July 5, 1949. M. MANNIST 2,475,103

STRUCTURAL MEMBER

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Fig. 1.

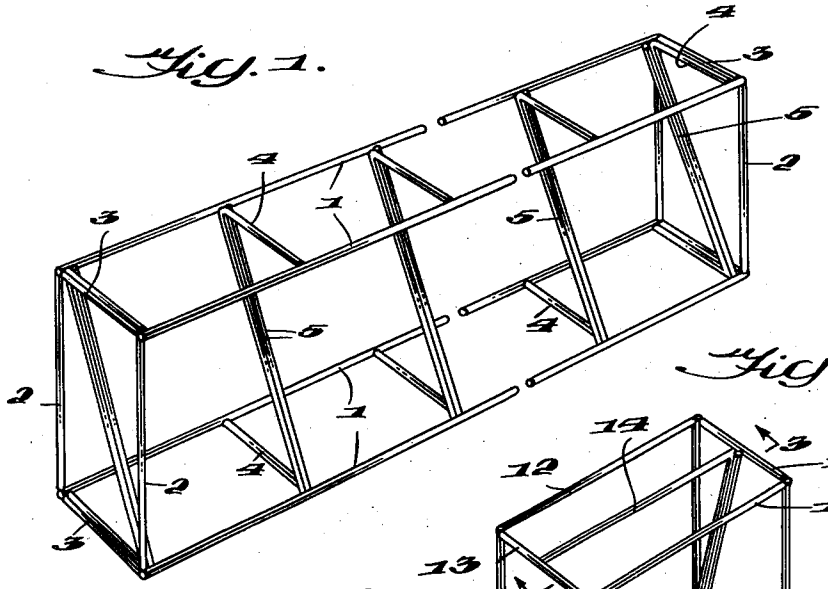


Fig. 2.

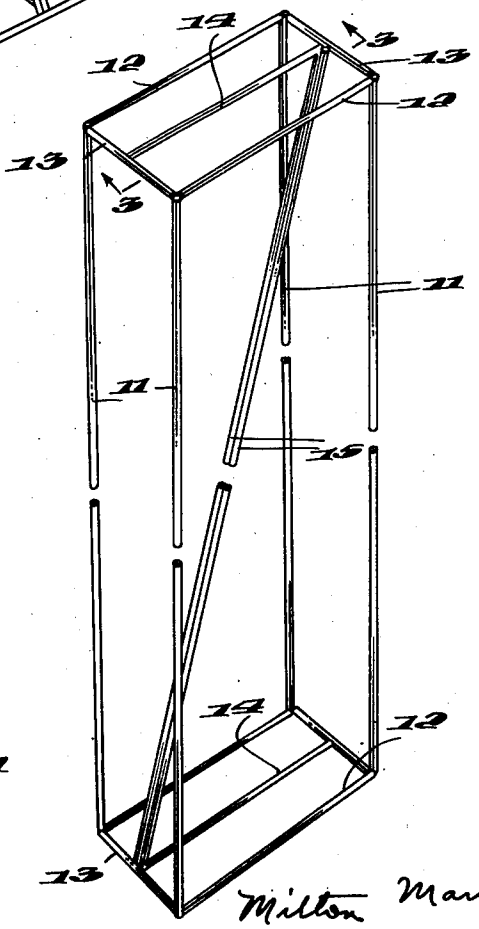
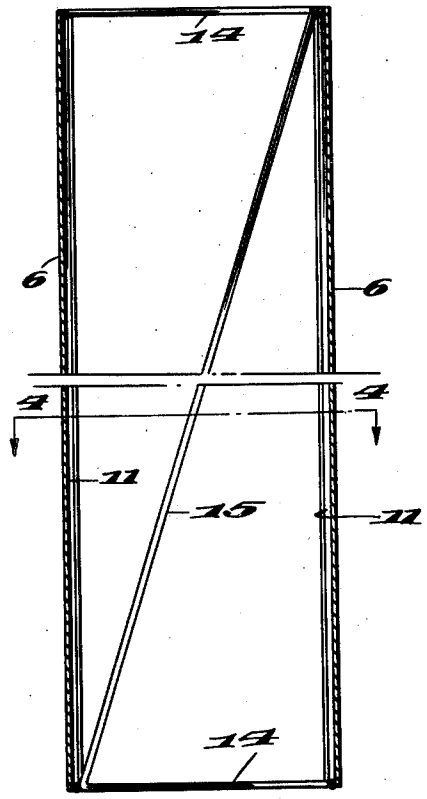


Fig. 3.



