Jan. 15, 1935. S. F. MIOTON 1,988,388

STRUCTURAL BUILDING FRAME

Filed Jan. 6, 1933 4 Sheets-Sheet 1

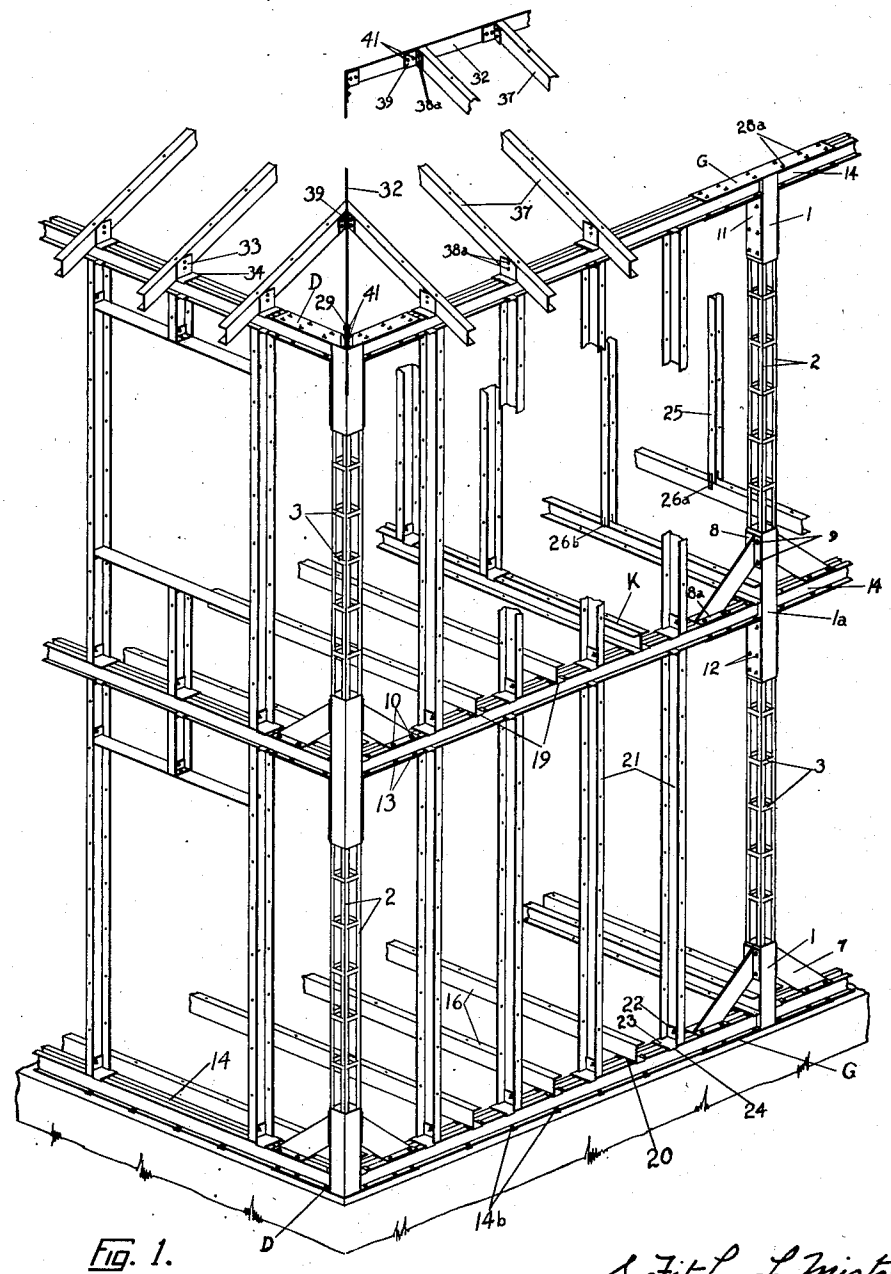

Fig. 1.

