Oct. 14, 1969 J. RUDIGER 3,472,475

BRIDGE OVERHANG BRACKET

Filed July 28, 1967 2 Sheets-Sheet 1

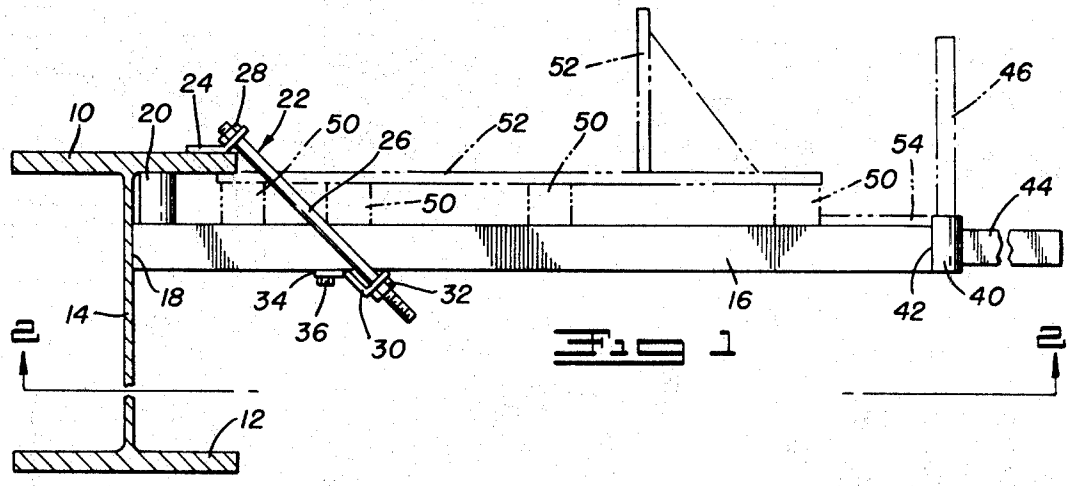


Fig 1

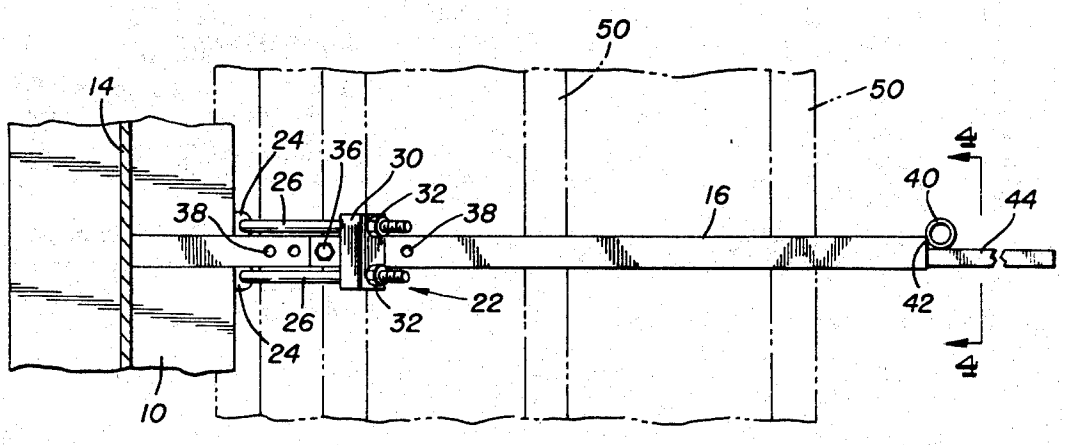


Fig 2

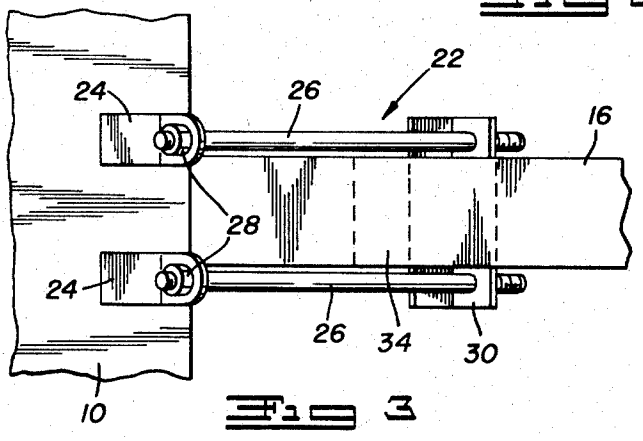


Fig 3

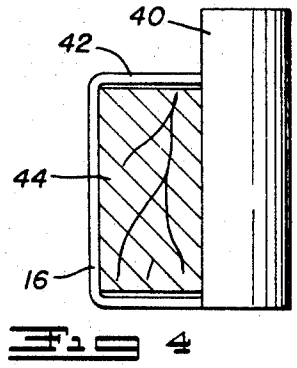


Fig 4

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BRIDGE OVERHANG BRACKET

