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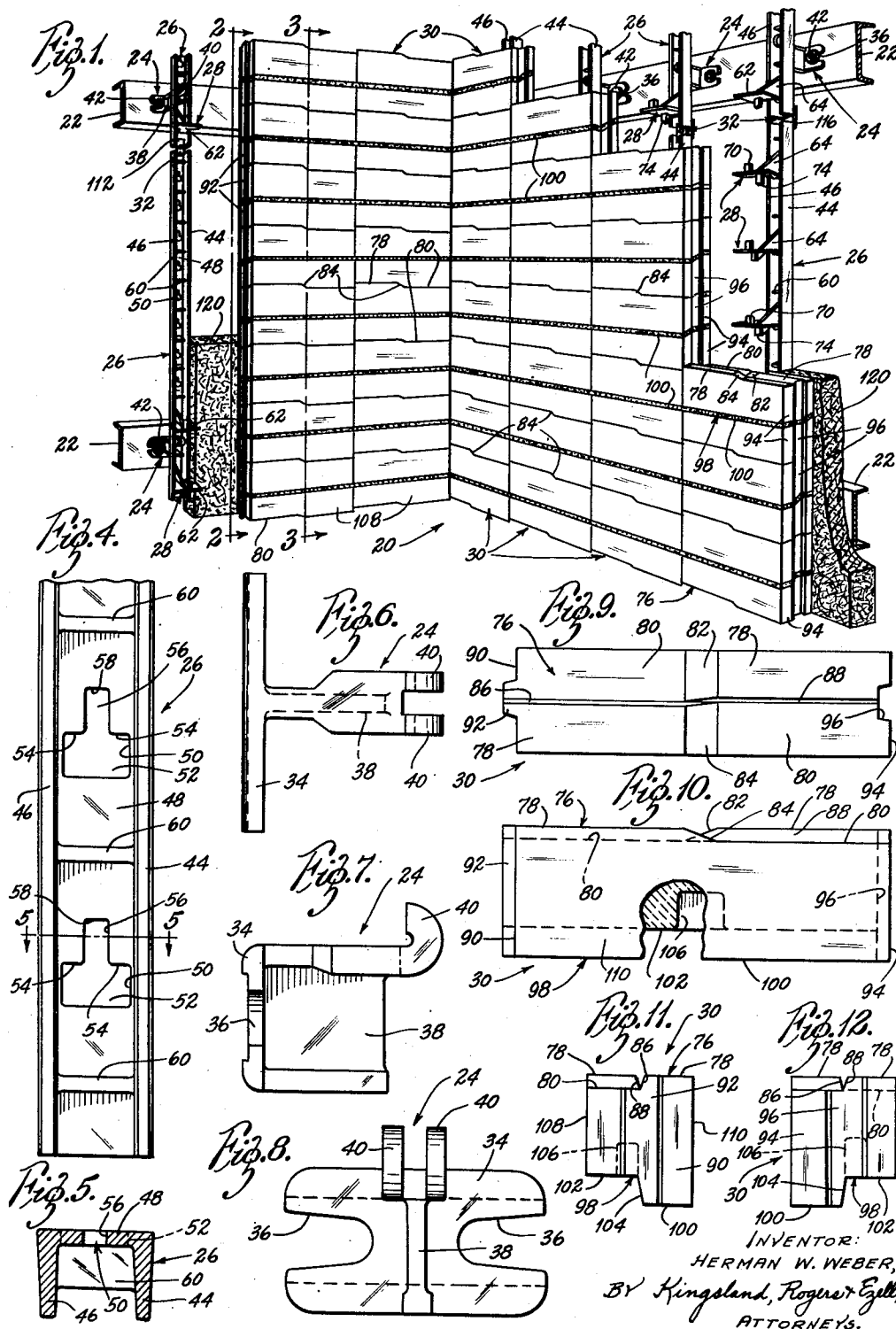
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FURNACE WALL STRUCTURE