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STRUCTURAL BUILDING FRAME

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Fig. 2a.

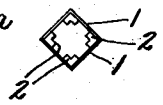

Fig. 3.

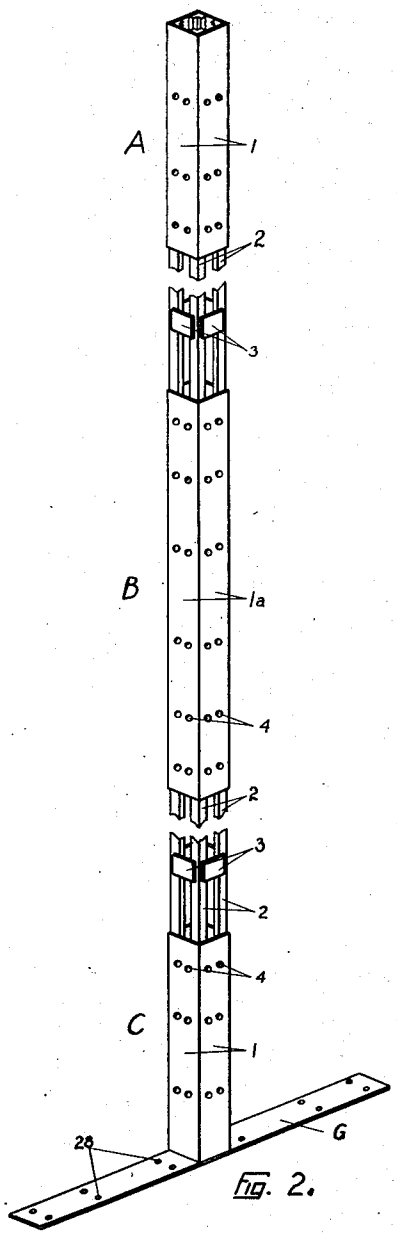

Fig. 2.

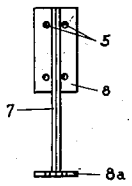

Fig. 4.

Fig. 5.

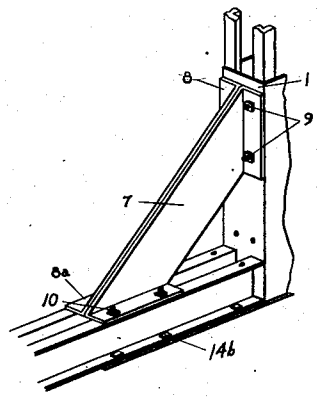

Fig. 6.

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STRUCTURAL BUILDING FRAME

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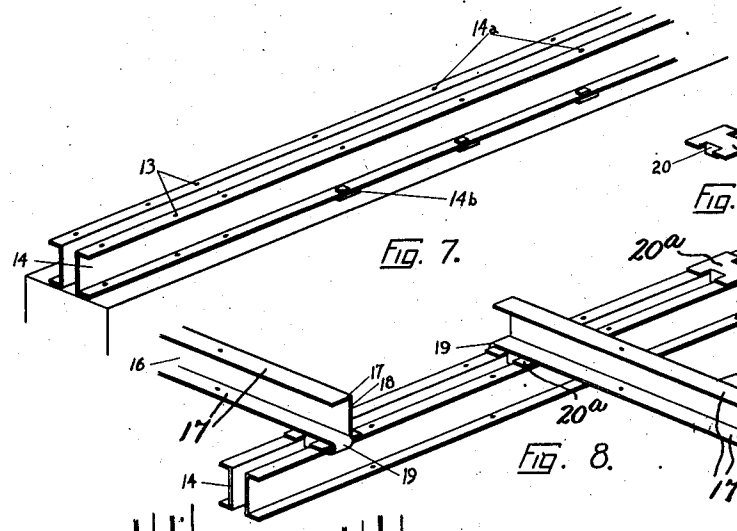

Fig. 7.

Fig. 9.

Fig. 8.

