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W. A. TROUT

2,073,889

FRAMED STRUCTURE

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Fig. 1.

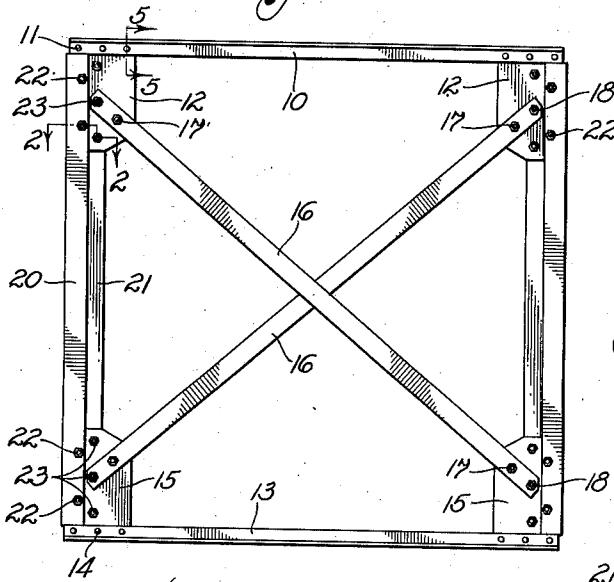


Fig. 6.

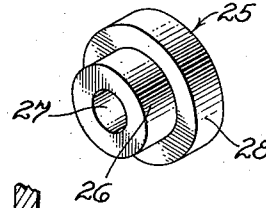


Fig. 8.

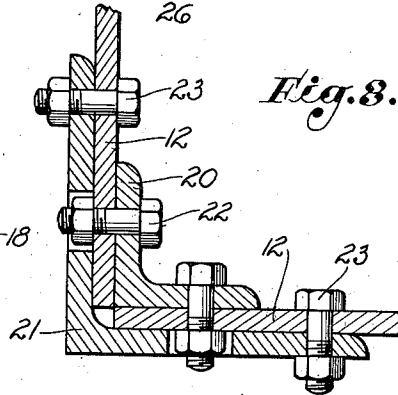


Fig. 5.

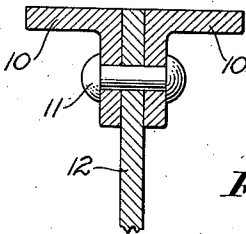


Fig. 2.

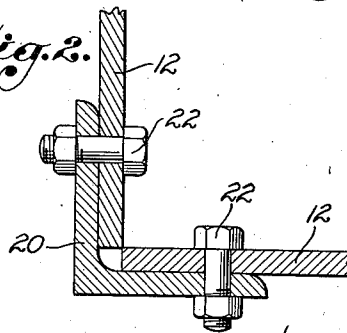


Fig. 3.

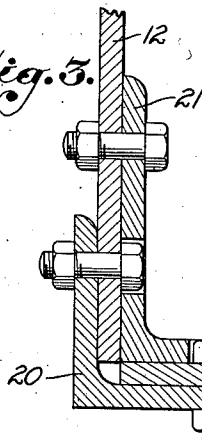


Fig. 7.

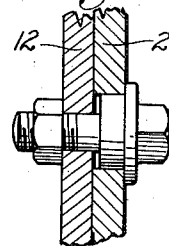
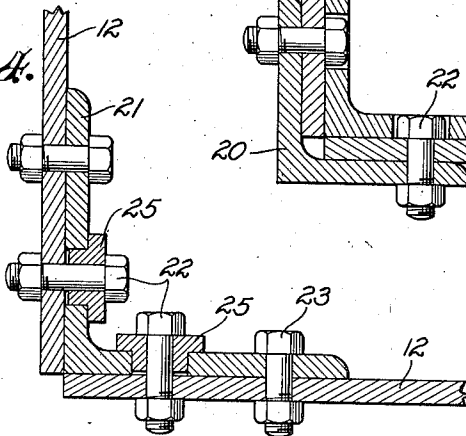


Fig. 4.



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FRAMED STRUCTURE

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7 Claims. (Cl. 189—36)

My invention relates to framed structures, and more particularly to structures which are formed from structural steel or iron members of conventional shape.

