

Sept. 15, 1936.

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2,054,477

METAL STUD AND THE LIKE FOR BUILDINGS

Filed Nov. 20, 1934

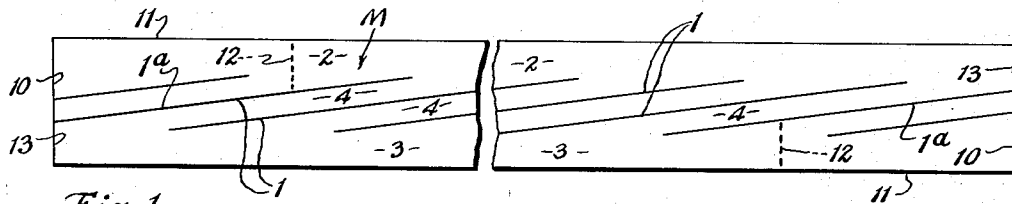


Fig. 1

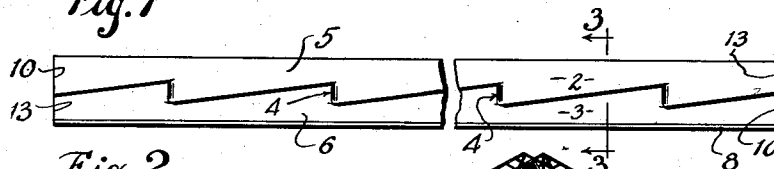


Fig. 2

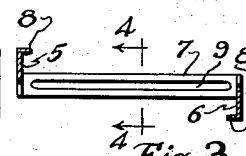


Fig. 3

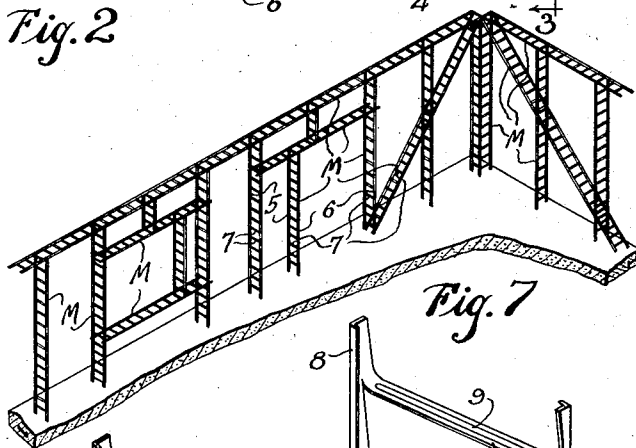


Fig. 7

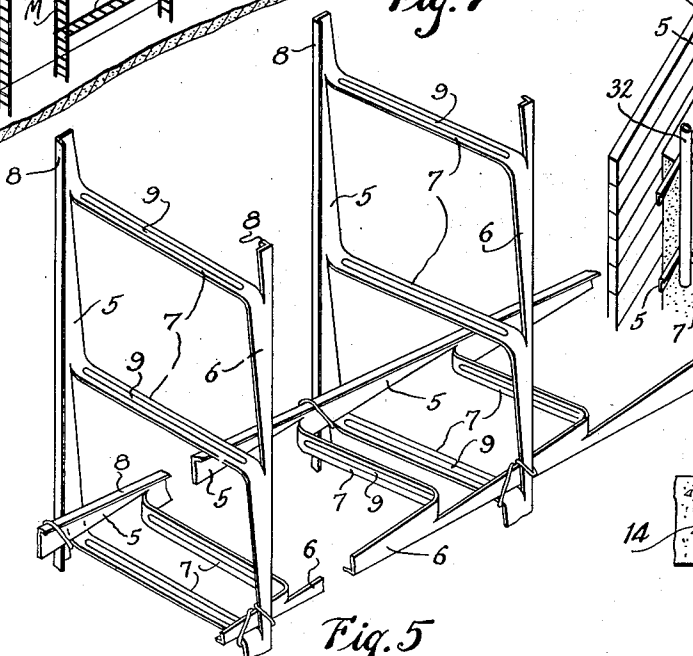


Fig. 5

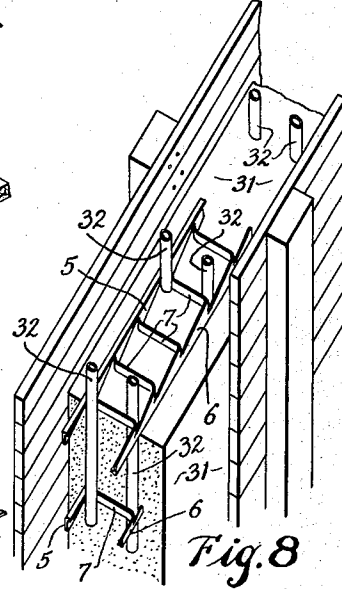


Fig. 8

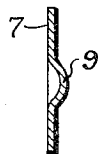


Fig. 4

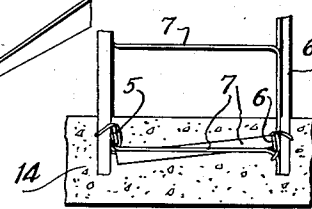


Fig. 6

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## UNITED STATES PATENT OFFICE

2,054,477

## METAL STUD AND THE LIKE FOR BUILDINGS

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Application November 20, 1934, Serial No. 753,907

5 Claims. (Cl. 72-115)

This invention relates in general to building construction and more particularly to an improved type of stud, brace, rafter or other member adapted to be used for forming the frame of a structure, and the principal object of my invention is to provide a simple, economical and integral member of light weight, so designed as to reduce the waste in materials to a minimum and yet provide a maximum of strength and durability.

Heretofore structural members of the character and for the purpose mentioned have been stamped out of sheet metal and formed so as to provide rigidity and light weight but the latter characteristic has occasioned the perforation of the members to such an extent that the waste metal is substantial and the cost of the product far too high for general use.

An object, therefore, of my invention is to provide a structural member which will possess all of the advantages of the more costly product and yet so economize in the use of materials as to render the product sufficiently cheap for general use. To this end I prefer to form the members of channelled or sheet material of uniform width by slitting strips of metal at uniformly spaced points diagonally of the strips and thereafter expanding the slitted strips to an extent corresponding to the desired width of the structural members.

Thus, the members when expanded will be formed with a pair of parallel side rails and a plurality of parallel transverse bars cross connecting the rails at uniform distances throughout the length of the members. Preferably, the cross bars are disposed at right angles to the side rails so as to afford maximum rigidity and strength, and the rails and bars may be of such cross section as will best contribute to the rigidity and strength of the members.

