L. H. WHITTREDGE.

METALLIC BUILDING STRUCTURE.

APPLICATION FILED JULY 5, 1917.

1,298,129.

Patented Mar. 25, 1919.

Fig. 1.

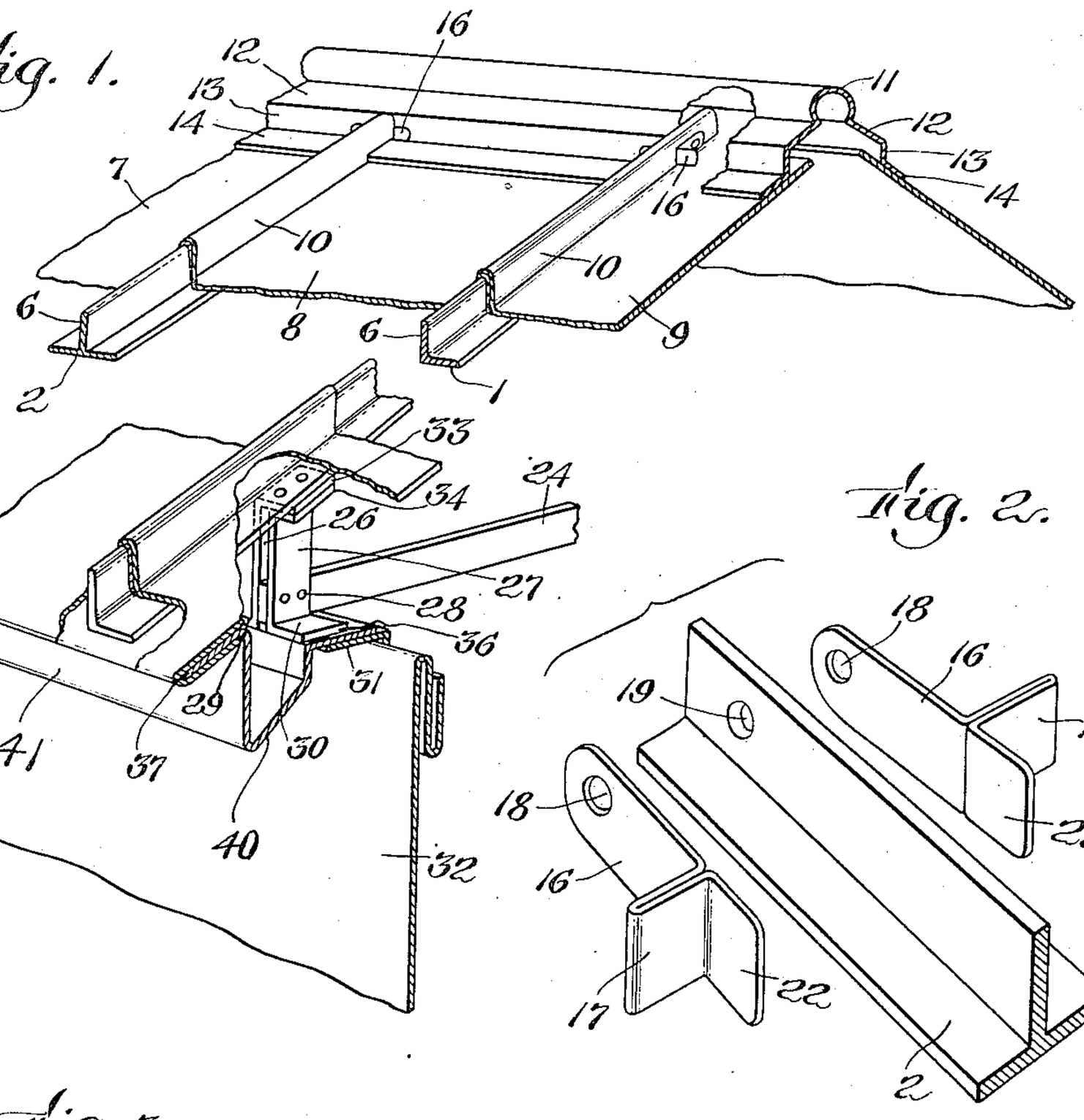


Fig. 2.

Fig. 3.

