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STUD AND RAFTER

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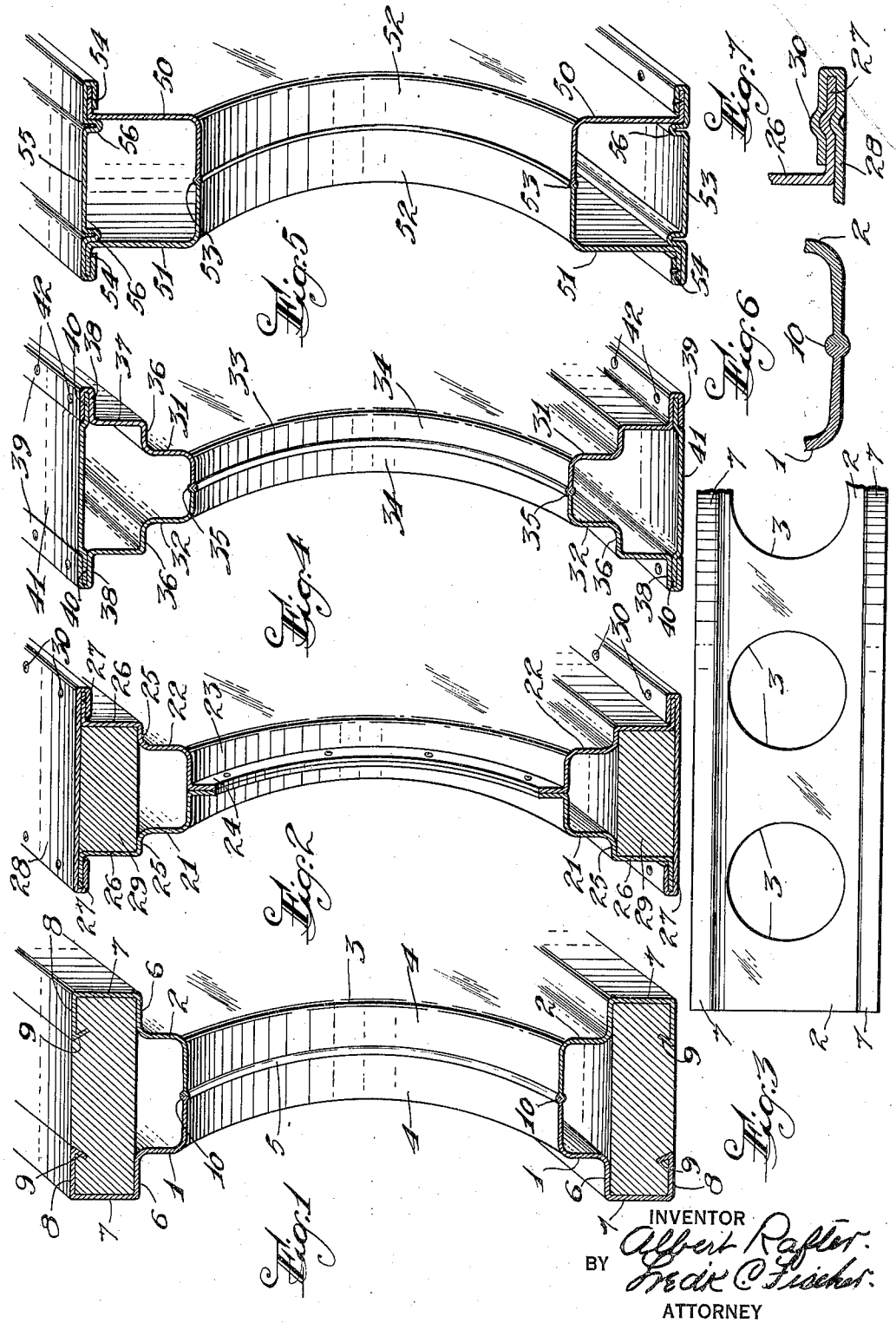


Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 5

Fig. 6

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5 Claims. (Cl. 189—37)

This invention relates to improvements in metallic beams, studs, rafters and the like for use in building construction.