The current trend of building construction being toward fire-proof and earthquake structures, structural members embodying my invention will find ready adoption in large and small buildings alike, for forming practically all of the members of building frames, such as studs, sills, headers, rafters, braces and the like.

Other objects may appear as the description progresses.

In the accompanying drawing I have shown a preferred form of invention, subject, however, to modification, abbreviation and addition, within the scope of the appended claims, without departing from the spirit thereof. In said drawing:

Fig. 1 is a plan view of a strip of sheet metal diagonally slitted preparatory to the expansion thereof for providing the completed structural member;

Fig. 2 is a side elevation of the expanded structural member embodying my invention;

Fig. 3 is a transverse section of the same on line 3-3 of Fig. 2;

Fig. 4 is a cross sectional view, on line 4-4 of Fig. 3, of one of the transverse bars of the structural member;

Fig. 5 is an enlarged perspective view of a portion of a building frame embodying several of the structural members assembled in a suitable manner;

Fig. 6 is a fragmental transverse section of a portion of a building foundation and frame, showing a suitable method of anchoring the building frame in a cementitious foundation;

Fig. 7 is a perspective view of a portion of a building frame showing the structural members arranged as different elements of the frame.

Fig. 8 is a perspective view of a reinforced wall structure embodying my improved structural members.

Preferably, structural members embodying my invention are formed of elongated strips of sheet metal M, as shown in Fig. 1, of uniform width throughout their length, the strips of metal being moved through a power press carrying dies by means of which diagonal slits 1, 1, etc. are provided. The slits 1 are uniformly spaced apart and their extremities are longitudinally aligned on the strips M substantially inwardly of the edges of the strip, thereby providing marginal portions 2 and 3 inwardly of the edges and outwardly of the slits and diagonal portions 4, 4, etc. between the slits 1, 1, etc.

When initially formed as shown in Fig. 1, the slitted strips of material M are expanded to a desired width, into the form shown in Fig. 5, thereby converting the marginal portions 2 and 3, respectively into side rails 5 and 6 and the diagonal portions 4 into transverse bars 7. If desired, in order to provide additional strength the rails 5 and 6 may be formed with inwardly or outwardly bent flanges 8 at their edges, as shown in Fig. 5, or said flanges may be omitted.