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Fig. 4.

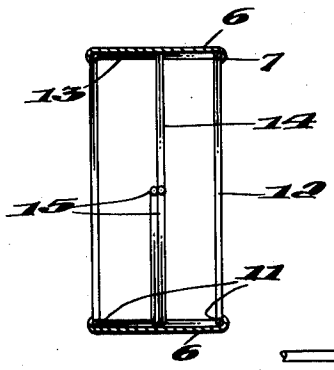


Fig. 6.

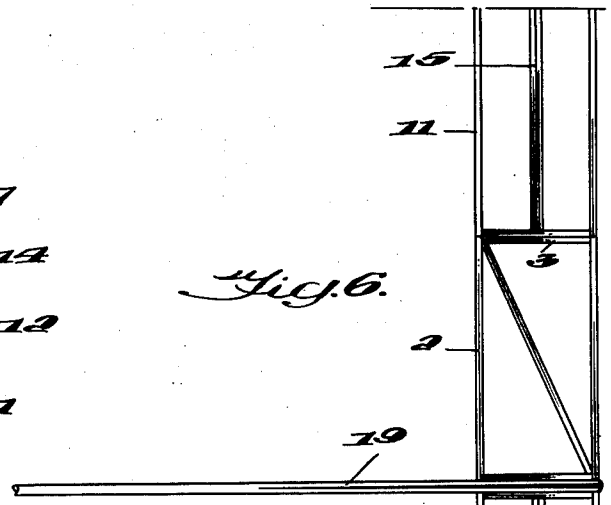


Fig. 7.

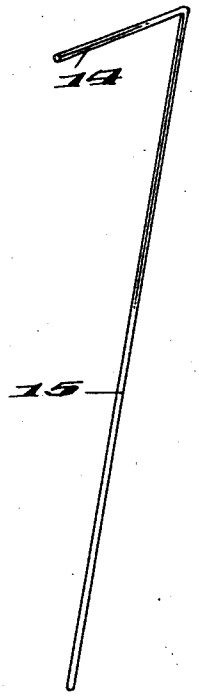
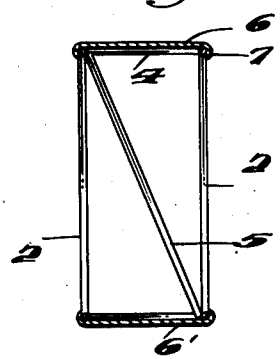


Fig. 5.



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2,475,103

UNITED STATES PATENT OFFICE

2,475,103

STRUCTURAL MEMBER

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7 Claims. (Cl. 189—34)

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This invention relates to improvements in structural members, particularly metal studs and joists used in building constructions.

The object of the invention is to improve the construction of such structural members, to enable them to be made of metal and formed of great strength and yet of light weight.

This object is accomplished preferably by the construction of the structural members in the form of a skeleton frame-work which is securely braced either vertically or transversely according to the use of the member as a stud or joist, by one or more T-members, which have a diagonal shank that extends across the skeleton frame-work and to which the T-member is rigidly secured. The skeleton frame-work may be formed of rods or bars welded together, but the strength thereof will be greatly increased, even though it is of light weight, by a suitable number of T-members arranged substantially across the intermediate portions of the structural member and with the shanks extending diagonally thereof and welded thereto.

The braces that extend lengthwise or transversely of the structural member are formed preferably of a pair of T-members having the shanks thereof in side-by-side relation and welded together, so as to form substantially a Z. These braces may be formed of wire and yet will add great strength to the structural member, providing sufficient rigidity therein, even though it is formed of light-weight skeleton frame-work.