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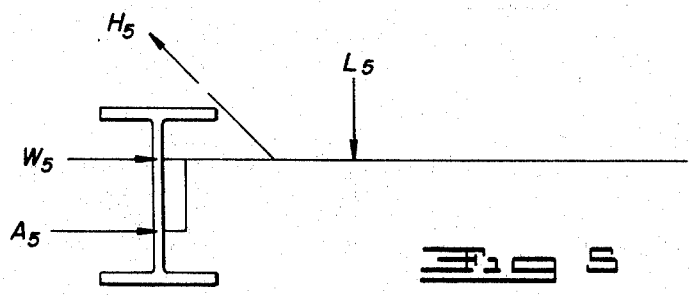


Fig 5

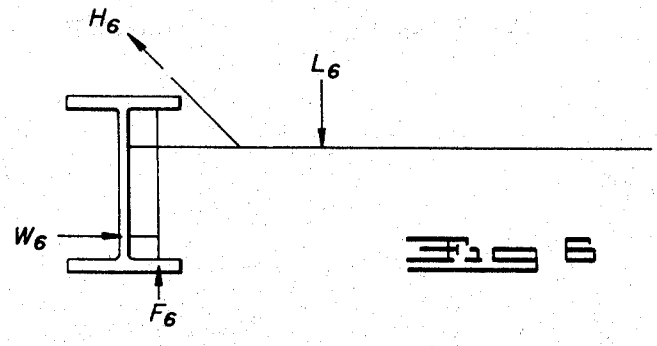


Fig 6

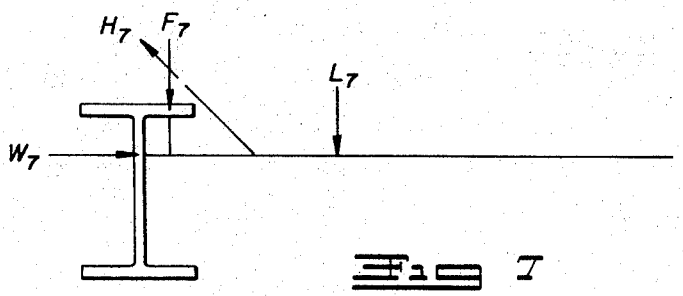


Fig 7

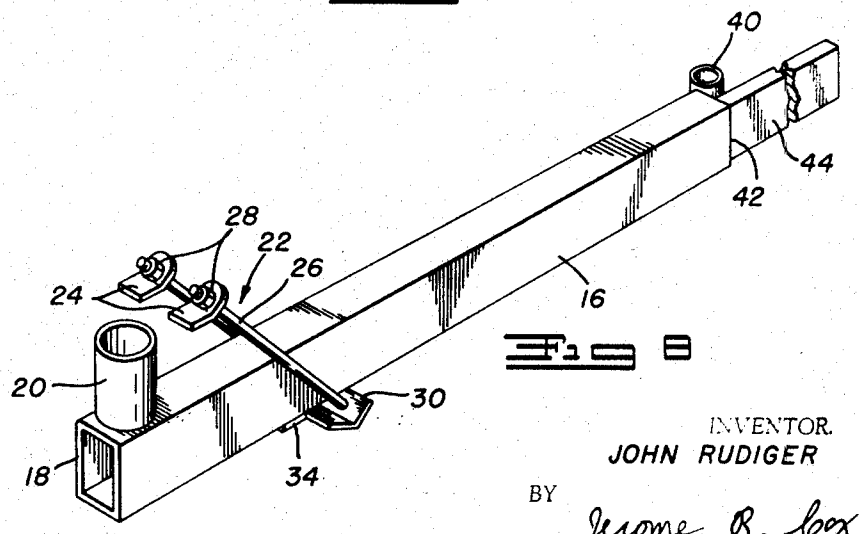


Fig 8

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United States Patent Office 3,472,475
Patented Oct. 14, 1969