The transverse bars 7 may be flat or ribbed as indicated at 9 in Figs. 4 and 5. In the expansion operation whereby the metal strips M are transformed into the completed structural members the metal is stretched laterally and also to a certain extent longitudinally so as to form the right angular bars 7 from the diagonal portions 4. Thus,

assuming that the portion 3 is expanded relative to the portion 2, as shown in Fig. 1, the portion 3 will move upwardly from and slightly to the right relative to portion 2 so that the diagonal portions 4 will be disposed at right angles to the portions 2 and 3. When so formed, end portions defined by slits 1<sup>a</sup> and marginal lines 10, 11 and broken lines 12 at each end of the strip of material will project outwardly of the ends 13, 13 and are cut away on the lines 12, 12, so that the edges 12 and 13 will lie in the same transverse planes. Obviously, the only waste of metal is that cut away, as described, and the amount is inconsequential as compared to the total metal in the strip from which the completed member is formed.

As shown in Figs. 2 and 3, the side rails 5 and 6 are disposed in offset transverse planes and extend in opposite directions from their junctions with the bars 7. The expanded members have substantially less metal and are correspondingly lighter than other types of members which are perforated to provide apertures through which electrical conduits and other elements of building frames are extended. The form of member herein shown provides a maximum opening between each pair of cross bars 7 and their horizontal disposition readily permits of the extension of braces, headers, sills and other members through the openings and said members are supported on the cross bars, as shown in Fig. 7.

The structural members of the design described are also adapted for other uses, as for instance in the construction of walls, buttresses, etc., as shown in Fig. 8, in which the structural members are laid horizontally in a cementitious structure 31 at different elevations with vertical pipes 32 threaded through the openings of the members as the concrete is poured, thereby providing a strong reinforcement for the structure. Other uses will be apparent to those skilled in the art of building structures.

The type of structural member shown lends itself readily to large and small buildings alike and the members of a frame may be lashed, riveted, bolted or welded at the joints, and the lower ends of the studs anchored in a cementitious foundation 14 as shown in Fig. 6. In such case, a wall may be framed by erecting a plurality of metal studs at suitably spaced points on the foundation in which a suitable channel has been previously formed, then laying a horizontal member upon the lowermost bars 7 of the studs and lashing or otherwise securing the members together at their junctions. Thereafter, cement is poured into the channel of the foundation around the vertical and horizontal members and the bottom of the frame thus formed is imbedded in the foundation.

The type of structural member shown and described herein is also particularly adapted for

other uses such as for reinforcing portions of buildings, and when and wherever used is comparable in cost to wooden framing members and is of substantially less weight than wooden members. A structure formed of such a type of members, especially when used in connection with metal lath is fire-proof and tends to resist distortion and buckling under strains occasioned by earthquakes, is capable of rapid assembly in the formation of a building frame, and buildings embodying the same are more durable than when otherwise formed.

What I claim, is:

1. A structural member formed of an integral sheet of metal of uniform thickness slitted diagonally between the margins thereof at uniformly spaced points and expanded laterally so as to provide a pair of parallel side rails offset one from the other and transverse bars integral with and cross connecting said rails, said rails having flanges formed thereon at their outer margins and extended in opposite directions.

2. A structural member formed of a flat strip of material of uniform width throughout its length and slitted at a plurality of uniformly spaced points and expanded so that the margins thereof will form side rails disposed in parallelism and the intermediate portions between said slits will form cross bars integral with said rails, said rails having flanges bent at right angles and extending in opposite directions.

3. A structural member formed of an integral sheet of metal and slitted diagonally at uniformly spaced points and expanded laterally so as to provide side rails disposed in transversely off-set planes, oppositely extended flanges being formed on said rails, and a plurality of transverse bars connecting said rails.

4. A structural member comprising: a pair of parallel side rails disposed in off-set transverse planes and having oppositely bent flanges and a plurality of uniformly spaced transverse bars cross connecting and integral with said rails.

5. A structure comprising: a cementitious foundation, a wall superposed thereon and formed of a plurality of sections, each formed of a single piece of metal and longitudinally cut and expanded laterally so as to provide a pair of parallel marginal rails and a plurality of uniformly spaced transverse bars connecting said rails, the lower ends of said sections being imbedded in said foundation, horizontally disposed similar sections supported on the lowermost bars of said first mentioned sections and also imbedded in said foundation, and other similar sections disposed at angles relative to and supported on the transverse bars of said first mentioned sections and secured thereto.

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