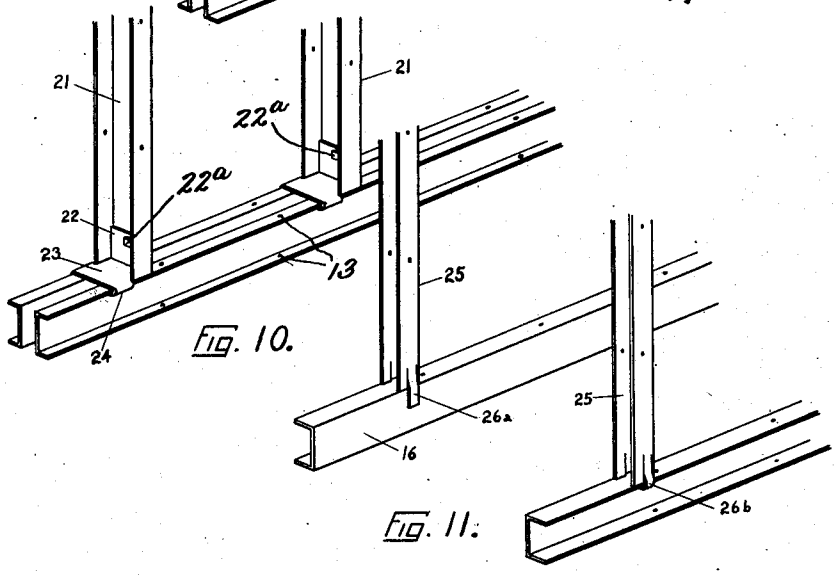

Fig. 10.

Fig. 11.

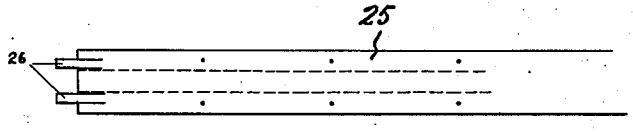

Fig. 12.

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STRUCTURAL BUILDING FRAME

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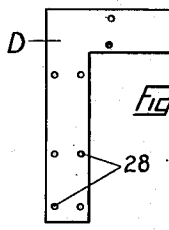

Fig. 13.

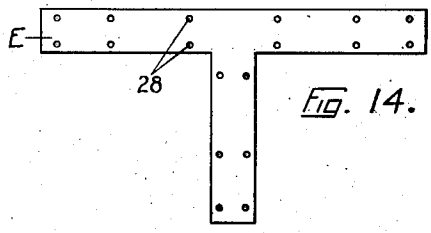

Fig. 14.

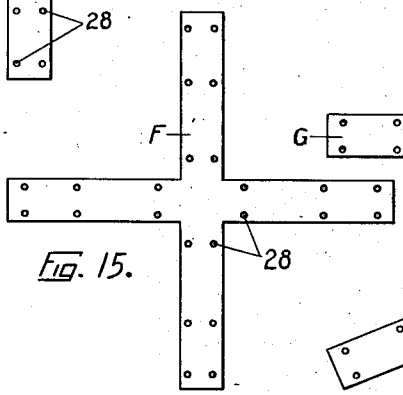

Fig. 15.

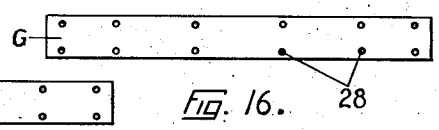

Fig. 16.

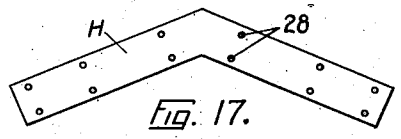

Fig. 17.

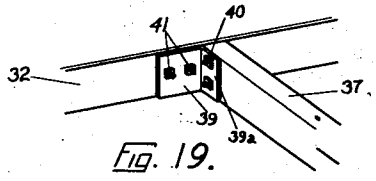

Fig. 19.