I have shown different embodiments of the invention in the accompanying drawings in which:

Fig. 1 is a perspective view of the invention applied to a joist;

Fig. 2 is a similar view showing the application of this invention to a stud;

Fig. 3 is a vertical sectional view therethrough on the line 3—3 of Fig. 2, but showing the application of a nailing base to the stud;

Fig. 4 is a cross section therethrough on the line 4—4 of Fig. 3;

Fig. 5 is a similar view through the joist of Fig. 1;

Fig. 6 is a side elevation of an assembly of studs and joists in a building construction; and

Fig. 7 is a perspective view of a reinforcing T-member detached.

While the invention is adapted to be applied to various forms of structural members, it is shown in the drawings in the manner used in the construction of studs and joists, for purpose of illustration. While the construction of such building elements is often the same for the different manners of use thereof, I prefer to form these somewhat differently because they are subjected to different kinds of strains lengthwise and transversely, according to whether a member is to be used as a stud or a joist, the strain being applied longitudinally in one instance and transversely in the other.

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Referring to the joist illustrated in Fig. 1, the skeleton frame-work thereof is formed by corner members 1, connected together at the opposite ends by end frame members 2 and 3. These members 1–3 may be formed of ordinary reinforcing rods or bars, welded or brazed together into a skeleton frame-work. Because of the strength added to the structural member according to this invention, only relatively light rods are required for this frame-work, such as three-eighths inch or one-half inch size, and yet the structure will be sufficiently sturdy and rigid for ordinary purposes.

This skeleton frame-work 1–3 is braced transversely and edgewise by a plurality of Z-braces placed at intervals along the length thereof, each Z-brace joining the corner rods 1 and rigidly secured thereto by welding or brazing. Each Z-brace is formed preferably by a pair of T-members, each having a head portion 4 and a shank portion 5. The shank portion 5 extends at an acute angle to the head portion 4 of the T-member substantially in the shape of the numeral T when this member is arranged substantially in an upright position with the head portion at the top. The T-members may be formed of wire or reinforcing rods or the like, bent to the required shape and size. The shanks 5 of the pair of T-members extend in side-by-side abutting relation and preferably are welded together throughout the length of the abutting portion thereof, although it will be sufficient for them to be tack-welded at intervals therealong for many different applications. The head portions 4 are then welded at opposite ends to the corner rods 1.

This provides a brace extending edgewise and transversely of each structural member, there being a head portion 4 extending between the pair of corner rods 1 at each edge of said members, while the reinforcing shank portions 5 provide double thickness of reinforcement diagonally and edgewise between the corner members 1 at diagonally opposite points of the structural member. I have found that this adds very great strength to the joist without, however, requiring so much material as to make the construction heavy in weight, whereby the complete structural

member is of very light weight in proportion to its strength.

These Z-braces are spaced at suitable intervals along the length of the structural member, depending upon the strength required. It will be sufficient for most building operations that they be spaced approximately four inches apart, substantially as indicated in Fig. 1, although this may be varied according to requirements and according to the size of the wire or rods used in the structural member.

Referring to Fig. 2, in applying this invention to a stud, the skeleton frame-work thereof is formed substantially as described above, of corner rods 11 extending lengthwise of the stud and connected together by members 12 and 13 at each end of the stud, the connecting members 12 and 13 being formed in a rectangular frame and welded or brazed together and to the adjacent ends of the corner rods 11.

In this instance, the greater strength required is lengthwise of the stud, and accordingly the Z-brace is arranged lengthwise, one only of which will be required in most instances, as shown in Fig. 2. This brace is formed of a pair of T-members, each of which has a head portion 14 extending edgewise of the stud between the frame members 3 at the ends thereof and having shank portions 15 extending lengthwise diagonally of the stud between the diagonally opposite end frame members 13 at opposite ends of the stud. As described above, these T-members are welded together and to the skeleton frame-work substantially in a rigid relationship, materially strengthening the structural member without adding appreciably to the weight thereof, and keeping the weight at a minimum. One form of the T-member is shown in Fig. 7, detached.

