Sept. 15, 1942. W. F. DREW 2,295,834

METAL REINFORCING FOR WOODEN FRAME BUILDINGS

Filed Sept. 22, 1939 3 Sheets-Sheet 1

Fig. 1.

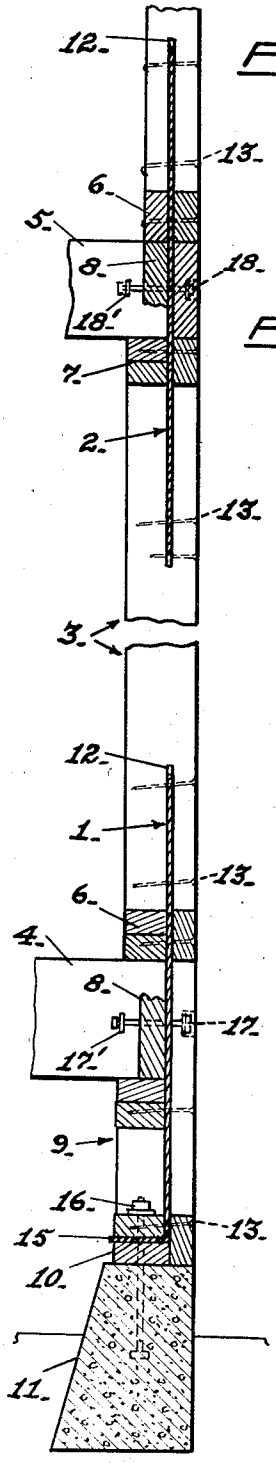
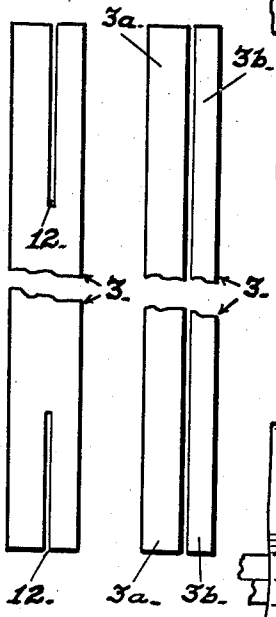
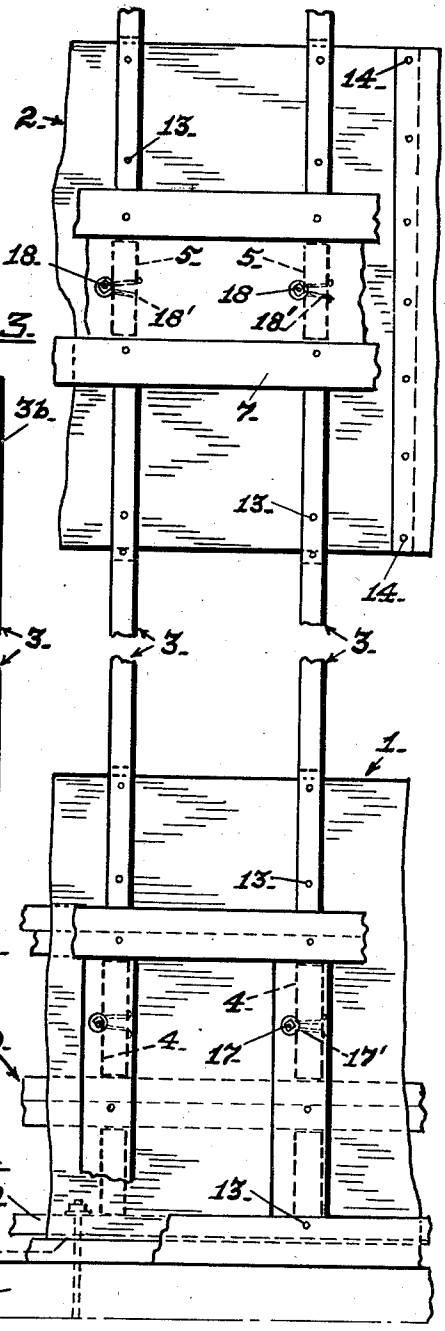


Fig. 2. Fig. 3.