5 An object of the invention is to provide in such structures a structural element or section in which the columns may be formed optionally of light or heavy angle-iron members and in which the type of column may be changed after
10 the structure is erected without dismantling the structure or destroying its structural unity. I have found that in some cases it is desired to erect a structure which is sufficiently strong to initially support a certain initial load, and that
15 it may later be desired to adapt the structure to support a considerably lighter or heavier load. Wherever it is desired to provide such a structure it will be found that my invention has a definite utility.

20 Further objects and advantages of the invention will be made evident hereinafter.

Referring to the drawing, which is for illustrative purposes only,

25 Fig. 1 is a side elevation of an element or section which is intended to form a part of a completed structure.

Fig. 2 is a cross-section on a somewhat enlarged scale showing a horizontal section through one corner of the section, for example, on a plane represented by the line 2—2 of Fig. 1 with a light column member.

30 Fig. 3 is a horizontal section on the same scale as Fig. 2 on the same plane as Fig. 2, but with both the heavy and light column members in place, but with the fastening means in the position they assume when the columns are being changed.

Fig. 4 is a section on the same plane and to the same scale as Fig. 2, with only the heavy column member in place.

Fig. 5 is a vertical section through the upper part of the permanent structure of the section on a plane represented by the line 5—5 of Fig. 1.

Fig. 6 is a perspective view of a spacing washer.

Fig. 7 is a view showing the use of a shoulder bolt.

Fig. 8 is a sectional view showing an alternative form of my invention.

50 In the structural section shown, upper supporting angle-iron members 10 are secured by rivets 11 to gusset plates 12, and lower supporting angle-iron members 13 are secured by rivets 14 to gusset plates 15. The angle-iron members
55 13 may rest on a suitable foundation or some

other structure and support the structural section, and the angle-iron members 10 may support the load directly or through other structure.

Cross bracing members 16 extend diagonally across the face of the structural section, being secured to the gusset plates 12 and 15 by permanent bolts 17 and removable bolts 18. The terms "permanent bolts" and "removable bolts" are used in a technical sense only. The permanent bolts are those which under ordinary
10 circumstances will never be removed as long as it is desired to maintain the structure, and the removable bolts are those which must be removed to change column members. The members, bolts, and rivets 10 to 17 inclusive are
15 hereinafter called the "permanent structure", since they are not removed or changed after the structure is erected and need not be so removed or changed to change columns.

Two separate and distinct sets of column members are provided; namely, light column members 20 and heavy column members 21. Both are conventional structural angle iron sections. They are secured to the gusset plates 12 as shown and in a similar manner to the gusset plates 15.
25 Two different types of bolt assemblies are used; namely, the washer type 22, and the plain type 23. These bolt assemblies both use a standard bolt and nut (with lock washers not shown, if desired), but the bolt assembly 22 contains a spacing washer 25. Each of these spacing washers has a body 26 of somewhat larger diameter than the head of the standard bolts used, a hole 27 large enough for the body of the bolt to pass therethrough, and a flange 28 of somewhat larger
30 diameter than the body 26.

In practice the light column members 20 are always bolted on the outside of the gusset plates 12 and 15, and the heavy column members are bolted on the inside of these gussets. However,
40 it comes within the scope of my invention to mount the light column members 20 on the inside of the gusset plates 11 and the heavy column members 21 on the outside, as shown in Fig. 8. These members 20 and 21 are in what
45 I refer to as nested relationship; that is, the corner of the angle 20 is disposed in the V-shaped channel formed by the two legs of the angle 21.

The method of assembly and the utility of
50 the two types of bolt assembly will be better understood if we consider the actual operation of assembling. Assuming that the structure has been assembled with only the heavy column members 21 in place and that the parts have
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been secured together by bolts 22 and 23 as shown in Fig. 4, it will be seen that the bolt assemblies 22 are effective in clamping the heavy column members 21 to the gussets 12 due to the use of the spacing washers 25, the bodies 26 of which pass through holes somewhat larger than the heads of the bolts in the column members 21, the flanges 28 serving to clamp the columns and gussets firmly together. In other words, both the bolts 22 and the bolts 23 are effective as securing means for the structure.