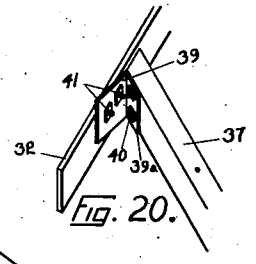

Fig. 20.

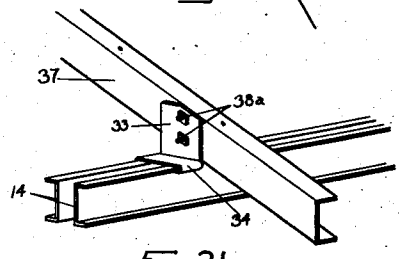

Fig. 21.

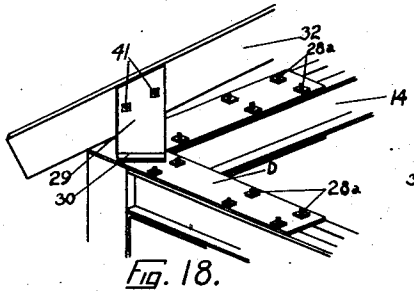

Fig. 18.

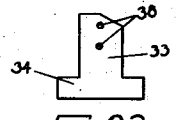

Fig. 22.

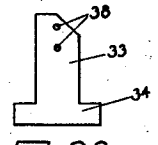

Fig. 23.

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UNITED STATES PATENT OFFICE

1,988,388

STRUCTURAL BUILDING FRAME

Sidney Fitzhugh Mioton, New Orleans, La.

Application January 6, 1933, Serial No. 650,539

3 Claims. (Cl. 189—1)

The present invention relates to metallic building construction, and more particularly to the structural frame work of buildings which may be more or less fire-proof in construction.

An object of the present invention is to provide standard building construction units which may be used in desired numbers and assembled in various ways to produce large or small houses or buildings.

Another object of the present invention is to provide improved means for securing the units together in various combinations and which admits of the comparatively easy knocking down of the structure comprising the units, and which when set up will provide a frame work which may be permanent; crack-proof and rigid; wherein the fire risk is diminished to a minimum and repairs negligible; wherein the cost of construction of building is reduced over the present standard steel construction; and wherein the parts may be quickly joined in assembled position.

The invention further aims at the provision of improved means for so joining the structural units as to meet the requirements of any architectural plans as to dimensions, size and distribution usual in residences or dwellings.

With the foregoing and other objects in view, the invention will be more fully described hereinafter, and will be more particularly pointed out in the claims appended hereto.

In the drawings, wherein like symbols refer to like or corresponding parts throughout the several views:

Figure 1 is a fragmentary perspective view, partly broken away, of a building frame embodying the features of the present invention.

Figure 2 is a detail fragmentary perspective view of a frame post.

Figure 2*a* is a top plan view thereof.

Figure 3 is a top plan view of a modified construction of the post shown in Figure 2 and wherein an octagonal wall structure is desired.

Figure 4 is a detail edge view of a windbrace which also serves simultaneously as a connecting member used between a post and a sill in the building frame.

Figure 5 is a fragmentary perspective view on an intermediate post and sill connection.

Figure 6 is a similar view of a lower end post and sill connection.

Figure 7 is a detail perspective view of a sill with its lower flange bolted to a foundation.

Figure 8 is a like view showing two joists resting at their ends on the sill and with interposed plates between the joists and the sill.

Figure 9 is a detail perspective view of the plate shown in Figure 8.

Figure 10 is a fragmentary perspective view of the connection between the lower ends of two studs and a supporting sill.

Figure 11 is a similar view of the connection between a pair of two small studs and their respective supporting joists.

Figure 12 is a fragmentary plan view of the blank from which the studs of Figure 11 may be constructed.

Figure 13 is a detail plan view of a right angle foundation plate.

Figure 14 is a like view of a modification showing a T plate.

Figure 15 is a similar view but showing another modification wherein the plate is cruciform.

Figure 16 is a plan view of a further modification wherein the plate is for a two-wall post.