Filed July 1, 1946

2 SHEETS—SHEET 1



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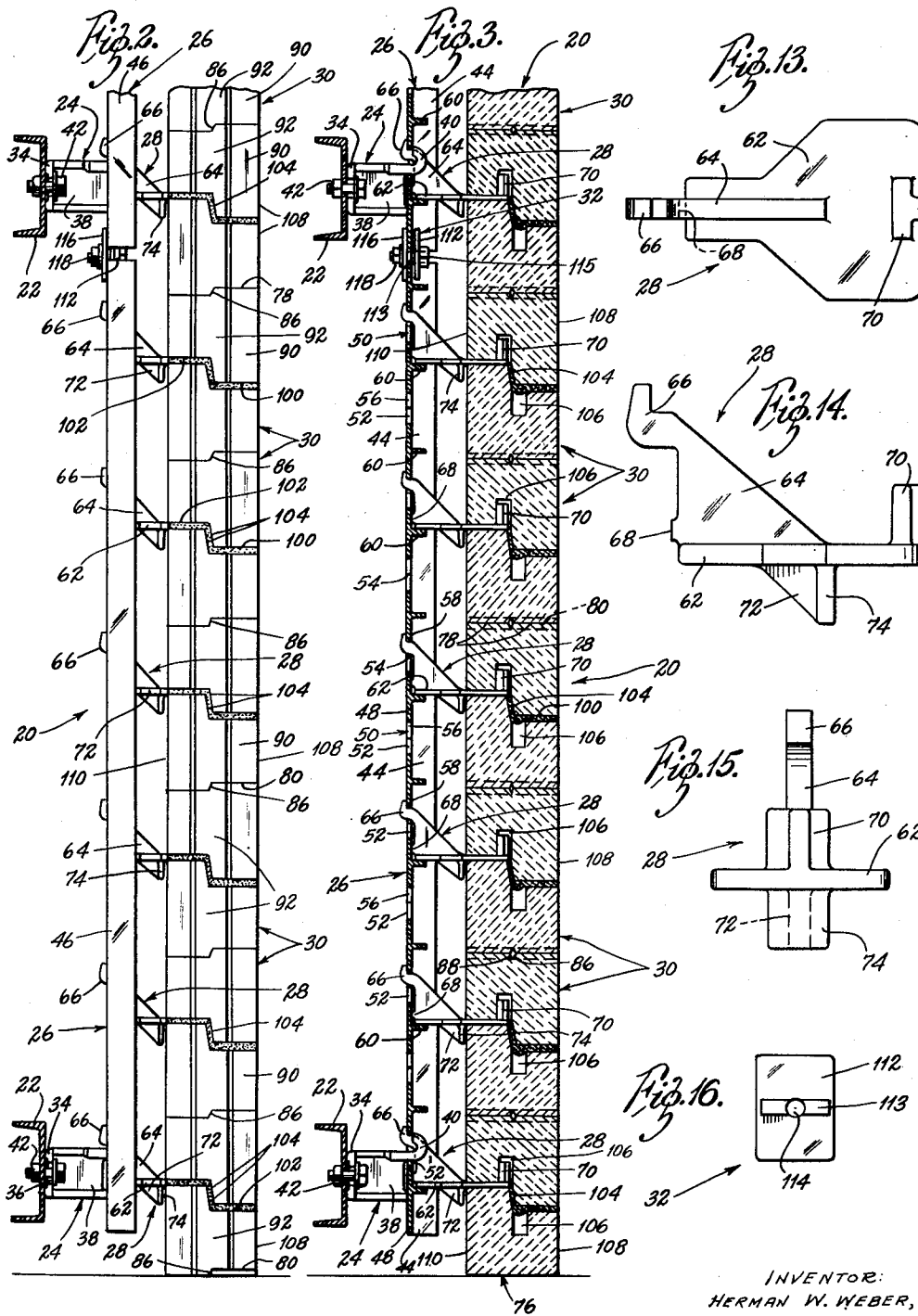
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2 SHEETS—SHEET 2



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UNITED STATES PATENT OFFICE

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FURNACE WALL STRUCTURE

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6 Claims. (Cl. 72-101)

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The present invention relates generally to wall constructions, and more particularly to a refractory thin wall for furnaces, and the like, which is not subjected to extremely high temperatures, but in which it is desired to provide maximum insulation against heat loss.

An object of the present invention is to provide a novel wall construction which is relatively thin in depth, but which is fabricated to reduce to a low percentage heat loss when the application of the novel wall is for enclosing a furnace, or the like.

Another object is to provide a novel thin wall construction, which is adapted to be subjected to heat, in which a minimum number of metal parts are subjected to relatively intense heat.

Another object is to provide a novel thin wall construction finding particular adaptation as a furnace enclosure, or the like, in which there is no flame impingement against metal supporting elements.

Another object is to provide a novel wall construction in which the elements are detachably related to facilitate both fabrication and dismantling procedures.

Another object is to provide a novel wall construction of heat resisting material incorporating an inner layer of refractory members, such as tiles, in which a single-shaped refractory member is employed.

Another object is to provide a novel wall construction incorporating bracket members which accommodate a basic refractory tile thickness and supporting runner thickness to the over-all allowable thickness of the wall construction.

