. 1), secured to and between the channels 10 and adapted to rest on the plate-like sill S to which it is secured by bolts 26. A similar angle iron may be secured to the channels 10 at the upper end of each of the wall sections to act as a plate to support the roof rafters.

Where the sidings are attached to the frame of each wall section prior to assembly of the sections into wall form, one siding, as 13, is made to project beyond the sides of its section to partially overlap the channels 10 of the two adjoining sections and the other siding as 14, is made narrower to receive the projecting edges of the sidings 13 of the two adjoining sections, as shown in Fig. 3. The wider sidings 13 are provided, as shown in Fig. 5, with slots 27 one opposite the end of each channel 15. These slots enable the welder to project the welding electrode through the slot to weld the butt joint between each end of channel 15 and the abutting channel 10.

A modification of the invention is shown in Fig. 4. In this case the two upright channel irons 30 of each wall section are staggered or laterally offset. These members 30, as before, are interconnected by small channel irons 31 and 32 but in a somewhat different manner. The channel 31 at one end is fastened to one channel 30, butting up against the same with the outer face of its flange flush with the corresponding face of the flange of channel 30. The other end of channel 31 lies against the outer face of one flange of the other channel 30 and is secured thereto and it also projects beyond the last named channel. The channel 32 is similarly fastened in abutting relation with the last named channel 30 and overlaps and projects beyond the first named channel. Alternate wall sections are turned upside down and reversed as they are assembled into wall formation. This brings the two channel sections 30 of one stud near together but spaced apart as before and for like purposes. The two sections of one stud are not, however, laterally offset as before. Instead alternate studs are laterally offset. The sidings 13 and 14 may be applied as shown in Fig. 6 and the parts may be fastened together as above described. Each of the channels 31 and 32 is longitudinally slotted at one end as at 33, where it lies outside of and overlaps the flange of a channel 30 and to a distance somewhat greater than the width of the flange of channel 30.

In both forms of the invention the wall section has a thickness as measured between the sidings, greater than the width of the load-bearing members 10 or 30 so that no one member can directly contact with both sidings. In the case of Fig. 4, the two members 30 which make up one load-bearing unit or stud, both contact with the same siding and neither contacts with the other siding. The next stud has its two members 30 in contact with the other siding but out of contact with the first. In the case of Fig. 3 the two sections of one stud or load-bearing unit are staggered so that one contacts with one siding and the other contacts with the other siding. However, the two sections are spaced apart so that they are out of direct contact and there isn't a direct and easy path of large area from one siding to the other as there is in the usual case where the metal stud is equal in width to the thickness of the wall between sidings and contacts with both. There are at intervals metallic connections through the channels 15 from the inner flange of each channel 10 and the siding from which it is spaced,

but these contact areas are relatively small and occur only at intervals and the aggregate of all such contact areas for one stud is naturally far less than the area of the stud itself. Then these channels 15 are slotted to avoid a direct path across them from the channel 10 to the siding. In Fig. 4 the slots 33 have a similar function.

Thus, the arrangement of the load-bearing members and their cross-connecting members or stringers (the parts 15 and 16 or 31 and 32) is such as to substantially reduce the transfer of heat through the wall by direct conduction through the metallic members. The wall may, of course, be insulated by any desired means and the construction lends itself readily to the application of insulation before or after the wall has been assembled. The stringers or cross members are narrow and do not block off the space between the channels 10 so that insulation can be poured or blown into said space to fill the same, unimpeded by the stringers. The same arrangement which serves to minimize conduction of heat laterally through the wall is likewise effective to minimize the conduction of sound therethrough.

The invention thus provides a wall section made up of metallic members, which is simple and relatively inexpensive to manufacture, and these sections may likewise be assembled into wall form in a simple and relatively inexpensive manner. The sections are of rugged construction and embody effective cross bracing and wind bracing. Furthermore, they are characterized by a staggered arrangement of the component parts which isolates the parts of the structure to substantially reduce the losses due to direct conduction of heat through the load bearing members.

