May 15, 1962 B. M. OLSEN 3,034,185

REINFORCING BRACE

Filed Jan. 7, 1957

FIG. 1

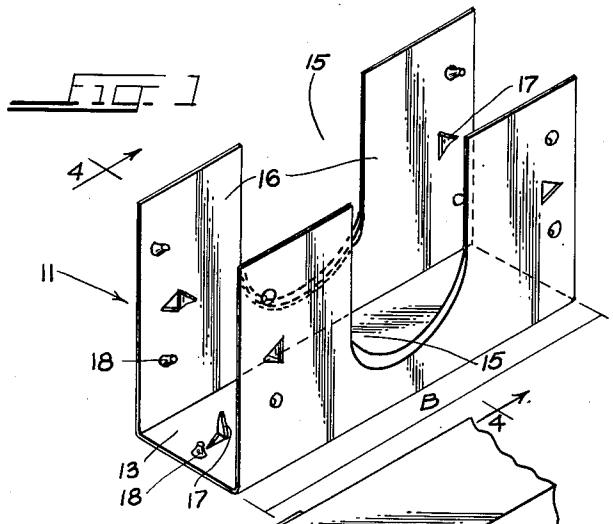


FIG. 4

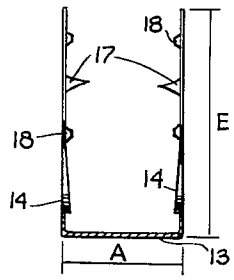


FIG. 2

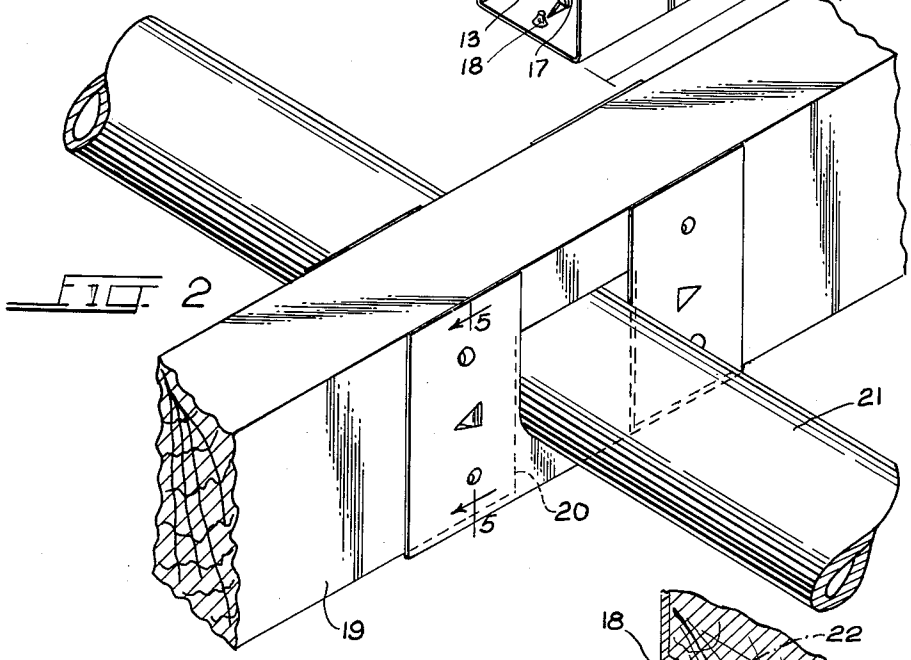


FIG. 5

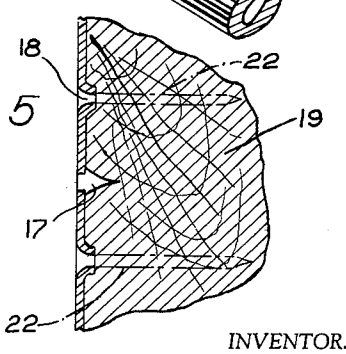
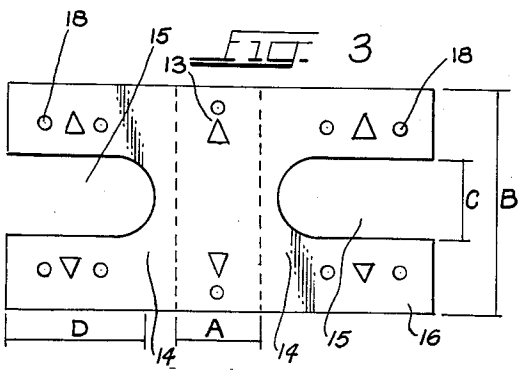


FIG. 3



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REINFORCING BRACE

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This invention relates to building construction; to means for reinforcing structural members where they are cut or notched to pass electrical, plumbing and heating conduits therethrough; and to a novel reinforcing brace adapted to fit nestingly over such cut-out areas in wooden stud, joist and rafter members to prevent failure in these areas of weakness.