Another object is to provide a novel thin wall construction for defining furnaces, and the like, which is of flexible fabrication for accommodation to allowable over-all thicknesses, and in which an inner refractory layer is supported from a plurality of individual points in order to minimize the specific load on each support point.

Other objects are to provide a novel thin wall construction finding particular adaptation to defining a furnace enclosure, or the like, which is economical to construct and to dismantle, which is economical in parts cost, which incorporates only a small percentage of heat resisting alloy castings, which is speedily installed and as speedily dismantled, which is of a minimum number of preformed shapes thereby facilitating stocking of the component elements, and which gives long and efficient service in operation.

The foregoing and other objects and advantages are readily apparent from the following

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description taken with the accompanying drawings, in which:

Fig. 1 is a perspective view of a thin wall construction fragment fabricated in accordance with the teachings of the present invention;

Fig. 2 is an enlarged cross-sectional view on the line 2-2 of Fig. 1;

Fig. 3 is an enlarged cross-sectional view on the line 3-3 of Fig. 1;

Fig. 4 is a view of a portion of a runner member which is one of the construction elements of the present wall construction;

Fig. 5 is a section on the line 5-5 of Fig. 4;

Fig. 6 is a plan view of a runner supporting bracket, which is another element of the present wall construction;

Fig. 7 is a side elevational view of the said bracket;

Fig. 8 is a front elevational view of the said bracket;

Fig. 9 is a top plan view of a refractory member or tile, which is another element of the present wall construction;

Fig. 10 is a side elevational view of the said tile, a portion being broken away to illustrate a mounting opening;

Fig. 11 is an end elevational view of the said tile looking from the left of Fig. 9;

Fig. 12 is an end elevational view of the said tile looking from the right of Fig. 9;

Fig. 13 is a plan view of a tile supporting bracket, which is another element of the present wall construction;

Fig. 14 is a side elevational view of the said tile supporting bracket;

Fig. 15 is a front elevational view of the said tile supporting bracket; and

Fig. 16 is a view of a connector member, which is adapted to align vertically superposed runner members.

Referring to the drawings more particularly by reference numerals, 20 represents generally a thin wall construction embodying the teachings of the present invention. Broadly, the wall construction 20 includes main supporting structural members 22, brackets or bolting lugs 24 (Figs. 6-8), runner members or bars 26 (Fig. 4), refractory members or tile supporting brackets 28 (Figs. 13-15), refractory members or tiles 30 (Figs. 9-12), and runner member connectors 32 (Fig. 16).

The structural members 22 may be channel irons, as are shown in the drawings, which in a preferred relationship are disposed horizontally

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with the webs vertical and substantially four feet center line to center line.

The brackets 24 are preferably of the configuration shown in the drawings (Figs. 6-8). Each bracket 24 includes a vertical flange 34 having opposed notches 36, a center web 38, and a pair of spaced hooks 40. The brackets 24 are removably secured to the structural members 22 by nut and bolt assemblies 42, which engage the flanges 34 inwardly of the notches 36 and extend through suitable apertures in the structural members 22.

Each runner member 26 is preferably of channel section (Fig. 5), and is four feet in length for one installation. Each channel-shaped runner member 26 includes spaced legs 44 and 46 between which extends a web 48. Longitudinally spaced apertures 50 are formed in the web 48 of the configuration clearly shown in Fig. 4 of the drawings. Each aperture 50 includes an enlarged portion 52 having shoulders 54, and a narrow neck portion 56 having a shoulder 58. Spaced from the enlarged portion 52 of each aperture 50 is a transverse web member 60, the purpose of which, in relation to the aperture, is set forth below.

Each refractory member or tile supporting bracket 28 (Figs. 13-15) is preferably of the configuration shown in the drawings and includes a horizontal shelf portion 62. A web portion 64 extends upwardly from one end of the shelf portion 62 and terminates in a hook portion 66. At the base of the web portion 64 is a projection 68. At the other end of the shelf portion 62 is a post 70 of a cross section and height clearly shown in Figs. 13 and 14, respectively. Extending downwardly from beneath the shelf portion 62 is a web 72 which terminates in a transverse wall portion 74.