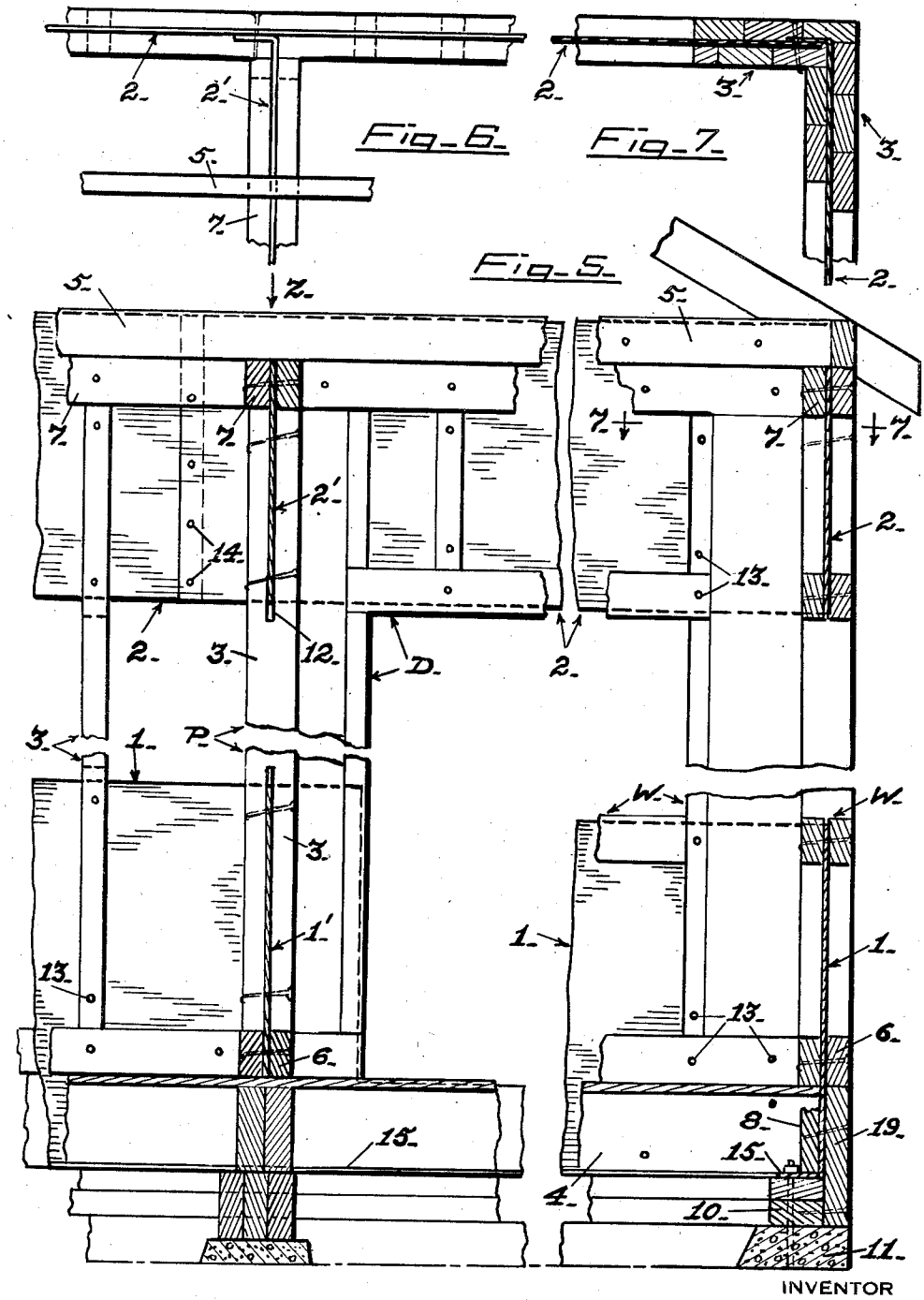
INVENTOR

William F. Drew

Sept. 15, 1942. W. F. DREW 2,295,834

METAL REINFORCING FOR WOODEN FRAME BUILDINGS

Filed Sept. 22, 1939 3 Sheets-Sheet 2



INVENTOR

William F. Drew

Sept. 15, 1942. W. F. DREW 2,295,834

METAL REINFORCING FOR WOODEN FRAME BUILDINGS

Filed Sept. 22, 1939 3 Sheets-Sheet 3

Fig. 8.