Figure 17 is a like view showing a further modification wherein the plate is adapted for walls disposed at relatively other than a right angle.

Figure 18 is a fragmentary perspective view of a corner of the building frame showing a corner post, two roof-girts or sills, a roof-girt connecting member as is shown in Figure 13, a ridge rafter and a connecting member joining the roof-girt connecting member and the ridge rafter.

Figure 19 is a fragmentary perspective view of the connection between a ridge rafter and a rafter.

Figure 20 is a similar view of a connection between a ridge rafter descending from a pinion and a rafter.

Figure 21 is a fragmentary perspective view of the connection between a sill and a rafter.

Figure 22 is a plan view of the blank from which the connecting member shown in Figure 21 is constructed, and

Figure 23 is a like view of a slightly modified form of the blank.

Referring now to the drawings, and first to Figures 2 and 2*a* which give the details of an entire post represented by sections A, B and C, the length of the sum of the complemental parts of which is equal to the desired height of the post.

Section A shows the upper and section C the lower portions of a post. Section B shows that portion of a post intermediate to sections A and C and is intended to receive the connecting

members of a floor intervening between the ground floor and the roof-girt or sill.

It is to be noted that as many of the sections B may be located on the post as are intervening floors intended.

The complemental parts of the post consist of four angle-irons 2 disposed in the corners and of the length of the post desired, and are held in their relative spaced parallel positions by plates 1 and 1*a* which are welded to the angle-irons 2 in the positions shown in the drawings to form a rectangle as shown in Figure 2*a*.

In the space or spaces intervening between these plates 1 and 1*a* are welded bracing strips 3, or the like, as shown in section B and C.

The plates 1 and 1*a* are suitably punched with bolt holes or openings 4 to receive the bolts which join this post to its connecting members.

This post may be modified so as to meet the requirements of walls abutting the post at other than a right angle, as for instance, as do walls forming an octagonal room and this modification is accomplished by simply bending, as shown in Figure 3, the strips 3*a* of sections A, B and C to the desired angle and to properly position the plates 1 and 1*a* on the post to receive the walls abutting thereagainst at such an angle.

Figure 4 shows a front elevation of a connecting member having a web which terminates at opposite ends in flanges 8 and 8*a* as shown in Figures 4, 5 and 6. This connecting member may comprise a pair of plates welded or otherwise secured together to provide the web 7 and having their ends bent outwardly to provide the flanges 8 and 8*a*.

This connecting member is shown in Figure 5 with its flanges 8 abutting against the plate 1*a* of the post and bolted thereto by the bolts 9, while its lower set of flanges 8*a* are shown connected to the sill 14, or like structure to be later described, by the bolts 10.

In Figure 6 the connecting member is shown in the same relative position with respect to the plate 1 at either an intervening floor or bottom of the frame post, and may be inserted from the position shown in Figure 5 to be used instead of angle 11, Figure 5, and secured by the bolts 13 and 12.

Be it noted that the connecting member 7, as applied in Figures 5 and 6 also acts as a wind brace, and also admits the placing of a joist in abutting contact with the post, thereby insuring a good floor end support.

In reference now to the connecting member 11, Figure 5, the same consists of an angle iron having its two legs in the same plane and at right angle to each other for supporting and joining a sill to the post.

This connecting member 11 is here shown with its horizontal leg bolted to the lower flanges of the sill 14 by bolts 13, Figure 5, whilst its vertical leg bears against the plate 1*a* in the post and is secured thereto by bolts 12, thereby rigidly connecting the sill to the post.

The connecting member 11 may be otherwise located in the frame structure and may be arranged beneath the diagonal connecting member 7 or interchanged therewith, and the bolt openings of the member 7 may be out of line with those of the connecting member 11 if the member 7 is placed over the member 11. Any desired mounting or arrangement of the members 7 and 11 may be resorted to to take care of the various conditions met with in erecting the frame.

The connecting member 11 may be used in any desired position without the use of the diagonal brace or connecting member 7.