Each refractory member or tile 30 is preferably of the configuration clearly shown in Figs. 9-12 of the drawings, and includes a top surface 76 comprising diagonally opposed raised quadrants 78 and diagonally relatively lowered quadrants 80, one pair of tandem quadrants 78 and 80 being separated by a beveled surface 82 sloping downwardly from right to left (Figs. 9-10), and the other pair of tandem quadrants 78 and 80 being separated by a beveled surface 84 sloping from left to right (Figs. 9-10). One pair of adjacent quadrants 78-80 is separated by a steep beveled surface 86 and the other pair by a steep beveled surface 88. The tile 30 has a first end 90 having a rib 92, and a second end 94 having a depression 96 of a configuration to receive a rib 92 of an adjacent tile 30. A bottom 98 thereof includes a first portion 100 extending the full length of the tile 30 and a second portion 102 offset inwardly from the first portion 100 by a beveled surface 104, the second portion 102 also extending the full longitudinal extent of the tile 30. A rectangular aperture 106 is formed centrally of the tile 30 in respect to the longitudinal dimension extending inwardly from the surface of the portion 102. Two parallel sides 108 and 110 complete the tile 30.

The connector 32 (Figs. 3 and 16) in one preferred form, comprises a plate 112 of a width not greater than the internal width of the web 48 of the runner member 26 having a rectangular projection 113 with an aperture 114 therethrough. A threaded bolt or stud 115 extends through the aperture 114 in the plate 112. A second plate 116, of a similar configuration to the plate 112, has a center aperture which receives the stud

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114, as is clearly shown in Fig. 3. A nut 118 maintains the plates 112-116 in operative position.

In fabricating the present novel thin wall construction 20, the structural members 22 are mounted in the desired location by any well known means (not shown). The structural members 22 are horizontally disposed, and are vertically spaced substantially four feet center line to center line. The brackets 24 are anchored to the structural members 22 by means of the nut and bolt assemblies 42.

Considering, for the moment, a single structural member 22 and its brackets 24, a runner member 26 is mounted on each bracket 24 so that the hooks 40 of the latter extend through the enlarged portion 52 of the lowermost aperture 50, the shoulders 54 resting on the bracket 24 and the flat portion of the hooks 40 bearing against the inner surface of the web 48 above the shoulders 54. The outer surface of the web 48 of the runner member 26 will bear against the base of the web 38 of the bracket 24 so that the runner member 26 is vertically disposed.

The hook portion 66 of a tile supporting bracket 28 is disposed through the neck portion 56 of the lowermost aperture 50 so that the flat vertical portion of the hook portion 66 bears against the outer surface of the web 48 above the shoulder 58, the projection 68 abuts the inner surface of the web 48, and the shelf portion 62 rests on the web member 60. A bracket 28 is similarly disposed in every other aperture 50 of the runner member 26.

A refractory member or tile 30 is disposed on each bracket 28 with the post 70 of the latter extending into the aperture 106 of the former. A second tile 30 is disposed on the already located tiles 30 with the top side of the secondly disposed tiles 30 interengaging the top surfaces of the initially located tiles 30, as is clearly shown in the drawings. A mortar, preferably of fire clay and grog, asbestos, and an air-setting binding agent, such as silicate of soda, is disposed between the bottom 98 of each bracket supported tile 30 and the opposed bottom 98 of the tile 30 disposed therebeneath. A thin mortar joint is also applied between the contiguous interlocking top surfaces 76 and the interlocking ends 90-94.

Insulation 120, such as slag wool, or the like, is disposed rearwardly of the exterior face of the tile construction to a depth to bring the insulation 120 flush with the outer surface of the webs 48 of the runner members 26. It is preferred to use some type of block insulation for ease of application, but a thin coat of hard surface plaster may be applied on the block insulation because it will present a smooth exterior surface in those installations in which no exterior wall or enclosure is provided.

It is manifest from the foregoing that there is no flame impingement on any of the metal parts of the present thin wall construction. However, the tile supporting brackets 28 are subjected to a relatively high temperature, and, therefore, preferably are cast of a heat resisting alloy. The runner members 26 and the brackets 24 may be of gray iron or rolled steel. It is expected to employ the present thin wall construction with furnaces, and the like, having a temperature only as high as about 2000° F. and, hence, the brackets 28 may be subjected to a temperature of as high as 1800° F. at the tile supporting posts thereof. However, the tiles 30 and the insulation 120 sharply reduce heat loss

so that the temperature in the vicinity of the runner members 26 is relatively nominal. Of course, the heat loss and, hence, the temperature at the runner members 26 depend upon the thickness of the tiles 30 and the thickness of the insulation 120, together with composition factors, and the like. Refractory members three inches and four and one-half inches in thickness have been found to be suitable for use in the present wall construction, and are manufactured by the well known dry press process from selected fire clays, and, hence, are uniform in size and shape. The brackets 24 and 28 are provided in different predetermined depths to accommodate the wall construction 20 to particular installations.