3,472,475

BRIDGE OVERHANG BRACKET

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Filed July 28, 1967, Ser. No. 656,906
Int. Cl. E04g 3/00; A47g 29/02
U.S. Cl. 248—228 9 Claims

ABSTRACT OF THE DISCLOSURE

A bridge overhang bracket, attachable to a flanged girder for supporting concrete forms and catwalks is described. In its operable, attached position, the preferred embodiment comprises a horizontally aligned support beam, one end of which abuts against the web of the flanged girder. Protruding upwardly from the top of the support beam, near its abutting end, is a cylindrical boss which abuts against a flange of the flanged girder. An inclined dual bolt hanger extends from clips, welded on the girder flange, to a stirrup on which the underside of the support beam rests. The support beam is shown as a tube having a rectangular cross section. A cylindrical adapter having its axis extending vertically is welded to the support beam on the end opposite the abutting end in order to permit the tight fitting insertion of a piece of lumber into the end of the support beam in order to extend the effective length of the support beam and also to provide a guard rail post socket.

BACKGROUND OF THE INVENTION

My invention relates to construction accessories, and more particularly relates to overhang brackets used with bridges or other structures and hereinafter sometimes referred to as brackets.

Several types of bridge overhang brackets are used to support concrete forms which extend beyond the longitudinal bridge girders on opposite sides of a bridge. While such brackets have been satisfactory, all have one or more of several undesirable characteristics.

All brackets, including mine, require that their support beam be adjusted to a horizontal position or to a desired inclination to the horizon. Brackets now in use require two different adjustments. Usually, one adjustment is made at a hanger which often extends from the horizontal support beam of the bracket up to a position of attachment to a part of the girder. Commonly, the second adjustment which must be made is necessarily at an adjustable bolt, threadedly engaged to the bracket understructure below its support beam, and abutting the web of the girder. Such a bracket requires that workmen adjust not only the hanger while standing above the bracket but also the adjustable bolt while standing below the bracket.

Some other brackets do not have an adjustable bolt below their support beam but rather use wedges between their understructure and the girder in order to adjust and tighten the bracket into position. Wedges, however, serve an equivalent adjustment purpose.

Still other brackets, in addition to their adjustable hanger, have adjustable understructure for bringing part of the understructure into proper contact with the web.

Some brackets even require the drilling of holes in the girders which of course tends to weaken the web and to consume laborers' time.

The requirements for double adjustment, positioning wedges, and drilling holes add to the one of the most important costs of a construction contractor—his labor

costs. There is a need for a bracket which does not require these extra adjustments but which permits easy and rapid installation of several brackets with fewer man hours than is now necessary.

Although it is not often necessary to extend the effective length of the support beam of a bracket, when it does become desirable, it is found to be difficult or impossible with other brackets. For example, because a particular bridge might have an unusually wide overhang, the contractor may need to extend the effective length of the bracket to provide an ordinary catwalk along the sides of the bridge for workers to use. Most brackets now in use cannot be appreciably and conveniently extended for such a purpose.

Most brackets in use today are difficult to stack and to efficiently transport from one construction site to another. Such brackets have supports and other projections extending in such a way that relatively few can be stacked on a truck bed.

Many brackets require that the concrete forms be attached to them; for example, by bolts; and that they be detached when the forms are removed.

Some brackets bear against the weaker central portion of a girder web with appreciable forces.

It is therefore an object of my invention to provide an improved overhang bracket.

A further object of my invention is to provide a bridge overhang bracket having no understructure.

A further object of my invention is to provide a bracket requiring only a single adjustment to properly align its support beam.

A further object of my invention is to provide a bracket which does not require the drilling of holes in the girder to which it is attached.

A further object of my invention is to provide a bracket which may be installed far more easily and quickly than heretofore possible with other brackets.

A still further object of my invention is to provide a bracket, the effective length of which may be easily and safely extended.

A further object of my invention is to provide brackets which may be neatly and compactly stacked for transportation to and re-use at another construction site.

A further object of my invention is to provide a bracket on which the concrete forms merely rest so as not to be attached thereto.

A further object of my invention is to provide a bracket which does not bear against the weaker central portion of a girder web.

Further objects and features of my invention will be apparent from the following specification and claims when considered in connection with the accompanying drawings illustrating several embodiments of my invention.