What I claim is:

1. A sectional metallic-frame wall construction, comprising, a plurality of wall units mounted side by side in abutting relation, each unit comprising a pair of longitudinal extending metallic load-bearing members mounted in laterally spaced relation one along each side edge of the unit, said load-bearing members each being less in width than the thickness of the wall, and a plurality of metallic members interconnecting the load-bearing members at intervals throughout their length, said interconnecting members being applied in part inside the width limits of the load-bearing members and in part outside such limits to build out the load-bearing members to wall thickness, said units being mounted one with respect to another so that certain of the load-bearing members have one side face positioned in one face of the wall and the others have an opposite side face positioned in the other face of the wall.

2. A sectional, metallic frame wall construction comprising a plurality of wall units mounted side by side in abutting relation, each unit comprising a pair of longitudinally extending metallic load-bearing members mounted in laterally spaced relation one along each side edge of the unit, said load-bearing members each being less in width than the thickness of the wall, and a plurality of metallic members interconnecting the load-bearing members at intervals through their length, said interconnecting members being applied in part inside the width limits of the load-bearing members and in part outside such limits to build out the load-bearing members to wall thickness, said units being mounted one with respect to another so that certain of the load-bearing members have one side face positioned in one face of the wall and the others have an opposite side face positioned in the other face of the wall, said interconnecting members which are applied outside the width limits and thus overlap the two load-bearing members of its unit extending beyond the latter to abut with the adjacent wall units and space apart the adjacent load-bearing members of adjoining wall units.

3. A sectional, metallic frame wall construction comprising a plurality of wall units mounted side by side in abutting relation, each unit comprising a pair of longitudinally extending metallic load-bearing members mounted in laterally spaced relation one along each side edge of the unit, said load-bearing members each being less in width than the thickness of the wall, and a plurality of metallic members interconnecting the load-bearing members at intervals through their length, said interconnecting members being applied in part inside the width limits of the load-bearing members and in part outside such limits to build out the load-bearing members to wall thickness, said units being mounted one with respect to another so that certain of the load-bearing members have one side face positioned in one face of the wall and the others have an opposite side face positioned in the other face of the wall, said interconnecting members which are applied outside the width limits and thus overlap the two load-bearing members of its unit extending beyond the latter to abut with the adjacent wall units and space apart the adjacent load-bearing members of adjoining wall units, each of the last-named interconnecting members having slots extending one from each end thereof inwardly beyond the load-bearing members which it overlaps.

4. A section for construction, comprising, a pair of metallic stud sections and metallic stringers interconnecting said sections at intervals throughout their length, each stud having one outer face located in one face of the wall and the other outer face being overlapped by a stringer the outer face of which lies in the other face of the wall, the stringers being slotted in those portions which overlap the stud sections.

5. A section for wall construction, comprising, two metallic load-bearing members mounted side by side in spaced relation with one outer side face of each located in the same plane and in the plane of one face of the wall, and metallic stringers cross-connecting said members at longitudinally spaced intervals, certain of said stringers secured to and overlapping the opposite outer side face of both said members and spacing the latter from the other face of the wall and projecting beyond the outer side face of each member.

6. A section for wall construction, comprising, two metallic load-bearing members mounted side by side in spaced relation with one outer side face of each located in the same plane and in the plane of one face of the wall, and metallic stringers cross-connecting said members at longitudinally spaced intervals, certain of said stringers secured to and overlapping the opposite outer side face of both said members and spacing the latter from the other face of the wall, and having slots extending from each end inwardly through the portions which overlap said members.