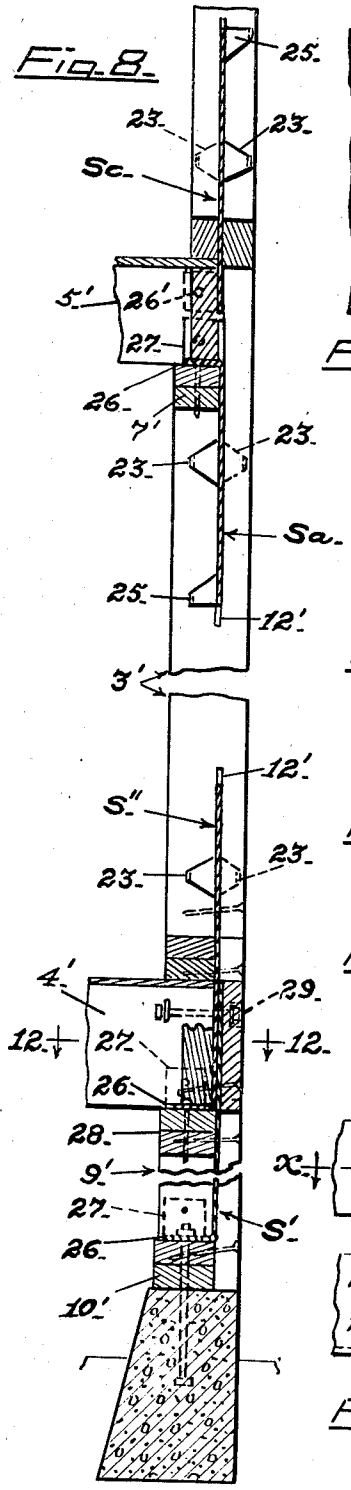


Fig. 9.

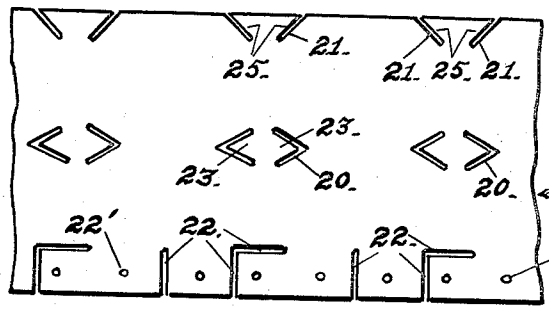


Fig. 10.

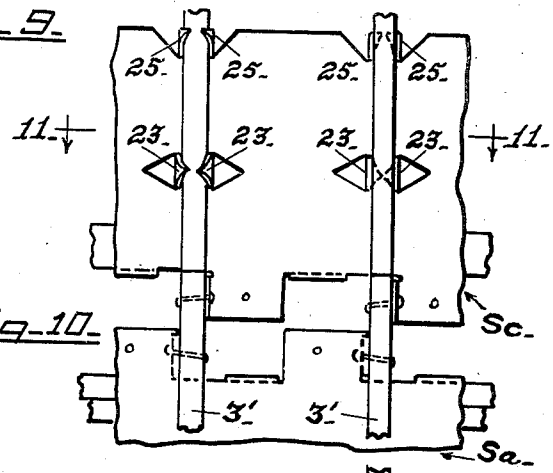


Fig. 11.

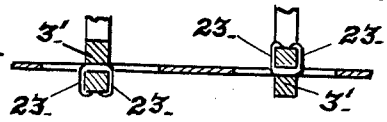
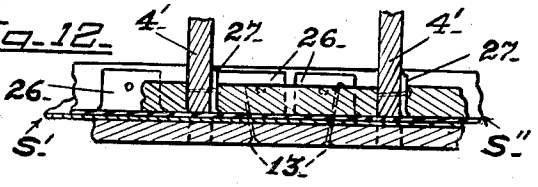


Fig. 12.



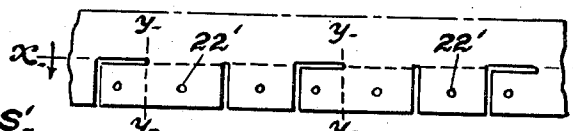


Fig. 13.

