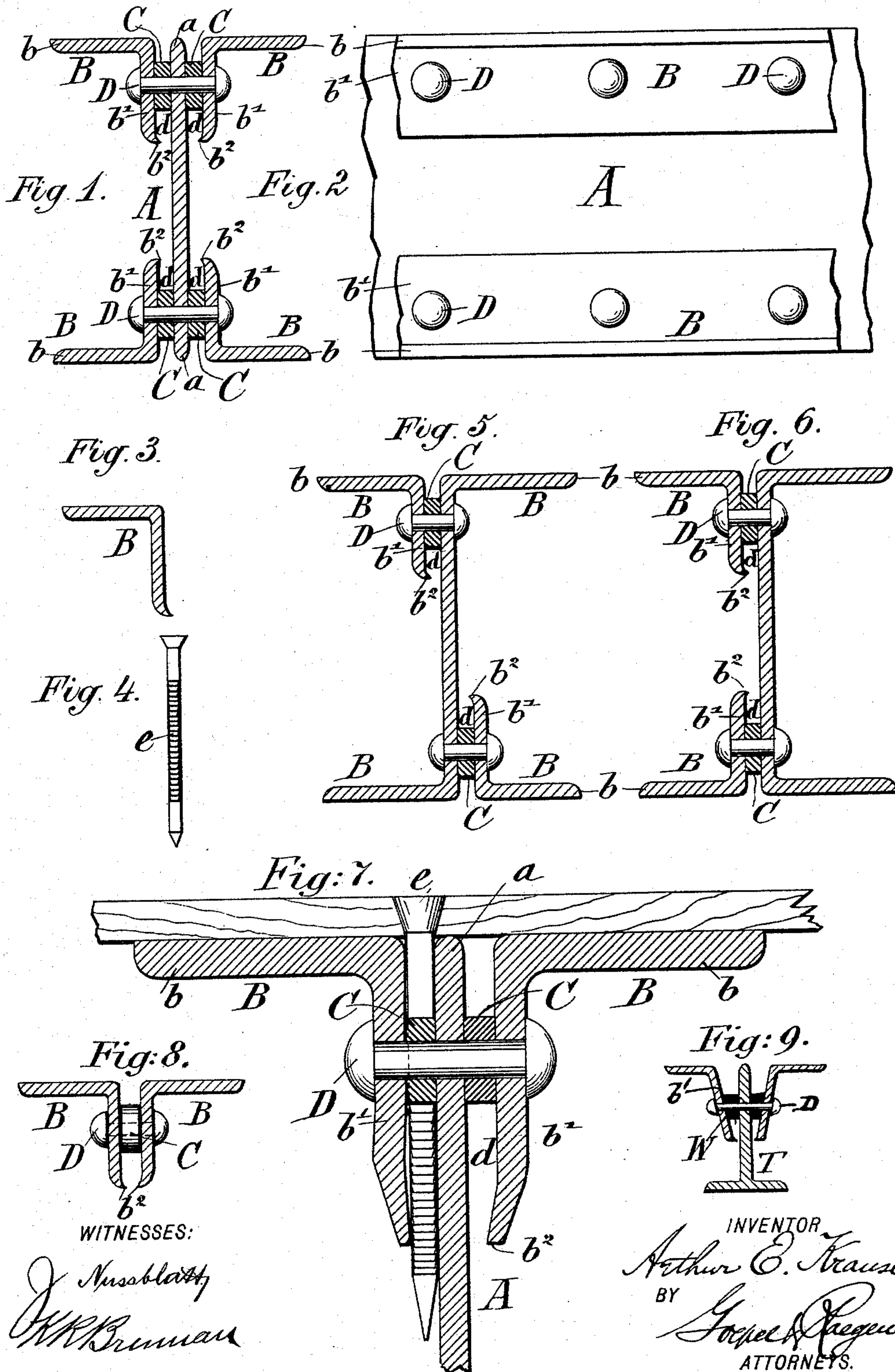


(No Model.)

A. E. KRAUSE.  
METALLIC BEAM, GIRDER, POST, &c.

No. 522,736.

Patented July 10, 1894.





# UNITED STATES PATENT OFFICE.

ARTHUR E. KRAUSE, OF JERSEY CITY, NEW JERSEY.