It is therefore to be understood that, whenever the use of the connecting member 7 is deemed insufficient as purely a connecting member, the combined use of the two members 7 and 11 is practicable.

Now referring to Figure 7, the sill 14 is composed of a pair of spaced channel rails with their flanges directed outwardly in opposite horizontal directions, and with their webs sufficiently spaced apart to allow its total width to correlate with that of all of its structural connections.

One of the objects of having this space between sill components is to allow for the free passage of service pipes, cables, braces, etc.

The adjacent ends of the sill components are similar and have series of openings or bolt holes 13 punched in their flanges to receive the bolts 10 and 13 of Figures 5 and 6.

Along the intervening surfaces of these flanges, bolt holes or openings 14*a*, are punched at desired intervals to receive the anchor bolts from the foundation, as shown by bolts 14*b*, Figure 7.

These openings are punched in both flanges of the sill components to insure tying locations for bracing elements on that surface of the sill which is not bolted to the foundation.

These openings are similarly placed in both of the channel flanges to avoid confusion when assembling on a job.

Having described the post, the sill 14 and their connecting and bracing members 7 and 11, the joist will now be described.

Figure 8 shows a joist 16 which comprises a channel rail which has at its end a portion of one of its flanges 17 and a corresponding portion of its web 18 so sheared off as to provide a tongue 19 projecting from the the other flange 17. The tongue 19 is adapted to be bent under or clinched to the outer flange of the sill 14 on which the joist 16 rests, as shown in Figure 8. This connection of the tongue 19 may be spot welded if desired.

Holes may be punched at intervals in the joist flanges 17 to receive any elements that might be used to secure desired material to the flanges.

Be it particularly noted that when weight bearing partitions are used where an ordinary sill 14 does not exist, two joists 16 may be so placed in relation to each other as to simulate and act in lieu of a sill 14, as shown in Figure 1, and are capable of receiving studs and their connecting members as does an ordinary sill.

Figure 9 illustrates a plate 20*a* formed as shown in the drawings and of a like thickness to that of the connecting member 11, Figure 5, and is intended to be placed on the sill 14 at a joist location to receive the joist thereon: two angled portions 20 are stamped and bent down from the opposite edges of the plate 20*a* and are of a width equal to that of the space intervening between the sill components and which are intended to project therebetween to insure against a lateral movement of the plate and also to reinforce the sill components against bending and to maintain their parallelism when joist tongue 19 is bent or clinched to the sill flange.

As the thickness of this plate 20*a* is indentical to that of the angle brace 11, shown in Figure 5,

it is obvious that whenever a joist 16 lies close to a post which is connected by the connecting member 11 to its sill 14, as in hallways and the like, the joist 16 must rest directly on a portion of the connecting member 11 and therefore would be out of level with other joists unless plates 20a were used under the other joists to insure a common level.

Reference will now be made to the stud or upright 21 shown in Figure 10. As both ends are similar only one end is shown. The stud 21 comprises a channel rail whose web is suitably punched near its end to register with a similar opening punched in a sill connecting member 22, Figure 10, to receive a tie bolt 22a, or the connection may be made by welding or other desired manner.

At intervals along the flanges of the stud 21 openings are provided for the reception of fastening elements which may be used to secure material or the like to the lateral surfaces of the stud.

The stud-sill connecting member 22 comprises an angle iron whose main leg lies between the flanges of the stud and whose leg 23 extends outwardly from between the flanges of the stud 21 and is of increased width therebeyond.

This wider portion of the angle iron 22 is of such width as to sufficiently extend beyond the lateral edges of the sill and insure enough metal so projecting as to allow of its being bent or clinched to the flanges of the sill and hold the stud in abutting relation thereto.

Both ends of the stud 21 are similarly connected except that the projections shown by 24 in Figure 10 are bent or clinched on the lower flanges of the sill when used to connect the upper end of a stud.