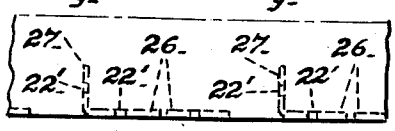


Fig. 14.

INVENTOR

William F. Drew

Patented Sept. 15, 1942

2,295,834

UNITED STATES PATENT OFFICE

2,295,834

METAL REINFORCING FOR WOODEN FRAME BUILDINGS

William F. Drew, Los Angeles, Calif.

Application September 22, 1939, Serial No. 296,083

14 Claims. (Cl. 20—1)

My invention has for its primary purpose the provision of new metal reinforcing and metal-reinforced wood framing for materially increasing the strength of wooden buildings without interfering with standard building practice and construction.

Another purpose of my invention is to provide building framing wherein wooden frame members and sheet metal reinforcing members are united to produce, in effect and utility, a wall structure providing continuous longitudinal "girders" at joist levels, the sheet metal members constituting the "webs" of the "girders" and extending below and above said levels for added strength.

A further purpose of my invention is to provide as an article of manufacture for reinforcing wooden buildings, a flat metal sheet or plate which is pre-slitted or cut so that tongues, flanges or ears may be struck therefrom and utilized for uniting the wooden-frame members with such sheets.

With the above and other objects in view the invention consists in the novel construction and combination of parts hereinafter described, illustrated in the accompanying drawings, and set forth in the claims hereto appended, it being understood that various changes in form, proportion, size and minor details of construction within the scope of the claims may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

Referring to the drawings:

Figure 1 is a fragmentary vertical section of building construction embodying my invention.

Figure 2 is a fragmentary side elevation of a stud as slotted to receive a metal reinforcing sheet in accordance with my invention.

Figure 3 is a fragmentary side elevation of a two-part stud shown as adapted to receive therebetween a metal reinforcing sheet.

Figure 4 is a fragmentary front elevation of the structure shown in Figure 1.

Figure 5 is a fragmentary sectional view through one wall and a parallel partition of a building illustrating one wall in elevation and the arrangement of the reinforcing members relative to window and door openings, walls and said partition.

Figure 6 is a fragmentary plan view of a portion of the structure shown in Figure 5 looking in the direction of the arrow Z at the upper left of Figure 5.

Figure 7 is a sectional view taken on the line 7—7 of Figure 5 and illustrating the manner of joining the reinforcing members at a corner whereby to form a continuous girder or belt as with all forms of the invention.

Figure 8 is a fragmentary vertical section of a modified form of my invention.

Figure 9 is a fragmentary plan view of one of the metal reinforcing sheets as shown in Figure 8.

Figure 10 is a fragmentary front elevation of a portion of the structure shown in Figure 8; with floor joists, flooring and box bridging omitted for clearness, showing the manner of bending tongues on the metal reinforcing sheets to secure the studs to the sheets and bind the associated framing members together.

Figure 11 is a sectional view on they line 11—11 of Figure 10.

Figure 12 is a sectional view on the line 12—12 of Figure 8.

Figure 13 is a fragmentary plan view of one edge of one of the reinforcing sheets showing the lines x—x and y—y on which said edge is bent to provide flanges, tongues or ears as shown at the lower end of Figure 8 and in Figure 14.

Figure 14 is a fragmentary elevational view of one of the reinforcing sheets after being bent to form said flanges, tongues or ears.

Referring to Figures 1 to 7 inclusive wherein I have shown a metal-reinforced wooden framing as constituting a wall of a standard wooden building embodying my invention, it is seen that metal reinforcing sheets or plates 1 and 2 are united with vertical and horizontal frame members such as studding 3, floor and ceiling joists 4 and 5, sills 6, plates 7, box bridging 8, underpinning 9 and mudsills 10 on the foundation 11, whereby to form longitudinal girders. The sheets 1 and 2 constitute the "webs" of such girders and as here shown the sheets 1 are extended from the mudsills 10 upwardly past the floor joists 4, whereas sheets 2 extend above and below the ceiling or second floor joists 5, whereby the "girders" as constituted are relatively deep and effectively reinforce the structure.