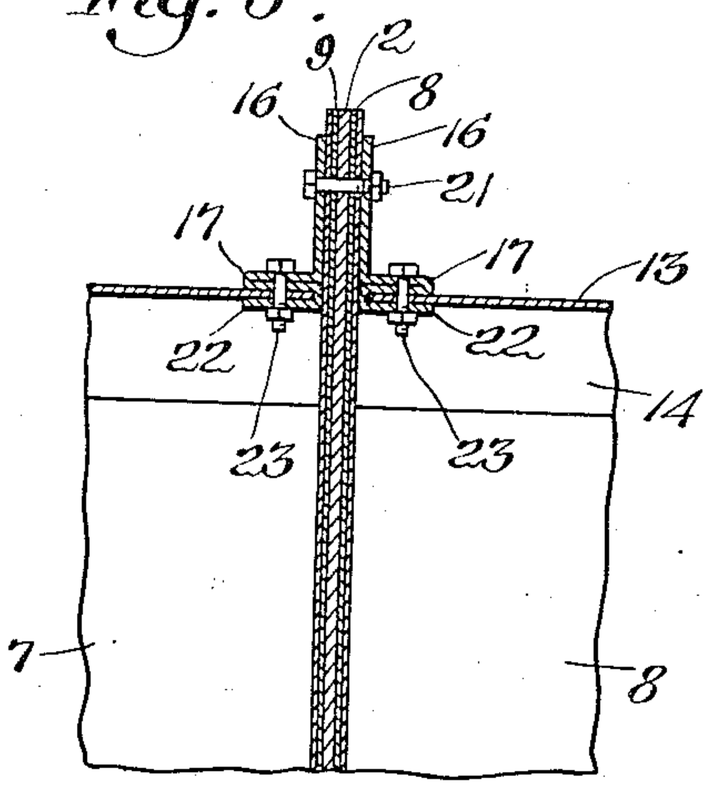


Fig. 5.

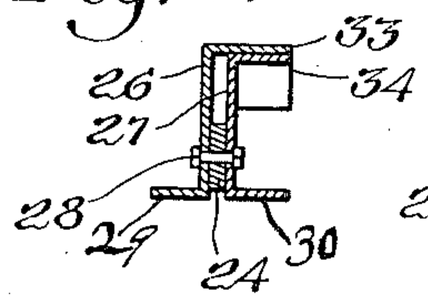
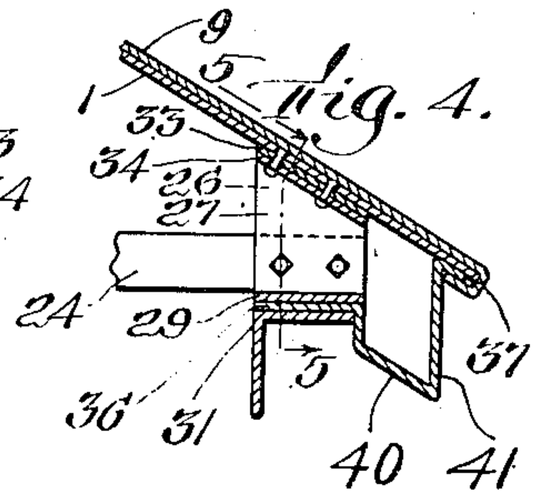


Fig. 4.



Inventor:

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UNITED STATES PATENT OFFICE.

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METALLIC BUILDING STRUCTURE.

1,298,129. Specification of Letters Patent. Patented Mar. 25, 1919.

Original application filed April 22, 1916, Serial No. 92,975. Divided and this application filed July 5, 1917. Serial No. 178,624.

To all whom it may concern:

Be it known that I, LUCIUS H. WHITTREDGE, a citizen of the United States, and a resident of Lynn, in the county of Essex and State of Massachusetts, have invented new and useful Improvements in Metallic Building Structures, of which the following is a specification.

The present invention relates to a metal building structure, and more particularly to the roof construction of a metallic building, this application being a division of my former application Sr. No. 92,975, filed April 22, 1916.

The principal objects of my invention are to provide a structure which is stiff and rigid, yet light in weight and requiring a minimum of material, which has tight and substantially moisture proof joints, which is substantial and durable in construction, which may be easily and quickly assembled by unskilled labor, which may be readily extended in length by removing one end and inserting a few standard parts, and which has a minimum number of fastening devices, all of which are located on the interior of the building where they are unexposed to the weather, thus affording a plain and attractive exterior appearance.