Figure 11 shows the small studs or uprights 25 consisting of channel rails proportioned to the width of the joists 16 upon which they are mounted. These studs 25 are constructed from the blank shown in Figure 12 and have projections 26 used as shown in Figure 11 where projection 26a bears against the web of joist 16 and projection 26b is clinched to the upper flange of joist 16 after the studs 25 have been properly located, and the projections may be welded to the joist if desired. These studs 25 are intended for nonweight carrying partitions, enclosing for instance clothes closets and the like.

The connecting or tie plates shown in Figures 13 to 17, inclusive, at D, E, F, G and H may be welded to the bottom of a post as shown in Figure 2 to anchor the post to the foundation, and may be secured to the top of the post to serve as a connecting member between the roof sills or girts, as shown in Figure 1, abutting the post.

When two walls abut on the adjoining sides of a post at a right angle the plate D, Figure 13, is selected and is welded to the bottom of the post and has openings or bolt holes 28 so located as to receive the properly located foundation anchor bolts commonly used, and which will thereafter be also engaged in the openings 13 of sills 14 when in place.

A second plate D, Figure 13 is used to tie the sills or girts abutting a corner post, Figure 1, at the top of the corner post, and there welded if desired in alinement with the bolt holes 28 in register with the bolt holes 13 of sills 14 of the roof girts or sills, and are bolted thereto as shown in Figure 18.

When two walls on the same plane abut on opposite sides of a post and a third wall abuts on one of its remaining sides, thereby forming a three wall post, then the plate E, Figure 14, is selected and welded to the bottom of the post so that its bolt holes or openings 28 will receive the properly placed foundation anchor bolts, which foundation bolts will in turn engage through the openings 13 of the sills 14.

A second plate E is placed at the top of the three wall post in the manner described in connection with the top plate D to tie or connect the sills or girts abutting thereagainst.

When four walls abut on four sides of a post at right angles to each other then the plate F, Figure 15, selected and welded to the bottom of the post and a second plate F is placed at the top of the four wall post as above set forth.

When two walls abut on opposite sides of a post or in the same plane, then the plate G, Figure 16, is welded to the bottom of the post as shown in Figure 2, and, as shown in Figure 1, a second plate G is secured to the top of the post for the same purpose as above described.

When two walls abut on two sides of a post, of the cross sectional configuration shown in Figure 3, and at an angle other than a right angle, as for instance at an angle formed by two walls of an octagonal room, the plate H Figure 17 is selected and welded to the bottom of such post and a second plate H is secured to the top of the irregular post of Figure 3 to accomplish the purposes set forth in connection with the other tie or connecting plates.

Reference will now be made to Figure 18 wherein is shown only one of two clips or angles 29 which connect the plate D to the ridge rafter 32. The flanges 30 of these angles 29 are welded to the plate D at the proper angle to receive between them the ridge rafter 32 to which they are secured by bolts 41.

The ridge rafter 32 is here shown with its lower end resting on the apex of the plate D at the corner or angle where more than two sides of a roof meet at a common point. The connecting angle 29 may be otherwise located and welded on plate "D" when found necessary to meet other conditions.

The ridge rafter 32, Figures 18, 19 and 20 comprises a strip of metal of sufficient proportions and dimensions to receive and support the upper ends of the ordinary rafters connected therewith by connecting members 39, to be later described. Along the length of this ridge rafter 32 are punched at determined locations sets of bolt holes or openings to receive bolts 41 which join it to a connecting member 39.

The bolt holes or openings in the ridge-rafter 32, as is obvious, become unnecessary when it is elected to weld thereto its abutting component of the connecting members 39.

The connecting member 39, Figures 19 and 20, connects the ridge rafter 32 to the ordinary rafter 37, and comprises an angle plate with one leg adapted to be bolted to the ridge-rafter 32 by the bolts 41 and with its other leg 39a adapted to be bolted to the rafter 37 by bolts 40.

While the legs 39 and 39a of the angle plate may be disposed at right angles to each other, one of the legs may be inclined in an edgewise direction relative to the other to meet various conditions in roof construction of different types.