If now it is desired to substitute for the heavy column member 21 a light column member 20, the bolts 22 may be withdrawn without affecting the structural integrity. The light column member 20 may then be put in place and secured as shown in Fig. 3, the spacing washers being omitted and the heads of the bolts 22 bearing directly on the gusset plates. The bolts 23 being then withdrawn, the heavy columns 21 may be withdrawn, thus leaving the structure wholly supported on the light columns 20.

It is entirely obvious that if the structure is erected with only the light column members 20 in place, as shown in Fig. 2, the heavy columns 21 may be inserted and the light columns withdrawn without disturbing the permanent structure or leaving it unsupported at any time by a reversal of the process above described. The heavy member is inserted and secured in place by the bolts 23, thus providing a support for the permanent structure. The bolts 22 are then taken out and the light column member is taken off the outside of the structure. The bolts 22 are then provided with spacing washers and put in place as shown in Fig. 4.

Instead of using a standard bolt with a spacing washer 25, special shoulder bolts, such as are shown in Fig. 7, may be used for the bolt assemblies 22 when used as shown in Fig. 4, these bolts being withdrawn and standard bolts being substituted therefor with the parts secured as in Fig. 2 and Fig. 3.

This invention has a special utility where it is desired to erect a low building and later to add additional stories thereto. It may also be used where it is desired to erect a structure adapted to carry a definite load and later to modify the structure to carry a lighter or heavier load.

I claim as my invention:

1. In a structure adapted to be converted from a condition in which it is adapted to support a heavy load into a condition in which it can support only a light load, the combination of: permanent members; heavy angle-iron column members adapted to be bolted at the corners of the structure on the inner side of said permanent members; light angle-iron column members adapted to be bolted at the corners of the structure on the outer side of said permanent members and in nested relationship to said heavy angle-iron column members; bolts securing each of said heavy column members to the inside of said permanent members independently of said light column members; and other bolts securing each of said light column members to said permanent members independently of said heavy column members.

2. In a frame structure formed of conventional structural shapes, the combination of: a permanent structure; primary members comprising angle-iron columns secured to the inner sides of the corners of said permanent struc-

ture; secondary members comprising angle-iron columns secured to the outer sides of the corners of said permanent structure in nested relationship to said primary members; and primary and secondary bolts securing said primary and secondary members independently to said permanent structure to enable removing or replacing of the inner column members or the outer column members without disturbing each other or said permanent structure.

3. In a frame structure formed of conventional structural shapes, the combination of: a permanent structure; dual angle-iron column members in nested relationship; and means independently securing said dual column members to said permanent structure so that either one of said dual column members can be removed or replaced without disturbing said permanent structure.

4. In a structure, the combination of: two plates placed in angular relationship with each other with their edges adjoining; a heavy angle member so placed that the sides of its legs abut on one side of each plate; a light angle member so placed that the sides of its legs abut on the other side of each plate; bolts fastening the heavy angle member to the plates; and bolts fastening the light angle member to the plates, the heavy angle member having holes therein large enough to permit the heads of certain of the bolts, securing the light angle member to the plates, to pass therethrough without gripping the heavy angle member.

5. In a structure, the combination of: two plates placed with their edges adjoining; a first connecting member so placed that it abuts on one side of each of said plates; a second connecting member so placed that it abuts on the other side of each of said plates; and fastening means securing said connecting members to said plates, holes being provided in one of said connecting members of sufficient size to permit the heads of at least some of the fastening means for the other connecting member to pass through said holes without engaging the member in which said holes are situated.

6. Corner reinforcing means for a structure comprising: a first connecting means adapted to be placed outside of and in contact with members forming part of the corner of the structure; a second connecting means adapted to be placed inside of and in contact with said members forming the corner of the structure; and bolts passing through holes in said connecting means and said members, some of the holes in one of said connecting means being sufficiently large to allow the heads of said bolts to pass therethrough so that the bolts used in said particular holes do not engage the means having said particular holes.

7. Corner reinforcing means for the corner of a structure, comprising: a connecting means adapted to be placed in contact with members forming a part of said structure; bolts passing through holes in said means and said members, some of the holes in said means through which said bolts pass being sufficiently large to allow the heads of said bolts to pass therethrough without engaging said means; and washers engaged by the heads of the bolts passing through said enlarged holes and engaging the surface of said means.

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