Other objects of my invention will be apparent from the specification and accompanying drawings, in which,—

Figure 1 is a perspective view of a portion of the structure, parts being broken away;

Fig. 2 is a perspective view of a detail of construction, the parts being shown in detached relationship;

Fig. 3 is a longitudinal sectional view of the connection between a rafter and the ridge roll taken parallel to the sloping roof;

Fig. 4 is a view of a vertical section through a flange of a rafter showing one form of connecting means for securing the rafters to the top of the side walls; and

Fig. 5 is a sectional view of said connecting means taken on the line 5—5 of Fig. 4.

The roof structure proper of the present invention comprises rafters 1, 2, etc., supporting roof sheets 7, 8, 9, etc., and ridge-roll 11. The cardinal feature of the rafters comprises the upstanding strips or ribs 6 over which the sections of the roof sheeting are intended to be folded, but in addition to the vertical portions 6 the rafters are also preferably provided with a lateral base portion on either one or both sides. For example, rafter 1 is provided with one lateral base portion, this rafter thus being in the form of an angle iron, while rafter 2 is provided with two lateral base portions, thus comprising a T-member. The roof sheeting is made up of sections 7, 8, 9, etc., the portions between adjacent rafters comprising separate sections. The lateral edges of each section are folded over the upstanding portions of adjacent rafters so that each rafter has two folds fitting over it, namely, a fold on each of the adjacent sections which are disposed on opposite sides of the rafter.

The ridge-roll, comprising a top tubular portion 11, lateral sloping portions 12, vertical portions 13 and sloping portions 14 resting on the roof sheets, has openings cut in the vertical portions 13 to receive the upper ends of the rafters which project a short distance thereinto. The rafters are attached to the ridge-roll by means of clips 16 which are preferably manufactured in the form shown in Fig. 2, that is, in the form of straps having folded portions 17 intermediate their ends, the inner ends being provided with openings 18 adapted to register with openings 19 in the ends of the rafters.

In securing the parts together, the rafters are suitably spaced apart and are preferably temporarily secured together by cleats extending along the under sides of the rafters. The roof sheets 7, 8, 9, etc., are then applied to the rafters, the folds 10 which fit over the rafters preferably being formed at the factory. The sheet 7, for example, is first applied, then the sheet 8, the left-hand fold (Fig. 1) of sheet 8 fitting over the right-hand fold of sheet 7, then the sheet 9 is applied, and so on progressing from left to right. A pair of clips 16 are then secured to the end of each rafter by means of a bolt 21 (Fig. 3), one clip being disposed on each side of the rafter and the bolt extending through both clips, the rafter, and the two folds of the adjacent roof sheets which have previously been fitted over the rafter. The ridge-roll is then placed in position, the folds 17 in the clips being so disposed as to bear against the inner faces of the vertical portions 13 of the ridge-roll. The outer ends 22 of clips 16 project through the openings in the sides of the ridge-roll along the rafters and are bent over to grip the vertical

portions 13 of the ridge-roll between the folds 17 and the ends 22. Bolts 23 may be employed as shown in Fig. 3 more tightly to secure the clips to the ridge-roll but ordinarily I prefer merely to bend the ends 22 outwardly against the outer surfaces of the vertical portions of the ridge-roll as shown in Fig. 1, thereby avoiding any fastening devices which project through the roof.

In order to tie the two sides of the roof together I preferably provide cross-ties 24 (Figs. 1, 4 and 5) extending transversely of the structure between the lower ends of opposing rafters, these cross-ties being secured to the lateral base portions of the rafters by means of one or more members 26 and 27 shaped as shown. The members 26 and 27 have vertical portions adapted to lie along opposite sides of the cross-ties and be secured thereto by means of bolts 28, base portions 29 and 30 turned outwardly in opposite directions 90° so as to rest upon the top plates 31 of the side walls 32, and sloping top portions 33 and 34 lying beneath the lateral base portions of the rafters, the top portions 33 and 34 being bolted or riveted to the rafters.

As shown in Figs. 1 and 4, a channel shaped member 40 extending the full length of the building and having flanges 36 and 37 may be provided along the eaves of the roof, the flange 36 lying upon the top plate 31 of the side wall and the flange 37 lying along and beneath the lower edge of the roof, the roof sheets 7, 8, 9, etc., being folded over the flange 37 as shown. This channel shaped member adds rigidity to the building and the flange 37 about which the edges of the roof sheets are folded affords a neat and tight connection between the roof and walls. Furthermore, the vertical portion 41 of the channel member 40 simulates the appearance of the ordinary wooden building.