In the building construction field it is common practice to provide cut-out sections in wall studs and floor and ceiling joists in order to accommodate electrical, plumbing and heating piping which must be passed therethrough. For example, plumbing and heating risers usually are placed in building corners or adjacent to columns and beams wherefrom their branches extend horizontally in the building outer wall or partition to the fixtures they are to join. In order that the branches may reach the fixtures, notches are cut in the wall studs, and the branches are passed therethrough. Sometimes, instead of notches, holes are drilled in the studs and short runs of piping are then passed through the drilled holes, the short runs being joined together by couplings to form the desired length of branch run to the fixture. While the drilled holes are not as injurious to the studs as are notches, still the resultant construction appreciably weakens the studs, is tedious and expensive to install, and requires a multiplicity of pipe fittings.

As another example, when running branches to second floor and above fixtures, such as bathroom tubs and sinks, it often is the practice to run the piping lines in the ceiling spaces by cutting notches in the ceiling joists and passing the lines through these notches. These ceiling joist notches, of course, appreciably weaken the entire ceiling structure, cause sagging and result in cracks in the ceiling plaster. Further, it is common practice today to provide baseboard heating units which are mounted flush in the wall structures, and thus require piping runs which must be passed through notched or drilled wall studs.

In providing these constructions, with either notches or drilled holes in the structural members, the individual members lose their strength and rigidity, while the overall wall, floor and ceiling structures in which the members lie become appreciably weakened. The result is floors and ceilings which sag, walls which sway and shake, cracking of plaster and interior finishes, and even an overall reduction in strength of the entire building. Moreover, the notches, more often than not, make plastering of the interior walls and ceilings quite difficult.

In contrast, the present invention provides means whereby studs and joists may accommodate piping which must be passed therethrough, while retaining the requisite strength in these structural members.

Accordingly, it is a principal object of this invention to provide for studs, joists and similar structural members having sections cut therefrom a novel reinforcing brace which when secured to these members provides the requisite strength.

Another object of this invention is to provide a brace which may be firmly secured to studs, joists and the like to bridge notches cut in such members for passing piping or conduit laterally therethrough, and thus provide reinforcing continuations to the cut surfaces in such members, and thereby eliminate the injurious effects of the notches.

Another object of this invention is to provide a reinforcing brace for studs, joists and the like having cut-out areas, the brace being adapted to fit nestingly over such members at such cut-out areas, and having struck out

teeth and punched out nail holes which facilitate firm but easy seating of the brace in the proper position.

A further object of this invention is to provide a one-piece brace adapted to reinforce notched wooden structural members, the brace being made from sheet metal which has sufficient reinforcing rigidity to give the necessary strength to the notched member while taking up little room.

A still further object of this invention is to provide a sheet metal reinforcing brace for notched wooden stud and joist members which is easy and economical to form, which may readily be installed, and which provides the necessary structural strength to such members without being obtrusive.

And a still further object of this invention is to provide a reinforcing brace which may be mass produced easily and economically for all standard size wooden structural members.

The foregoing objects, advantages and features of construction will become more apparent when considered together with the following description and the appended drawings.

In the drawings:

FIGURE 1 is a perspective view of the brace comprising the instant invention;

FIGURE 2 is a perspective view of the brace mounted on a wooden structural beam having a pipe passing therethrough;

FIGURE 3 is a view of the blank from which the brace shown in FIGURE 1 is formed;

FIGURE 4 is a view taken on line 4—4 in FIGURE 1; and

FIGURE 5 is a view taken on line 5—5 in FIGURE 2.

The brace comprising the present invention is intended to be used principally with wooden boards, studs, joists, rafters and the like. These members usually are standardized in size, and the size employed depends upon the particular purpose each member is to serve. For example, it is common to use 2 inch by 4 inch wooden studs for walls and 2 inch by 10 inch wooden joists for floors and ceilings.

As seen in the drawings, the brace 11 is formed from a blank 12 suitably cut from sheet metal, and comprises a central body portion 13, and two portions 14—14 bent (on the dotted lines shown in FIGURE 3) to extend substantially perpendicular from opposed edges of the body portion 13. Each portion 14 has a section 15 die cut therefrom, thereby forming legs 16—16. During the forming process of brace 11, a plurality of triangular shaped members 17 also are die cut and pressed inwardly of the brace body to form teeth in central body portion 13 and legs 16. These teeth bite into the wooden structural member whereon the brace is mounted to provide a secure attachment. As the teeth 17 are die cut, nail holes 18 also are punched out to facilitate easy mounting of the brace.

Dimensionally the width A of central portion 13 is such as to allow the brace to fit nestingly over the wooden structural member 19 which it is to reinforce, while its length B is sufficient to span the notch 20 cut therefrom to allow an electrical, heating or plumbing pipe 21 to pass therethrough. The brace cut-out section 15, of course, is of sufficient width C and depth D to accommodate the pipe 21, while the legs 16—16 straddling the notch 20 are of sufficient length E to provide rigidity to the entire structure.