7. A section for wall construction, comprising, two metallic load-bearing members mounted side by side in spaced relation with one outer side face of each located in the same plane and in the plane of one face of the wall, and metallic stringers cross-connecting said members at longitudinally spaced intervals, certain of said stringers secured to and overlapping the opposite outer side face

of both said members and spacing the latter from the other face of the wall and projecting beyond the outer side face of each member, a siding secured to the first-named outer side faces of said members and overlapping the same in part, and a siding secured to the stringers which overlap the second-named faces of said members, said second siding projecting beyond each end of each of said overlapping stringers.

8. A section for wall construction, comprising, two metallic load-bearing members mounted side by side in spaced relation with one outer side face of each located in the same plane and in the plane of one face of the wall, and metallic stringers cross-connecting said members at longitudinally spaced intervals, certain of said stringers secured to and overlapping the opposite outer side face of both said members and spacing the latter from the other face of the wall and projecting beyond the outer side face of each member, and a siding secured to the stringers which overlap the second-named faces of said members, said second siding projecting beyond each end of each of said overlapping stringers and having openings therethrough located one at each end of each overlapping stringer.

9. A section for wall construction comprising, a pair of metallic load-bearing members mounted side by side in spaced relation, and two sets of metallic stringers each set interconnecting said members at longitudinally spaced intervals, said members being laterally offset by a distance equal to the width of the stringers, one set of stringers at one end overlapping one side face of one member and at the other end being fastened to the other member flush with the corresponding face thereof, the other set of stringers at one end overlapping the opposite side face of the second-named member and at the opposite end being fastened to the first-named member flush with the opposite side face thereof.

10. A section for wall construction comprising, a pair of metallic load-bearing members mounted side by side in spaced relation, and two sets of metallic stringers each set interconnecting said members at longitudinally spaced intervals, said members being laterally offset by a distance equal to the width of the stringers, one set of stringers at one end overlapping one side face of one member and at the other end being fastened to the other member flush with the corresponding face thereof, the other set of stringers at one end overlapping the opposite side face of the second-named member and at the opposite end being fastened to the first-named member flush with the opposite side face thereof, the end of each stringer which overlaps an outer side face of a member projecting beyond said member.

11. A section for wall construction comprising, a pair of metallic load-bearing members mounted side by side in spaced relation, and two sets of metallic stringers each set interconnecting said members at longitudinally spaced intervals, said members being laterally offset by a distance equal to the width of the stringers, one set of stringers at one end overlapping one side face of one member and at the other end being fastened to the other member flush with the corresponding face thereof, the other set of stringers at one end overlapping the opposite side face of the second-named member and at the opposite end being fastened to the first-named member flush with the opposite side face thereof, the end of each stringer which overlaps an outer side face of a member projecting beyond said member and being slotted in the portion which overlaps.

12. A section for wall construction, comprising, a pair of metallic load-bearing members mounted side by side in spaced relation and forming the sides of the section, and metallic stringers cross-connecting said members at intervals throughout their length and permanently fixed to each member, each member having one face overlapped by a stringer, that end of each stringer which overlaps a member projecting beyond that member and the side of the section, the thickness of the section being equal to the combined width of a member and a stringer.

13. A preformed unit for sectional wall construction, comprising a pair of longitudinally-extending, metallic, load-bearing members mounted side by side in laterally-spaced relation and each being substantially less in width than the thickness of the unit; and a plurality of metallic members cross-connecting the load-bearing members at intervals throughout their length and fixed thereto, said cross-connecting members tying together and bracing the load-bearing members, said cross-connecting members being applied in part inside the width limits of the load-bearing members and in part outside such limits and where applied outside such limits serving to build out each load-bearing member to the desired thickness of the unit.

EDWARD H. McCLINTOCK.

CERTIFICATE OF CORRECTION.

Patent No. 2,093,615. September 21, 1937.

EDWARD H. McCLINTOCK.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, first column, line 66, and second column, line 16, claims 2 and 3 respectively, for the word "through" read throughout; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 26th day of October, A. D. 1937.

Henry Van Arsdale,
Acting Commissioner of Patents.

(Seal)