The studs or upright frame members 3 are provided with longitudinal slots 12 in one or more ends thereof, whereby the sheets 1 and 2 may extend edgewise through the studs and be secured thereto. Instead of this, the studding may comprise two parts 3a and 3b as shown in Figure 3, adapted to have the reinforcing sheets extended edgewise through and held therebetween, it being noted that whether slotted or two-part studs are used, the sheets and studs are secured together as by the nails 13 or other suitable means driven therethrough as shown in Figure 1. In this con-

nection it should be noted that ordinary nails will readily penetrate relatively thin metal reinforcing sheets, whereas for heavier gauge sheets, nails having tempered points or the like are employed.

Referring now to Figures 4 and 5 it is seen that the reinforcing sheets extend laterally between and edgewise through the studs and are overlapped and secured to one another by fastenings 14, whereas as shown in Figure 7 the end sheets of adjoining walls of the building are similarly overlapped and secured at the corners to form continuous belts of metal reinforcing on horizontal planes around the building at the levels of the joists, or in other words the "girders" as aforementioned.

Referring more specifically to the reinforcing sheets and the metal-reinforced framing formed by combining said sheets with the studs, joists and associated members, it is seen in Figures 1 to 4 that the lower portions of the sheets 1 are formed with flanges 15 which are secured by means of the foundation bolts 16 to and between the parts or sections of the mudsills 10. This arrangement provides for securely anchoring to the foundation by means of metal sheets, the framing members of a wooden building.

Parts of the underpinning 9 are disposed opposite the outer ends of the floor joists 4 and the metal sheets 1 extend between said parts and said ends and are secured thereto by bolts 17. These bolts pass through said parts of the underpinning, the sheets 1, box bridging 8 and are secured by staples 17' or other fastenings to the sides of the joists. The sheets 1 in extending upwardly past the joists 4, pass between the sections of the sills 6 and thence upwardly into the slots 12 of the studs 3 above said joists. It is now seen that the reinforcing sheets 1 are gripped between the framing members so as to be securely united therewith as a metal reinforcing band extending between the studs and other upright frame members above and below the joist level. Due to the particular manner of extending the reinforcing sheets into the slots of the studs and between parts of the other frame members, all of such framing may be nailed or bolted together through the reinforcing sheets and otherwise without interfering with the standard joining and erecting practices for constructing wooden buildings, yet such reinforcing provides for materially increased strength in a wooden building and will effectively resist shocks and stresses which would damage ordinary wooden buildings not having the reinforcing means of my invention, and this is particularly true as to resisting earth shocks, etc.

The ceiling or second floor joists 5 are secured to the studs 3 by means of the plates 2 which pass through said studs and sections of the plates 7 and box bridging 8 and bolts 18 secured to the joists by staples 18' or other fastenings. The plates 2 extend above and below the level of the ceiling joists and are united with the studding above and below the latter in the same manner as the plates 1. These upper sheets 2 together with the associated framing members constitute another band or girderlike framing which together with other similar reinforcement provides for wooden framing having the characteristics of steel wall structures.

With reference to Figures 5, 6 and 7 it is seen that a partition P has its upright members or studding united with sheets 1' and 2' in the same manner as shown in Figures 1 to 4.

The sheets 1 extend from the mudsills to the wall openings W of the framing whereas the sheets 2 may extend downwardly from the ceiling joists 5 to the upper edges of said openings. Where a door opening such as one D, shown in Figure 5 is provided, the sheets 1 are terminated to extend to the margins of said opening. Figure 5 plainly shows the relation of the two girders or bands to the framing and the manner in which the latter may be nailed together through the sheets 1 and 2. All wall, floor and ceiling joists of the structure are tied together with the reinforcing sheets 1 and 2 as will be apparent from the showing in Figures 5, 6 and 7 and it is therefore seen that the metal-reinforced wood framing embodying this invention, will make possible the attainment of the objects and advantages hereof in a particularly efficacious manner.

In Figure 5 the underpinning is omitted and the floor joists 4 rest on the mudsills 10, the flanges 15 on the plates 1 being secured on top of the mudsill instead of between the sill members as shown in Figure 1. Longitudinal members 19 resting on the foundation are nailed to the mudsill and ends of the floor joists and to the box bridging through the metal sheets. These variations from Figure 1 are shown to enable the illustration of Figure 5 on a larger scale.