From the foregoing it will be evident that the fold connections are substantially airtight and moisture proof, and that there are no exterior crevices or seams into which water will run by gravity. The vertical longitudinal ribs on the rafters permit the folded roof sheets to be securely locked thereto and owing to the folds being at right angles to the sheets the roof is stiffened. The folds not only fit snugly over the rafters but the channel-shaped sections of the roof formed by folding up the edges over the rafters fit accurately between each pair of adjacent rafters thereby further to strengthen the structure. By folding the lower edges of the roof sheets underneath the longitudinal channel members 40, a weather proof connection between the roof and wall is secured.

It will be noted that the fastening devices throughout the entire structure are located wholly on the interior, thus eliminating unsightly fastening heads on the exterior, making the fastenings inaccessible from the outside and protecting them from adverse weather condition. Moreover, owing to the fact that no holes need be made through the walls or roof for fastening devices a troublesome source of leakage and rusting is eliminated.

I claim:

1. A metallic building structure comprising a plurality of rafters having flat upstanding portions disposed in spaced parallelism along the roof, a plurality of roof sheets having their lateral edges bent upwardly at substantially right-angles to form channel members adapted to fit snugly into the channel-shaped spaces between adjacent portions of said upstanding portions, the bent-up edges of said sheets being folded outwardly through substantially 180° so as to fit over said upstanding portions in superposition, the outer ends of said sheets being turned under to hold the sheets on the rafters, whereby the rafters and roof sheets are rigidly united without the use of fastening means along the rafters.

2. A metallic building structure comprising a plurality of rafters having flat upstanding portions disposed in spaced parallelism along the roof, a plurality of roof sheets having their lateral edges bent upwardly at substantially right-angles to form channel members adapted to fit snugly into the channel-shaped spaces between adjacent portions of said upstanding portions, the bent-up edges of said sheets being folded outwardly through substantially 180° so as to fit over said upstanding portions in superposition, the outer ends of said sheets being turned under to hold the sheets on the rafters, and a ridge roll mounted over the inner ends of said sheets, whereby the rafters and roof sheets are rigidly united without the use of fastening means along the rafters.

3. A metallic building structure comprising a rafter having a vertical longitudinal rib, roof sheets having channels at their edges fitting over said rib, a ridge roll having a portion overlapping said roof sheets and a portion substantially perpendicular to said roof sheets adjacent said overlapping portion and having an opening in said portions to receive said rafter and channels, and a clip secured to said rafter within said ridge roll and to the perpendicular portion of said ridge roll.

4. A metallic building structure comprising a rafter having a vertical longitudinal strip, roof sheeting supported by the rafter, a ridge roll having a portion substantially perpendicular to said rafter and having an opening in said portion to receive said rafter, and a clip having one end secured to said rafter, said clip having a projection bear-

ing against the inside of said portion and having an intermediate portion bearing against the outside of said portion.

5. In a metallic building structure, the combination of a roof sheet, means for supporting said roof sheet near its outer edge, and a channel member secured to said supporting means beneath said outer edge of the roof sheet, said channel member having a flange in parallel juxtaposition to said outer edge of the roof sheet and the roof sheet being folded over said flange through an angle of approximately 180°.

6. A metallic building structure comprising a wall, a channel member secured to the top of said wall and roof sheets, said channel member having a vertical exterior portion and a flange and said roof sheets being folded over said flange.

7. A building structure comprising a wall, a rafter and an angle iron for securing said wall and said rafter together, said angle iron having a vertical portion disposed longitudinally of the rafter and having a sloping flange to support said rafter.

8. A building structure comprising a wall, a rafter and a pair of angle irons for securing said wall and said rafter together, said angle irons being disposed transversely of said wall and having sloping flanges to support the said rafter.

9. A metallic building structure comprising a wall, a pair of angle irons secured to said wall, a cross-tie secured between said angle irons, and a rafter, said angle irons having sloping flanges secured to said rafter.

Signed by me at Boston, Massachusetts this fifteenth day of June 1917.

L. H. WHITTREDGE.