## METALLIC BEAM, GIRDER, POST, &c.

SPECIFICATION forming part of Letters Patent No. 522,736, dated July 10, 1894.

Application filed March 26, 1894. Serial No. 505,084. (No model.)

*To all whom it may concern:*

Be it known that I, ARTHUR E. KRAUSE, a citizen of the United States, residing in Jersey City, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Metallic Beams, Girders, or Posts, of which the following is a specification.

My invention relates to metallic beams, girders, posts and the like, and its object is to provide a construction thereof which will readily permit the connection or attachment of various building materials to the same, by means of nails, spikes or hooks and also to provide spaces or openings for the ready insertion of tie pieces and other structural members and connections. By my invention a construction is provided which is a superior fire-proof substitute for the ordinary wooden studding or timber-work, and by which an entirely fire-proof metallic frame-work is produced. Where constructions with a somewhat similar object in view have been devised, they were limited to sheet-metal only, having a comparatively thin cross-section, by reason of which the elasticity of the material could be utilized in a very limited manner. The general application of such constructions, however, is therefore confined to lighter work and not applicable to building purposes generally.

My invention consists of a beam, girder, post or the like, and comprises in its primary form or shape two angle-irons having the faces of their contiguous flanges so fastened and fixed with respect to one another that there is a separating space formed between the faces of the said flanges, by means of washers or other suitable means, and so that two of the contiguous edges of said flanges either by special shaping or by giving them the desired inclination, are adapted to firmly engage nails, spikes or other suitable fastenings driven sufficiently far into the said space so as to cause the partial springing apart of the flanges with a force proportional to the strength or elasticity of the metal used, the edges of the contiguous flanges engaging serrations in the nails or spikes.

My invention further consists of a beam, girder, post or the like which comprises a central web or metallic plate to which angle-

pieces or irons are fastened or riveted, one flange of each angle-iron being separated from the said central web by a narrow space of diminishing width, said angle-iron being so shaped as to have the edge of its riveted flange bent and inclined toward the said central web, thereby forming a lip or projection which firmly engages any nail or spike driven sufficiently far into said space. And my invention further consists of certain other specific features, constructions and combinations to be hereinafter described and then particularly pointed out in the claims.

In the accompanying drawings: Figure 1 represents a cross-section of my improved beam, girder or post. Fig. 2 represents a side view of a broken portion thereof. Fig. 3 represents a cross-section of my improved or special angle-iron, which is one of the essential features of my invention. Fig. 4 represents an elevation of the preferred form of nail or spike used in making attachments or fastening other structural elements to the beam, girder or post. Fig. 5 represents a cross-section of a modification, showing the improved angle-iron as applied to Z-bars or irons. Fig. 6 represents a cross-section of another modification, showing the improved angle-iron as applied to the ordinary channel-iron. Fig. 7 is an enlarged transverse view of a modification, showing a slightly different form of angle-iron, one flange being drawn thinner to give more spring to the same in case it is desired to have the other flange of heavier section. Fig. 8 shows an adaptation of my specially shaped angle-irons without the interposition of a central piece or web, when required for lighter beams or posts. Fig. 9 shows a beam similar to Fig. 1 but with ordinary angle-irons in combination with special washers for making the contracted space.

Similar letters of reference refer to similar parts in the drawings.

Referring to the drawings, letter A indicates in Figs. 1, 2 and 7 a flat metallic plate or member forming the central web of the beam, girder or post to be constructed.

B, B, indicate my specially formed angle-irons which are riveted to each side of the plate or web A, the foot *b* of each angle-iron being arranged approximately at right-angles to the web, and the flange *b'* extending to-



ward the longitudinal center-line of the web. The free edge of the flange  $b'$  of each angle-iron is preferably bent or inclined inwardly toward the central web so as to provide a lip or toe  $b^2$  which is formed with an approximately-sharp or acute edge. In this manner the inner faces of the riveted flanges  $b'$  are caused to converge so that the space between them is contracted at the edges of the riveted flanges. The edges  $a$  of the web A are preferably rounded-off, and when the angle-irons are secured to the web, the foot-portions of the opposite angle-irons will lie in about the same plane and on each side of said rounded edges. Between the angle-irons and the central web suitable spacing washers C are placed and through the whole the rivets or fastenings D are passed and headed on the outer faces of the flanges  $b'$  of said angle-irons, whereby the parts are rigidly and firmly connected together.