Heretofore, metal beams used in building construction have been of the I-beam type and have been found objectionably heavy and expensive. Also, the usual metal I-beam has required reenforcement of the flanges by means of strips parallel with the web engaging the two flanges of the beam. This reenforcement is necessary due to the weakness of the flanges and the tendency of the beam to turn. That is, the I-beam does not satisfactorily resist torques.

It is, therefore, an object of this invention to provide a metal beam which is considerably lighter in weight than the metal beams heretofore used in building construction, and consequently less expensive and more satisfactory for use in constructing buildings.

A further object is the provision of a metal beam for building construction which can be formed from sheet metal by means of dies at a very rapid rate, and which has a construction enabling it to satisfactorily resist torques.

A further object is the provision of a metal beam which is provided with spaced apertures on the longitudinal center line thereof which obviates the necessity of cutting the beam for the installation of electrical wires or plumbing.

A further object of this invention is the provision of a metal beam for building construction which can be advantageously substituted for the usual wooden beams and rafters at present employed. The beams herein disclosed are adapted as supports for flooring, ceilings and roofs, and for all other purposes where wooden beams have heretofore been used.

These and other advantageous objects, which will later appear, are accomplished by the simple and practical construction and arrangement of parts hereinafter described and exhibited in the accompanying drawing, forming part hereof, and in which:

Fig. 1 is a sectional view of a metal beam embodying my invention,

Fig. 2 is a sectional view of a modified form of the invention,

Fig. 3 is an elevational view of a portion of a beam constructed in accordance with the form shown in Fig. 1,

Figs. 4 and 5 are sectional views of further modifications of the invention,

Fig. 6 is a sectional view showing in detail the formation of a bead when two parts of the metal beam are welded together, and

Fig. 7 is a sectional view showing the detail matter in which parts of the modification shown in Figs. 2, 4 and 5 are held together by embossing.

Referring to the drawing, in Fig. 1 a building stud or rafter is shown to comprise a pair of parallel metal plates 1 and 2, each of said plates being provided with a plurality of spaced apertures 3 along the longitudinal center line thereof. Surrounding each aperture is a cylindrical inwardly directed flange 4. The flanges on plate 1 engage the flanges on plate 2 along the line 5.

Plates 1 and 2 are bent outwardly at right angles thereto at 6, then upwardly at 7, then inwardly at 8 to provide a flange having a downturned portion 9.

In forming the cylindrical flanges 4 the metal is drawn as far as possible without destroying the edges of the flanges 4. Obviously, the metal along the line 5 will be considerably thinner than the metal in the main body of plates 1 and 2. However, the metal along the line 5 has been hardened and possesses considerable strength, so that when the flanges 4 of plates 1 and 2 are rigidly connected to each other by butt welding along the line 5, to provide a circumferential bead 10 (see Fig. 6), there is produced a structure of great rigidity and strength and capable of withstanding extremely large loads, whether distributed or concentrated. It has been found that a beam of this structure will withstand a concentrated load of 2800 pounds with no more than $\frac{3}{16}$'' deflection, while I-beams and other metal structures heretofore employed will withstand only about 1200 pounds before collapsing. The beam herein described is about one third of the weight of beams heretofore used and consequently is highly desirable for building construction in that it is easy to handle, less expensive due to the saving on metal, and due to its weight it minimizes the load in the building.

In practice, a strip of wood is inserted in the beam between the portions 6, 7 and 8, which enables nails to be driven into the beam for holding flooring or the like.

The spaced apertures along the longitudinal center line of the beam, when used in the construction of dwellings, enables the passage of electric conduits, pipes and plumbing devices without necessitating cutting of apertures in the beam as has heretofore been the case with other types of beams.