In use, the structural members 19 are prepared where necessary with open end notches 20, after which the piping 21 is laid in the notches. To mount a brace 11, its paired portions 14—14 are sprung outwardly slightly from each other and slipped over the member 19 to which it is to be mounted in the area of the notch 20

and the piping 21 laid therein. Light hammering on the brace body drives the retaining teeth 17 into the structural member to achieve a secure attachment of brace 11 thereon. For added security of the mounting, nails 22 may be driven through holes 18 and into member 19. The final assembly is shown in FIGURE 2.

In practice a 2 inch by 4 inch stud often is notched to a depth of 3 inches, leaving only 1 inch of structural material to support a load which should be supported by the full 4 inches. While a 2 inch by 4 inch stud may safely support a compression load of over 21,000 pounds, tests have shown that a stud having a 3 inch notch is able to support less than one-quarter of the normal load. In shear, tests further have shown that the same size stud normally withstands a load of 4500 p.s.i., while when notched it is able to withstand at the most a load of only 700 p.s.i. In contrast, when using the herein described brace made from 20 gage sheet steel on the same size stud and notch, the stud and brace are able to withstand loads approximating the strength of unnotched members and twice the load of studs having holes drilled therein.

It will be seen that the invention provides many other advantages. Branch lines may be run horizontally from main risers and through notched members to the desired fixture, using long pieces of piping requiring few or no couplings. Thereafter the braces 11 are secured to the studs, and the individual studs and the entire wall or partition which they form are able to withstand loads for which they were designed.

Further, when used with floor and ceiling joists, the braces not only provide the necessary strength to the members, but further may serve as hangers for supporting piping in joists having notches in their bottom surfaces. Moreover, since the central portion 13 is mounted contiguous with the surface of the structural member, the brace offers surface over which plaster may be applied with ease.

While many types of sheet metals may be employed, 20 gage sheet steel has been found ideal for the herein brace. It further is preferred that drive nails, which thread themselves into the member into which they are driven, be employed; since a much smaller drive nail achieves the small secure attachment that only a larger ordinary nail can provide. With a smaller nail, of course, there is less chance of fracturing or injuring the wooden structural members.

While the structure defined forms a satisfactory brace construction, it is to be understood that other forms may be utilized and that the embodiment herein illustrated is for the purpose of exposition only and not intended to limit and define the invention, the scope of which is defined in the claims.

What is claimed is:

1. The combination with a wooden structural member of substantially rectangular cross-section and having in one side thereof a notch extending between opposed other sides of the same, of an integral metal brace for reinforcing said structural member in the area of said notch and comprising: a generally flat longitudinal section substantially the width of said member one side, having an uninterrupted area for arrangement at the location of said notch to overlie and bridge the same; paired generally flat plate sections extending substantially perpendicular to said longitudinal section, connected thereto along opposed longitudinal edges of the same for arrangement against said opposed other sides of said member, and having cut-out portions therein extending from edges remote from said longitudinal edges, toward the longitudinal edges, and alined with the ends of the notch in said member, the bottoms of said cut-out portions being spaced from the bottom of said notch, in alignment therewith, and thereby providing a passage for extension of pipe therethrough; the sections including means mounting the brace on said member including generally flat struck out teeth on said longitudinal section extending into said structural member at opposed sides of said cut-out portions and having surfaces generally perpendicular to said sections.

2. The combination of a wooden structural member, substantially rectangular in cross-section and having in one side thereof a notch extending between opposed other sides of the same; and a metal brace reinforcing said member in the area of said notch and including a generally flat longitudinal section substantially the width of said member one side, having an uninterrupted area for arrangement at the location of said notch to overlie and bridge the same; paired generally flat plate sections extending substantially perpendicular to said longitudinal section from along opposed longitudinal edges of the same for arrangement against said opposed other sides of said member, said plate sections having cut-out portions therein extending from edges remote from said longitudinal edges, toward the longitudinal edges, and alined with the ends of the notch in said member, the bottoms of said cut-out portions being spaced from the bottom of said notch and in alignment therewith thereby to provide a passage for passing of pipe therethrough; the sections including means mounting the brace to said member including generally flat struck out teeth on said longitudinal section extending into said structural member and having surfaces generally perpendicular to said sections.

3. The combination of a four sided wooden structural member having a cut-out portion extending therethrough to opposed sides of the same; and an integral metal brace including a generally flat central section overlying one of the sides of said member in the area of said cut-out portion in the same; paired generally flat side sections bent from the plane of said central section along opposed longitudinal edges thereof to a position substantially perpendicular to said plane for arrangement snugly against said opposed sides of said member, said side sections having removed therefrom cut-out portions alined with the ends of the cut-out portion in said member, marginal parts of the ends of the cut-out portion in said member being spaced from marginal parts of the cut-out portions in said side sections and in alignment therewith to provide openings to permit passage of pipe therethrough; said sections further including means securing said brace to said member.

4. The combination as described in claim 3 wherein said means includes on said central section and said side sections struck out teeth extending into said structural member and having surfaces generally perpendicular to said sections.

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