The washer C separates the riveted flanges of the angle-irons from the web so that a space or opening  $d$  which diminishes in width is formed, the same being adapted for the reception of the nails or spikes to be driven in when spiking other material thereto, as also for the insertion and connection of other structural parts which may be necessary in the construction of fire-proof buildings; such parts being then preferably fastened by rivets or bolts as may be desired. As the inner surface of the riveted flange of each angle-iron converges toward the central web the width of the open space at one edge of that surface is made less than the thickness of the washers C to the end that the spring or elasticity of the metal from the center of the rivet to the end of the toe or edge of the angle-iron can be utilized to firmly hold the spikes or nails in place when driven through the space.

In Figs. 1 and 2 an unflanged web or central plate is employed, four angle-irons B being riveted thereto, two being located at each side.

In Figs. 5 and 6, Z-irons and channel-irons or beams are respectively shown, only two of the improved angle-irons being employed, the flanges of the Z or channel-irons being used for strength only.

A slight modification is shown in Fig. 7 in which the edge of the riveted flange of the angle-iron B converges toward the web as before, but it is also tapered in order to obtain sufficient spring in case heavier angle-irons are used. This construction is especially designed for heavy beams, girders or posts.

In Fig. 8 the central web is omitted, two specially formed angle-irons B, B, being shown as united together, the converging edges of which are adapted to grip and hold the nails or spikes as in the other forms. Ordinary washers are used in this case. The means I preferably use in my beams, girders and posts for separating the converging faces of the angle-irons from one another so as to form the

intervening space, are ordinary metal washers such as are used for bolts and as shown in connection with the above-described forms. I also use specially shaped washers W, see Fig. 9, the same being thicker on one side than on the other in order to form a space, a portion of which is diminished in width, as in the other forms shown. In this case the riveted flanges of the angle-irons B, B, are inclined at obtuse-angles to the other flanges so that when they are properly connected to the T-shaped member T and separated by such washers as W, the inner faces of the riveted flanges converge toward a common point and the edges of the same will be located nearer together at said common point than at any other parts thereof.

When fastening planks or other structural parts to my improved beam, girder or post by means of nails or spikes  $e$ , they are preferably formed as shown in Fig. 4 with teeth, serrations or suitable burrs, and the nails or spikes should be approximately of equal diameter to the thickness of the washers. The said nails or spikes are driven into the space  $d$  between the web member and the springy or yielding leg of the angle-iron, thus wedging and springing outwardly the lip or toe  $b^2$  of the latter, the spring or elastic force of which holds the nail or spike against the web member with a force proportional to the thickness or strength of the metal from the rivet above to the lower and converging edge of the angle-iron. The edge of the lip will enter the serrations of the nails or spikes thus giving a positive grip or clinch. The nails or spikes are consequently prevented from being readily withdrawn.

I do not limit myself to any special dimensions or thickness of metal in the construction of my improved beams, girders or posts, the nature of the requirements dictating such considerations to the manufacturer. Attention is therefore drawn to the fact that by means of my specially shaped angle-irons and washers in the various combinations shown, my improved beams, girders and posts are applicable to the heaviest possible constructions, as well as to the lightest, and by reason of the separation of the constituent parts from one another by an open contracted space they afford facilities for connections of other structural pieces not admissible in other hitherto used beams, girders and posts.

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

1. A beam, girder or post, comprising, in combination, a metallic structural member of suitable shape, and an angle-iron having a springy or yielding leg, said angle-iron being secured to said member, so as to provide an open space of diminishing width between the contiguous surfaces of said structural member and the leg of said angle-iron, substantially as set forth.

2. A beam, girder or post comprising in



combination a central metallic web-member,  
one or more angle-irons secured thereto in  
such manner as to provide open spaces of di-  
minishing width between the contiguous sur-  
5 faces of said central web-member and the an-  
gle-irons, rivets or means for securing the an-  
gle-irons to the central web-member, and spac-  
ing means or washers for regulating the width  
of the spaces between the angle-irons and the

aforesaid central web-member, substantially as  
as described and for the purpose as set forth.

In testimony that I claim the foregoing as  
my invention I have signed my name in pres-  
ence of two subscribing witnesses.

ARTHUR E. KRAUSE.

Witnesses:

PAUL GOEPEL,  
K. R. BRENNAN.