When it is desired to nail building materials to the structural members, provision may be made for this very readily by the application of sheet metal to the edges or sides of these members as desired, as indicated in Figs. 3 to 5, by the numerals 6 and 6', respectively. Relatively thin sheet metal of suitable character to receive nails or other fastenings, may be secured over an edge or side of the structural member and bent around the corner rods 1 or 11 thereof, as indicated at 7 and 7' in Figs. 4 and 5, which will securely hold this nailing base in place. Such sheet metal will serve also to add stiffness and rigidity to the structural member when applied over opposite sides thereof.

When using such structural members in the construction of a house or building, as shown in Fig. 6, these are arranged in superposed relation, with the studs upstanding with respect to the joists. Suitable tie sections or reinforcing connections may be provided at the respective floor and ceiling levels as indicated at 18 and 19 in Fig. 6, to hold the structural members in proper relation to each other and to reinforce the building, as will be evident to a building contractor in using these structural members in place of the ordinary wooden or other structural members used heretofore.

I have found that a structural member of this character, even though made of light weight, will have sufficent strength so that it may be spaced at greater distances apart than studs are normally located, which is a material saving both in construction and in the cost of building material over what has been customarily required heretofore. For instance, studs may be spaced apart on forty-eight inch centers instead of the usual sixteen inch centers that have been customary. This is especially important in producing low cost houses either by pre-fabrication in mass production or by individual construction, inasmuch as it reduces the cost of both material and labor and yet without weakening the structure.

I claim:

1. A brace for a structural member comprising a pair of approximately T-shaped members each constructed of an elongated bar bent to form a head and a shank portion, the shank portions of the T-shaped members extending in side-by-side relation diagonally of the pair of T-shaped members and rigidly connected together, and the head portions extending laterally in opposite directions from the respective opposite ends of the shank portions.

2. A brace for a structural member comprising a pair of approximately T-shaped members, each formed of a wire rod bent substantially to T-shape with head and shank portions extending at an acute angle to each other, the shank portions being arranged in side-by-side abutting relation and welded together, and the head portions extending in opposite directions from the opposite ends of the shank portions.

3. A structural member comprising a skeleton frame-work, and a brace therefor, said brace comprising a pair of approximately T-shaped members, each formed with head and shank portions, the shank portions extending in side-by-side relation and rigidly secured together and extending approximately diagonally of the skeleton frame-work, and the head portions of the respective members extending in opposite directions from said shank portions and being rigidly secured to the skeleton frame-work.

4. A structural member comprising a skeleton frame-work, and a brace therefor, said brace comprising a pair of approximately T-shaped members, each formed with head and shank portions of wire rod, the shank portions of the respective T-members being arranged in side-by-side relation and welded together and extending diagonally of the structural member and secured to diagonally opposite portions of the skeleton frame-work, and the head portions of the respective T-members extending in opposite directions from opposite ends of the shank portions at acute angles thereto and secured to the opposite end portions of the skeleton frame-work.

5. A structural member comprising a skeleton frame-work, and a brace therefor, said brace comprising a pair of approximately T-shaped members, each formed with head and shank portions, the shank portions of the T-members extending lengthwise of the structural member diagonally thereof and arranged in side-by-side relation rigidly secured together, and the head portions of the respective T-members extending transversely at opposite ends of said structural member and rigidly secured to the skeleton frame-work.

6. A structural member comprising a skeleton frame-work, and a brace therefor, said brace comprising a pair of approximately T-shaped members, each formed with head and shank portions, the shank portions of the respective T-members extending transversely of the length of the structural member approximately diagonally thereof and arranged in side-by-side relation and rigidly secured together, and the head portions of the respective T-members extending transversely at opposite sides of said structural mem-

bers and rigidly secured to the skeleton frame-work.

7. A structural member comprising a skeleton frame-work, and a brace therefor, said brace comprising a pair of approximately T-shaped members, each formed with head and shank portions of wire rod, the shank portions of the respective T-members being arranged in side-by-side relation and welded together and extending diagonally of the structural member and secured to diagonally opposite portions of the skeleton frame-work, the head portions of the respective T-members extending in opposite directions from opposite ends of the shank portions at acute angles thereto and secured to the opposite end portions of the skeleton frame-work, and sheet-metal facing extending over opposite

sides of said skeleton frame-work and secured thereto forming a nailing base for the structural member.

MILTON MANNIST.

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