SUMMARY OF THE INVENTION

I have found that the foregoing and other objects may be attained in a bridge overhang bracket comprising: (a) a support beam which has one end for abutting against the web of a flanged girder; and (b) a boss protruding upwardly from the support beam near the end that abuts against the web of the flanged girder. These objects are even better attained if the support beam has a hollow rectangular cross section into which a wooden extension beam may be inserted to extend the effective length of the bracket.

Further objects are attained by providing a vertically aligned cylindrical adapter at the end of the support beam opposite the web to provide for the tight fitting insertion of the wooden extension beam and to provide a guard rail post socket.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevation of a bracket constructed according to my invention fixed to a flanged girder and showing a concrete form in phantom resting on the bracket.

FIG. 2 is a bottom view of the bracket shown in FIG. 1 with a horizontal section taken through the girder substantially along the line 2—2 of FIG. 1 and showing a concrete form in phantom.

FIG. 3 is an enlarged top view of a portion of the bracket shown in FIG. 1 showing parts of the hanger portion of my invention.

FIG. 4 is an enlarged end view of the end portion of the bracket shown in FIG. 1 with a vertical section through the wooden extension beam taken substantially along the line 4—4 of FIG. 2.

FIG. 5 is a diagrammatic view of a type of prior art bracket showing the forces acting thereon, treating it as a rigid body.

FIG. 6 is a diagrammatic view of another type of prior art bracket showing the forces acting thereon, treating it as a rigid body.

FIG. 7 is a diagrammatic view of a bracket constructed according to my invention showing the forces acting thereon, treating it as a rigid body.

FIG. 8 is a view in perspective of a bracket constructed according to my invention.

In describing the preferred embodiment of the invention illustrated in the drawings, specific terminology will be resorted to for the sake of clarity. However, it is not intended to be limited to the specific terms so selected, and it is to be understood that each specific term includes all technical equivalents which operate in a similar manner to accomplish a similar purpose.

DETAILED DESCRIPTION OF THE INVENTION

Structure

The preferred embodiment of my invention is shown in FIG. 1 installed on a flanged girder. The girder, shown in section, consists of an upper flange **10**, a lower flange **12**, and a web **14** connecting those flanges. Although a steel I-beam is shown as the girder, my bracket could be installed on other shapes of metal beams and on some concrete beams with either no modification or with slight and obvious modification.

The overhang bracket comprises, when operably installed, an approximately horizontal support beam **16** which supports the concrete forms. One end **18** of the support beam **16** abuts against the web **14** of the girder. Near the same abutting end **18** of the support beam **16** is a boss **20**. The boss **20**, in the operable position of the bracket, extends upwardly from the support beam **16** to contact the flange **10** of the girder. Although the boss **20** could be of any shape and material, as long as it can withstand the compression forces exerted upon it, I prefer to use a length of steel tube or pipe and to weld it to the support beam **16**. Although I prefer to weld, glue, or otherwise fix the boss **20** to the support beam **16**, it could merely be inserted between the support beam **16** and the flange **10** of the girder and be held in place by the compression forces exerted upon it. The boss **20**, so inserted and not fixed to the support beam, is still considered as protruding from the support beam. The boss could even be fixed to the flange **10** and still function in an equivalent manner within the concepts of my invention.

A hanger, indicated generally by the numeral **22**, is used to support the support beam **16**. Many types of hangers are available. My invention uses a hanger which has one end shaped so that it can be fixed to the girder and has the other end connected, preferably removably connected, to the support beam **16**. While removability of the connection to the support beam is not essential, it is highly desirable to permit ease of installation as described below.

Referring to FIGS. 1, 2, and the enlarged view of FIG. 3, the particular hanger **22** which I prefer comprises at the end shaped for fixing to the flange a pair of clips **24** which are welded to the girder flange **10**, and a pair of threaded rods **26** which are inserted through holes in the clips **24** and are secured to it, for tension stress, by nuts **28**.

At the other end of the hanger **22**, the rods **26** pass on opposite sides of the support beam **16** and are inserted through holes in a length of angle steel **30** to form a stirrup. Another pair of nuts **32** secure the rods to the angle steel for tension stress.