In Fig. 2 there is shown a modified form of the invention in which a pair of parallel plates 21 and 22 have a plurality of spaced apertures along the longitudinal center line thereof, a portion of

the plate surrounding the apertures being cupped at 23 and provided with inturned flanges 24, the flanges on plates 21 and 22 abutting each other and secured together by spot welding or the like. The plates have outturned portions 25 which are turned upwardly at 26, then outwardly at 27 to provide flanges which are covered by a plate 28, which is secured to the flanges by embossing at 30 and as shown in detail in Fig. 7.

A wood strip 29 is inserted between the plates and the cover 28. By means of the above structure an unusually strong beam is obtained having characteristics as outlined above.

The beams herein described require no strengthening as is the case with the usual I beam, and they are capable of effectively resisting torques.

In Fig. 4 is shown a modified form of the invention in which the metal beam or rafter is shown to comprise a pair of parallel metal plates 31 and 32 provided with a plurality of spaced apertures 33 along the longitudinal center line thereof, each aperture being surrounded by an inwardly directed flange 34, the flanges on plate 31 engaging the flanges on plate 32 and rigidly secured to each other by butt-welding to provide a bead 35 in the same manner as described above in connection with Fig. 1.

Plates 31 and 32 are bent outwardly at right angles thereto at 36 then upwardly at 37 then outwardly to provide a flange 38 which is doubled back upon itself thus producing a channel having an upper wall 39. The channel produced by flange 38 and the upper wall 39 receives the edges 40 of the plate 41, said edges of the plate being bent upwardly at the edges of the walls 39 so that the main body of the plate is flush with the wall 39. The plate is then secured to the walls 39 by spot welding at the points 42.

In Fig. 5 is shown a further modification in which a pair of plates 50 and 51 are provided with a plurality of spaced apertures along the longitudinal center line thereof, each aperture being surrounded by inwardly directed flanges 52 which abut each other and are firmly secured together by welding to provide a bead 53 in the same manner as described in connection with Fig. 1. The plates 51 and 50 are provided with outturned flanges 54 which are covered by a plate 55 the edges of which are bent around the flanges 54. The plate 55 is provided with downwardly extending crimps 56 which engage the inner walls of the plates 50 and 51, thus providing a very rigid structure.

The foregoing disclosure is to be regarded as descriptive and illustrative only, and not as restrictive or limitative of the invention, of which obviously embodiments may be constructed, including many modifications, without departing from the general scope herein indicated and denoted in the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In a metal structural member for building construction, a pair of spaced plates provided with a plurality of spaced apertures along the longitudinal center line thereof, inwardly directed flanges surrounding said apertures and integral with said plates, said flanges being tapered to a thin hard edge the edges of flanges on one plate engaging the edges of the flanges on the other plate, and secured to each other by a metal bead formed by welding said edges to each other.

2. The method of making a structural beam for building construction, comprising forming a plurality of spaced apertures in a pair of plates, drawing the metal surrounding said apertures to provide flanges tapering to a thin hard edge surrounding said apertures, placing said plates so that the edges of the flanges on one plate will abut the edges of the flanges on the other plate, then securing said flanges together by welding the edges to provide well defined metal beads at the junctions of the flanges.

3. The method of making a structural member for building construction, comprising forming in a pair of plates a plurality of spaced apertures surrounded by cylindrical flanges tapering to a thin hard edge, engaging the edges of the flanges of one plate with the flanges of the other, and rigidly securing said flanges to each other by welding to produce pronounced beads of metal at the junctions of said flanges.

4. In a metal structural member for building construction, a pair of spaced plates provided with a plurality of spaced apertures along the longitudinal center line thereof, inwardly directed flanges surrounding said apertures and integral with said plates, each of said flanges being tapered to a relatively thin edge, the edges of the flanges on one plate engaging the edges of the flanges on the other plate, and secured to each other by a metal bead formed by welding said edges to each other.

5. The method of making a structural beam for building construction, comprising forming a plurality of spaced apertures in a pair of plates, drawing the metal surrounding said apertures to provide flanges tapering to relatively thin edges surrounding said apertures, placing said plates so that the edges of the flanges on one plate will abut the edges of the flanges on the other plate, then securing said flanges together by welding the edges to provide well defined metal beads at the junctions of the flanges.

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