In Figures 8 to 14 inclusive I have shown a modified form of reinforcing sheets which is used in the same manner as in the other form of the invention but differs therefrom in that it is made up as a flat sheet with pre-formed slits or cuts 20, 21 and 22 along the longitudinal center line and margins thereof. The center line slits or cuts 20 provide for striking out, on the job, the tongues 23, in such manner as to embrace and hold the studs 3' as shown in Figures 8, 10 and 11. The upper marginal slits 21 provide for similarly striking out ears or tongues 25 for embracing the studs as shown in Figures 8 and 10. The lower marginal slits 22 provide for striking tongues or ears which may be variously bent as desired at right angles or otherwise for joining the metal sheets with the framing by suitable means such as nails, inserted through the preformed holes 22'. As shown in Figures 13 and 14 one way of utilizing the tongues formed by means of the slits 22, takes into consideration the bending of the lower marginal portion along the line x—x to form a lateral flange or flanges 26, then bending along lines y—y to form tongues or ears 27 at right angles to the flanges 26. The flanges 26 when so formed will contact and may be nailed or otherwise secured to sills and members presenting horizontal surfaces, whereas the flanges or tongues 27 will contact and may be likewise secured to vertical surfaces. This is clearly shown in Figure 8, where the flanges 26 are bolted to the mudsills 10', and the flanges 27 are nailed to sides of the underpinning 9'. When the flanges 27 are formed by bending on the line y—y only; the other marginal portions lie in the plane of the sheet and are thus adapted to secure adjoining vertical framing members.

As shown in Figure 8, I may use metal sheets S' between the mudsills and the floor joists 4' and similar metal sheets S'' betwen said joists and the studs 3', said sheets S' and S'' being overlapped. Sheets S'' extend into the slots 12' of the studs 3' and have their lower flanges 26 and ears 27 nailed respectively to the lower wood plate 28 and sides of the floor joists 4'. Bolts 29 pass through these overlapped sheets and are secured

to the floor joists in the same manner as in the other form of the invention.

The ceiling or second floor joists **5'** are secured to the upper ends of the studs **3'** by means of reinforcing sheets *Sa* which have their upper margins provided with the flanges **26** and **27** and are respectively secured to horizontal surfaces of the plates **7'** and sides of the joists **5'**. Similar metal sheets *Sc* are fixed by means of flanges **26'**, formed by bending only on line *y—y* of Figure 13, to the vertical surfaces of the joists **5'** but do not necessarily overlap the sheets *Sa*. Sheets *Sa* and *Sc* extend into the slots of the studs which are secured to the joists **5'** and it is seen that these sheets as well as the one S' and S'' will be extended between the two part frame members and into and through the slots in the studding, similarly to sheets **1** and **2**.

It is worthy of note that the reinforcing metal sheets inserted in the framing members in accordance with this invention provide for securing siding, lathing, plaster board or other wall finishing material in the same manner as would be effected if the framing consisted solely of wooden members, while affording the qualities of metal framing.

Whether slotted or two-part studs or like wood frame members are used the metal reinforcing sheets of this invention will extend edgewise through and laterally between said studs or members so that when nails or other fastenings are passed through or into the studs or members and said sheets, the metal reinforced framing hereof will be provided.

I claim:

1. A metal-reinforced wooden framing for buildings including a plurality of spaced wooden studs, a metal sheet extending edgewise transversely through parallel to and between said studs and means for securing said studs to said sheet.

2. A metal-reinforced wooden framing for buildings including a plurality of connected wooden frame members certain of which are disposed in laterally spaced relation to one another, a metal sheet extending edgewise transversely through parallel to and between and joining said spaced members, and means for securing said spaced members to said sheet.

3. A metal-reinforced wooden framing for buildings including joists, studs associated with said joists, a metal sheet extending edgewise through parallel to and between said studs, and means for securing said joists and said studs to said sheet.

4. A metal-reinforced wooden framing for buildings including a plurality of wooden frame members certain of which as one group are disposed in upright laterally spaced relation to one another and others of which as another group are mounted above the members of said one group, a metal sheet extending edgewise through parallel to and between the members of said groups, and means for securing members of said groups to said sheet.