A plate **34**, with a bore through it, is attached to the under side of the support beam **16** by a bolt **36**. The bolt **36** is threadedly engaged to the under side of the support beam **16** by means of a threaded bore in the support beam. A series of such threaded bores **38** are tapped in longitudinal sequence along the underside of the support beam **16** to permit adjustment of the position of the plate **36** and therefore of the hanger **22** to allow its use on various sizes of girders. The plate **36** and the undersurface of the support beam **16** form a shoulder against which the length of angle steel **30** seats to removably connect the hanger **22** to the support beam **16**. By removably connected, I mean that the hanger fully supports the beam without appreciable movement relative to it, but that the beam may be inserted into or removed from the hanger very easily. With this embodiment, it may be removed by merely lifting the support beam **16** upwardly.

The support beam **16** that I prefer to use is a steel beam with a substantially rectangular cross section as best seen in FIGS. 4 and 8. However, other shapes of beams, such as I-beams, and other materials such as wood, may be used to construct a bracket having the features of my invention corresponding to those of the structure I have already described.

The use of the rectangular beam, however, provides other advantages for my bracket. Referring to FIGS. 1, 2, 4, and 8, an adapter **40**, shown as a cylindrical tube, is fixed to the end **42** of the support beam **16** which is opposite the abutting end **18** so that its central axis is substantially vertical.

FIG. 4 shows that the adapter **40** is fixed to a position at the end **42** of the support beam **16** so that a wood extension beam **44** may be inserted into the support beam **16** with a reasonably tight fit. The adapter **40** functions also as a guard rail post socket. In FIG. 1, the adapter **40** has a guard rail post **46** shown in phantom inserted therein.

Obviously, a support beam and a wood extension beam could be selected so that the adapter is unnecessary to provide a tight fit. The adapter could then be omitted or welded to one side to provide a guard rail post socket.

In FIG. 1, I also show, in phantom, the general shape of the concrete forms supported by my bracket. The forms comprise several joists **50** running parallel to the girder and supported by a series of parallel bridge overhang brackets extending from the girder. Joists **50** support the mold walls **52** of the concrete form.

One end of the adapter **40** extends vertically above the top surface of the support beam **16** so that a kicker block **54** may be inserted between the adapter **40** and the nearest joist **50** in order to prevent movement of the concrete form away from the girder during pouring of the concrete.

A catwalk may be laid along the extreme ends of the series of brackets so that workers may walk along it. However, if the overhang is so great that the mold walls extend out to the adapter **40**, then a wooden extension beam, such as beam **44**, may be inserted in the end of the bracket to provide a catwalk support.

Operation

The simplicity of installing a series of brackets constructed according to my invention is its most remarkable feature.

The first step, in installation, is to weld the clips **24** into position on the flange **10**. A series of such clips can be welded along the girder wherever brackets are to be attached.

The second step is to insert the threaded rods **26** through the clips **24** and through the length of angle steel **30**, and thread the upper nuts **28** and the lower nuts **32** onto the rod so that the distance between the nuts will position the bracket in a roughly horizontal position.

The third step involves two workmen. While one lifts the lower end of the hanger away from the girder, for example with a board used as a lever, the other slips the boss **20** underneath the flange **10** and drops the support beam **16** into the hanger. Then they go to the next hanger and repeat the dropping procedure. Obviously, this step would be slightly modified if a boss, which is not fixed to the support beam, is used.

The fourth and last step is an adjustment of the support beam **16** to its proper inclination with the horizon. A single man merely places his level on the support beam **16** and adjusts the upper nuts **28** or the lower nuts **32** until he gets the desired inclination.

A very important fact is that all of these steps are performed by persons positioned on top of the girder. No one need walk along the lower girder flange **12** or on a special platform, as is necessary with other brackets. Only with my bracket may all workers at all times remain on top of the girder.

After installing a series of brackets, the concrete forms are built upon the brackets, again without going under the brackets. The joists **50** do not need to be bolted or nailed to the bracket. The concrete mold walls **52**, which may be plywood panels, for example, are nailed to the joists **50**.

A guard rail may easily be constructed by inserting poles **46** into the adapters **40** and then connecting the poles with boards, rope, chain, etc.

If extra catwalk space is needed, wooden extension beams **44** may be inserted in the end of the bracket, and planks laid between them.

I believe that the new results accomplished by my bracket are possible because my bracket has not understructure. Designers of other brackets seem to all have assumed that an overhang bracket requires some supporting understructure. Usually they provided brackets with the common triangle understructure extending below the support beam. One put the triangular structure partly above and partly below the support beam. Most of these structures also use a hanger.