In some instances, as in high pitched roofs, the upper surfaces of the rafter's end will extend above the ridge-rafter's upper edge but as

is obvious, this condition is taken care of by the roof sheeting meeting at the pinion.

The same connecting member 39, Figure 20, is used when a ridge rafter descends to rest on the apex of a corner post and receives other rafters 37 connected to it an angle.

Figure 21 shows the lower or girt-end of an ordinary rafter 37 comprising a channel beam the web of which is punched near opposite ends to receive at its upper end, Figure 19, bolts 40 and at its lower end bolts 38*a*, Figure 21, which secure rafter 37 to a connecting member 33. The holes or openings for the bolts 40 and 38*a* are always to be punched on opposite sides of and equidistant from, the rafter's center line and also equidistant from the rafter's web's end which measurements coincide with those of the openings in leg 39*a*, Figure 19, and as is noted places these openings on a line parallel to the web's end.

The connecting member 33 on Figure 21 ties the rafter 37 to the roof sill or girt 14 and has its main leg punched as at 38, Figure 22, to correspond with the openings of the rafter 37 and admit of its being bolted to the rafter as shown by bolts 38*a*. The horizontal portion of the connecting member 33 extends transversely across the sill 14 and has extensions 34 adapted to be bent or clinched under the adjacent flanges of the roof sill 14, Figure 21, after which it may be spot welded.

Figures 22 and 23 show two forms of blanks of the connecting member 33. These sets of bolt holes or openings 38 are so located in the main leg of the member 33, Figure 22, that when a rafter 37 of a flat roof is bolted thereto the rafter will have its lower surface, say at a distance of two inches from the upper surface of the roof girt, whilst a rafter bolted thereto and forming, say a medium pitched roof would have its lower surface touch the roof girt, and in neither instance would a portion of the member 33 be higher than the upper surface of the rafter connected thereto.

Whereas if the member 33, Figure 23, is made proportionately longer and the openings therein punched proportionately higher the result will be that a rafter 37 forming a medium pitched roof will have its under surface two inches above the outer edge of the roof girt: therefore it is obvious that the pitch may be increased until the rafter's under surface touches the edge of the roof girt.

In view of the foregoing it is noted that with the use of the connecting member 39, Figure 19, and the connecting member 33, shown in Figures 21, 22 and 23, and the rafters 37 punched as described, an infinite number of roof pitches may be obtained.

It is obvious that various changes and modifications may be made in the details of construction and design of the above specifically described embodiment of this invention without departing from the spirit thereof, such changes and modifications being restricted only by the scope of the following claims:

What is claimed is:

1. In building construction, a post, upper sills abutting the angularly disposed sides of the post, a tie member permanently secured to and extending over the upper end of the post and having wing portions overlapping the upper edges of the sills, means for securing said wing portions to the sills, a ridge rafter having its lower end disposed in angular relation over the end of the post, a connecting plate permanently secured at its lower end to the apex portion of the tie member substantially in line with the post, and means for securing the upper end of the connecting plate to said ridge rafter.

2. In a building construction, a post, angularly related sills abutting the sides of the post, an angular tie member having the apex thereof engaging the upper end of the post, each arm of said tie member overlapping the upper edges of the sills, means for securing the arms of the tie member to the sills, a ridge rafter having its lower end disposed in angular relation over the end of the post, a connecting plate permanently secured at its lower end to the apex portion of the tie member substantially in line with the post, and means for securing the upper end of the connecting plate to said ridge rafter.

3. In a building construction, a post, angularly related sills abutting the sides of the post, a flat angular tie member having the apex thereof engaging the upper end of the post, each arm of said tie member overlapping the upper edges of the sills, means for securing the arms of the tie member to the sills, a ridge rafter having its lower end disposed in angular relation over the end of the post, a connecting plate permanently secured at its lower end to the apex portion of the tie member substantially in line with the post, and means for securing the upper end of the connecting plate to said ridge rafter.

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