It is to be observed that each bracket 28 preferably carries only two tiles 30, which insures distribution of the loading and lends longer life to the individual brackets. Some expansion will occur in the tiles 20 when the wall construction 20 is subjected to full temperature, but resiliency in the mortar derived from the asbestos readily permits this expansion.

It is apparent from the foregoing that there has been provided a novel thin wall construction which achieves the objects and advantages sought therefor.

It is to be understood that the foregoing description and the accompanying drawings have been given by way of illustration and example and not by way of limitation.

It is to be understood further that changes in form, rearrangement of parts, and substitution of equivalents, which will be apparent to those skilled in the art, are contemplated as within the scope of the present invention, which is limited only by the claims which follow.

What is claimed is:

1. In combination, a wall construction comprising a runner member of substantially channel cross section including spaced apertures in the web thereof, a bracket for supporting the runner member engaging one of said apertures and bearing against a surface of said web to maintain said runner member in a vertical position, and a second bracket member engaging said same aperture and bearing against the opposite surface of said web, said second bracket extending outwardly from said runner member and including a supporting platform.

2. In combination, a wall construction comprising a runner member of substantially channel cross section including spaced apertures in the web thereof, a bracket for supporting the runner member engaging one of said apertures and bearing against a surface of said web to maintain said runner member in a vertical position, a second bracket member engaging said same aperture and bearing against the opposite surface of said web, said second bracket extending outwardly from said runner member and including a supporting platform, and a plurality of bracket members similar to the said second bracket member engaging other apertures of the runner member.

3. In combination, a wall construction comprising spaced runner supporting brackets, means supporting said brackets, a runner supportingly mounted on each bracket in substantially vertical position, each runner being of elongated form and including spaced openings formed for receiving portions of supporting and supported brackets, each supporting bracket including a portion extending through a selected opening of the sup-

ported runner, and a portion engaging said runner below such selected opening, said portion which extends through a selected opening engaging the side of said runner opposite from said second mentioned portion, vertically spaced refractory member supporting brackets supported by each runner adjacent the side opposite to the runner supporting bracket, each refractory member supporting bracket including a portion extending through an opening of the supporting runner and a portion engaging said runner below such opening, one of said refractory member supporting brackets having the first mentioned portion thereof extending through the selected opening through which the first mentioned portion of said runner supporting bracket extends an engaging the side of the runner against which the runner supporting bracket is disposed, and refractory members mounted on each refractory member supporting bracket in spaced relation to said runners providing an insulation space.

4. In combination, a wall construction comprising spaced runner supporting brackets, means supporting said brackets, a runner supportingly mounted on each bracket in substantially vertical position, each runner being of elongated form and including spaced openings formed for receiving portions of supporting and supported brackets, each runner also having a transverse web formed adjacent to and below each opening and extending outwardly from said runner, each supporting bracket including a portion extending through a selected opening of the supported runner and a portion engaging said runner below such selected opening, said portion which extends through a selected opening engaging the side of said runner opposite from said second mentioned portion, vertically spaced refractory member supporting brackets supported by each runner adjacent the side opposite to the runner supporting bracket, each refractory member supporting bracket including a portion extending through an opening of the supporting runner and a portion both engaging said runner below such opening and resting upon the adjacent transverse web, one of said refractory member supporting brackets having the first mentioned portion thereof extending through the selected opening through which the first mentioned portion of said runner supporting bracket extends and engaging the side of the runner against which the runner supporting bracket is disposed, and refractory members mounted on each refractory member supporting bracket in spaced relation to said runners providing an insulation space.

5. In combination, a wall construction comprising a runner member of substantially channel cross section including a web, spaced apertures in said web, a transverse web adjacent to and below each aperture, a bracket for supporting the runner member engaging one of said apertures and bearing against a surface of the first mentioned web and maintaining said runner member in a vertical position, and a second bracket member engaging said same aperture and bearing against the opposite surface of the first mentioned web, said second bracket resting upon the second mentioned adjacent web for support, said second bracket extending outwardly from said runner member and including a supporting platform.

6. In combination, a wall construction comprising a runner member of substantially channel cross section including spaced apertures in

the web thereof, each aperture being of substantially inverted T form, a bracket for supporting said runner in a vertical position including hook portions extending through a selected aperture and engaging the web on the opposite side from said bracket adjacent the stem portion of the inverted T, said bracket bearing against the web below the engaged aperture, and a second bracket, said second bracket including a hook portion extending through the aperture through which said hook portions of said first-mentioned bracket extend and from the opposite side thereof, said hook portion of said second bracket extending through the stem of the inverted T and engaging the web above the free end of the stem, said second bracket bearing against the web below the engaged aperture and extending outwardly therefrom in opposed relation to said first-mentioned bracket.

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