However, I have invented a bracket with no triangular, supporting, understructure. Because my bracket has no supporting understructure, no adjustment of the understructure is necessary.

The difference in the manner of operation of my bracket is illustrated diagrammatically in FIGS. 5, 6, and 7. FIGS. 5 and 6 represent two common types of overhang brackets, and FIG. 7 represents an embodiment of my invention. They are treated as rigid bodies suspended from a girder. All three have distributed loads along their support beams which, for purposes here, may be considered to be identical point loads L5, L6, and L7.

All three brackets have hanger forces H5, H6 and H7 which act along the axes of their threaded hanger rods. These forces may, however, be different for different brackets.

Although the web exerts a horizontal force on all three brackets, it does so at different places. With the bracket shown in FIG. 5, the web exerts two forces, W5 and A5. With this bracket, two adjustments are necessary to provide static equilibrium, one at H5 and one at A5.

The bracket shown in FIG. 6 needs the force W6 exerted by the web on the understructure and the force F6 exerted upwardly by the flange on the understructure to be in equilibrium. With such a bracket, adjustments are made not only at H6 but also at W6 and F6, often by driving wedges between the bracket and girder.

With a bracket constructed according to my invention, as shown in FIG. 7, a horizontal force W7 is exerted by the web, and a downward force F7 is exerted by the flange. However, no adjustments are necessary at either W7 or F7. The only adjustment is performed at H7. The critical fact is that although my bracket, like other brackets, is an entirely rigid body except for its hanger, only with my bracket do the points at which the forces are exerted by the girder on the bracket always remain in contact with the girder as the bracket is adjusted at its hanger to adjust the inclination of the support beam. Because these points always make such a contact, there is no need to provide an adjustment to move the points into contact. Adjustment of the hanger to correct the inclination of the support beam results in the automatic and simultaneous sliding movement of the top of the boss **20** and the end **18** of the support beam to a new position at which there is always proper contact with the girder so that the forces W7 and F7 may be properly applied.

It is to be understood that while the detailed drawings and specific examples given describe preferred embodiments of my invention, they are for the purposes of illustration only, that the apparatus of the invention is not limited to the precise details and conditions disclosed.

I claim:

1. A bridge construction comprising in combination,
a flanged girder having a web and an upper flange;
a support beam, having its inner end abutting against the outer face of the web of the flanged girder;
a boss, protruding from the support beam near said inner abutting end of the support beam, extending upwardly in the operable position of the support beam, abutting against the upper flange of the flanged girder and bearing compression forces; and
means for bearing substantially all of the forces exerted by said support beam on said flanged girder, including all the forces resulting from forces exerted on said support beam, said means consisting of
(1) said inner end of the support beam;
(2) said boss; and
(3) a hanger having its lower end removably connected to the support beam between the ends of the support beam, having its other end affixed to the upper flange of the flanged girder, and bearing tension forces.

2. A bridge construction according to claim **1**
wherein the hanger comprises a pair of clips adapted for fixation to the girder flange, a pair of threaded rods each secured to one of the clips near its one end, and a stirrup secured to both of the rods near their other ends, the clips and the stirrup being secured for supporting tension forces.

3. A bridge construction according to claim **1**
wherein a guard rail post socket is fixed to the end of the support beam opposite said abutting end.

4. A bridge construction according to claim **1**
wherein a portion of a wooden extension beam is inserted in the support beam for extending the effective length of the support beam.

5. A bracket according to claim **4**
wherein an adapter is fixed to the end of the support beam opposite said abutting end in a position to permit a substantially tight fitting insertion of a wooden extension beam.

6. A bracket according to claim **5**
wherein the adapter is a guard rail post socket.

7. A bracket according to claim **5**
wherein the adapter is a cylindrical tube which is

vertically aligned in the operable position of the bracket.

8. An improved bridge construction according to claim 1 wherein

(a) said support beam is a tube having a substantially rectangular cross section;

(b) a wooden extension beam has a portion slidably and snugly inserted in the support beam for extending the effective length of the bracket; and

(c) a tubular adapter is fixed to the end face of the support beam in a position to permit a substantially tight fitting insertion of the wooden extension beam.

9. A bracket according to claim 8 wherein the adapter is a cylindrical tube which is vertically aligned in the operable position of the bracket.

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U.S. Cl. X.R.

25—131.5; 248—235