5. A metal-reinforced wooden framing for buildings including a plurality of wooden frame members certain of which are disposed in upright and laterally spaced relation to one another and others are disposed upright above and in substantial alignment with the first named upright members, a metal sheet inserted edgewise through parallel to and between the members of both groups and fastening elements extending into said members of both groups and penetrating said sheet for securing said members thereto.

6. A metal-reinforced wooden framing for buildings including a plurality of wooden frame members certain of which are disposed in upright and laterally spaced relation to one another and others are disposed upright above and in substantial alignment with the first named upright members, a metal sheet inserted edgewise through parallel to and between the members of both groups and fastening elements extending into said members of both groups and penetrating said sheet for securing said members thereto, horizontal wooden frame members and means for securing said horizontal members to said sheet.

7. A metal-reinforced wooden framing for buildings including a plurality of wooden frame members certain of which are disposed in upright and laterally spaced relation to one another and others are disposed upright above and in substantial alignment with the first named upright members, a metal sheet inserted edgewise through parallel to and between the members of both groups and fastening elements extending into said members of both groups and penetrating said sheet for securing said members thereto, certain of said members being provided with slots through which said sheet extends.

8. In combination, a foundation for a building, a mudsill thereon, underpinning extending upwardly from said foundation and mudsill, floor joists, studs extending upwardly from said joists, a metal reinforcing sheet secured at its lower edge to said sill and extending edgewise through and parallel to said underpinning and said studs and reaching laterally between the studs above and below said joists for affording the joining of the underpinning, joists and studs, and fastenings penetrating said wooden members and said sheet for securing said members to said sheet and effecting the joining of said members.

9. In combination, a foundation for a building, a mudsill thereon, underpinning extending upwardly from said foundation and mudsill, floor joists, studs extending upwardly from said joists, a metal reinforcing sheet secured at its lower edge to said sill and extending edgewise through and parallel to said studs and reaching laterally between the studs above said joists, and extending between and engaging the underpinning for affording the joining of the underpinning, joists and studs, and fastenings penetrating said wooden members and said sheet for securing said members to said sheet and effecting the joining of said members, box bridging between said joists and engaging said metal sheet, fastenings extending through said sheet and the box bridging and engaging said joists.

10. A wall framing for a building including a plurality of upright wooden frame members disposed in laterally spaced relation, in groups arranged one above the other, horizontal wooden frame members interposed between said group members, a metal reinforcing sheet extending edgewise through and parallel to and between the upright members of said groups as well as laterally between said horizontal members, and means for securing all of said members and said sheet together.

11. A metal-reinforced wooden frame for forming the wall of a building including a plurality of upright laterally spaced wooden members and a plurality of horizontal wooden members, and a plurality of end to end connected metal sheets inserted edgewise through parallel to and between said upright members and for forming a metal belt or girder extending the

length of the wall, and means for securing the wooden members and sheets together.

12. A metal-reinforced wood framing for walls including laterally spaced horizontal wooden members, laterally spaced vertical wooden members extending above and below said horizontal wooden members and a metal sheet inserted edgewise through and parallel to the upper and lower upright members and laterally therebetween as well as across and between said horizontal members, and means for securing said horizontal and vertical members to said sheet.

13. A metal-reinforced wood framing for walls including laterally spaced horizontal wooden members, laterally spaced vertical wooden members extending above and below said horizontal wooden members and a metal sheet inserted edgewise through and parallel to the upper and lower upright members and laterally therebetween as well as across and between said horizontal members, means for securing said horizontal and vertical members to said sheet, a foundation, a wooden sill thereon and means for securing the lower edge of said sheet to said sill.

14. A metal-reinforced wood framing for walls including laterally spaced horizontal wooden members, laterally spaced vertical wooden members extending above and below said horizontal wooden members and a metal sheet inserted edgewise through and parallel to the upper and lower upright members and therebetween as well as across and between said horizontal members, and means for securing said horizontal and vertical members to said sheet including members formed integral with said plate and extending angularly therefrom for engaging said wooden members.

WILLIAM F. DREW.