BRIDGE DECK FORM HANGER

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ABSTRACT

A bridge deck form hanger for suspending deck forms from concrete bridge girders so that a concrete deck can be poured. The hanger has a lower end portion adapted to be embedded in the top surface of a girder and an upper end portion which extends over the edge of the girder to interconnect with the bridge deck form to secure the form in its proper position with respect to the girders.

9 Claims, 5 Drawing Figures
BRIDGE DECK FORM HANGER

This application is a divisional of application S. N. 851,985, filed Aug. 21, 1969 and issued on Dec. 14, 1971 as U.S. Pat. No. 3,626,648.

BACKGROUND OF THE INVENTION

This invention relates to a hanger for supporting bridge deck forms, and particularly to a hanger which is adapted to be precast and embedded in the top of a concrete bridge girder.

In the construction of certain bridges, primarily reinforced concrete bridges, a concrete deck or roadway is formed integrally with a plurality of concrete girders which are generally placed parallel to traffic movement. The deck is fabricated by pouring concrete into forms, which are positioned between adjacent girders and at the edges of the bridge to form curbs and sidewalks. The forms have to be positioned so that the deck is integrally connected to the girders and has a substantially uniform thickness throughout its length. Thus, it is necessary to securely connect the forms to the girders and to be able to adjust the forms to achieve the substantially uniform deck thickness. It is desirable that the forms be supported from the tops of the girders since workmen can more easily adjust the forms from this position.

Heretofore, bridge deck forms have been supported from below the girders as well as from above. In supporting forms from the tops of the girders, some devices have been used which merely straddle the top of the girder. These devices generally have a plate, each end of which extends over one edge of the girder to receive a bolt for fastening one end of a form to the device. Many problems, however, are encountered using such devices. First, the devices must be carried to the tops of each girder. Then, workmen must individually position each device at appropriately spaced intervals along the length of the girder. A form can then be hoisted into position and bolted to one end of the device. However, before the hoist or crane can release the form, another form must be secured to the opposite end of the device or the device must be welded to some of the reinforcing steel projecting out from the top of the girder. Otherwise, the device would be pulled off the girder by the weight of the form secured to one end. Additionally, these devices are rather large, cumbersome and relatively expensive since they must extend over the entire width of the girder and must be heavy enough to support the weight of the forms attached thereto and the weight of the poured concrete.

SUMMARY OF THE INVENTION

The subject hanger for supporting bridge deck forms from concrete bridge girders includes a body member having a lower portion which is adapted to be embedded into the top of a concrete girder at appropriately spaced intervals during the fabrication of the girders. The lower portion has a plurality of projections formed thereon for securely anchoring the hanger in the precast girder. The upper portion of the support extends upwardly from the embedded portion and projects outwardly from the side of the girder. An aperture is formed in the projecting upper portion to receive a fastener, such as a bolt, to secure the deck form to the hanger. Additionally, an angularly disposed aperture is formed in the upper portion to receive a bolt which is inserted at an angle when there is an overlapping slab of concrete, such as at the curb side of the roadway.

The subject hanger eliminates the need for separate hangers to be delivered to a construction site and individually positioned at spaced intervals on the tops of girders. By properly positioning the hangers in the concrete girders during the fabrication thereof, valuable construction time is saved. Furthermore, it eliminates the hazard of loose, falling hangers which can be blown off by high winds or inadvertently pushed off while trying to secure the deck forms to the hangers. Additionally, the subject hangers are relatively small in size, light in weight, economical to manufacture, and easy to connect with the deck forms.

Other advantages of the present invention will be apparent from the following detailed description when considered in conjunction with the following detailed drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a partial cross-sectional view of a bridge illustrating the hangers embodying the principles of this invention embedded in the concrete girders and supporting bridge deck forms;

FIG. 2 is an exploded view of a portion of a girder having a hanger embedded therein and supporting a bridge deck form;

FIG. 3 is a perspective view of a hanger embodying the principles of the present invention;

FIG. 4 is a partial cross-sectional view of the hanger in FIG. 3 taken along line 4—4; and

FIG. 5 is an alternative embodiment of the present invention which includes a separate anchor portion which is embedded in the concrete girder and facilitates for attaching the upper portion to the anchor portion.

DESCRIPTION OF THE INVENTION

Referring to FIGS. 1 and 2, there is shown a cross-section of a typical reinforced concrete bridge where a plurality of hangers, generally designated as 10, are embedded in the tops of concrete girders 11. The bridge deck forms, generally designated as 12, are supported from the hangers 10 by coil bolts 13. These coil bolts have very large threads which are usually greased prior to their being fastened to the hangers 10 in order to facilitate their subsequent removal after the concrete is poured and sets. This permits the forms 12 to be removed and used again.

The deck forms 12 include an upper surface 14 on which the concrete 16, shown in dotted lines, is poured. The upper surface 14 is supported by a plurality of transverse members 17 which in turn are supported by a plurality of planks or boards 18. The deck forms 12 are used to form the major portion of the concrete bridge deck surface. However, on the sides of the bridge deck, another form generally designated as 19 is used to form the curbs and sidewalks, if any. Form 19 includes a vertical member 21 which extends above the proposed road surface to the desired curb height and a horizontal surface member 22 which supports the concrete. The horizontal surface member 22 rests on a plurality of transverse members 23, which are supported on base members 24. Since the form 19 is mounted to the last girder, one end thereof has no support, and consequently braces 26 and 27 are utilized to adequately support the form. It is to be noted that be-
cause of the close positioning of the form 19 with respect to the girder 11, it is difficult to insert the coil bolt 13 vertically through an aperture in the hanger 10. Consequently, another aperture is formed at an angle through the hanger to receive the coil bolt 28 which extends through the curb form 19. This also provides better support for the form 19 than would be provided if a vertical bolt 13 were used. While a specially designed hanger having only the angularly disposed aperture therethrough could be utilized for the particular girder being placed adjacent to the curb side of the deck, it is, of course, advantageous to have all of the hangers alike so that no special care need be taken to position any of the girders in a special place during the construction of the bridge.

Referring now to FIGS. 2, 3 and 4, the hanger 10 is shown having a lower portion 31 which is adapted to be embedded in the top surface of the concrete girder 11. The lower portion 31 includes a plurality of ridges or projections 32 formed thereon and a bottom projecting base 33, all of which aid in securely anchoring the hanger 10 in the concrete. A web 34 is provided for added rigidity and strength of the lower member 31. The upper portion of the hanger 10, generally designated as 36, includes a shoulder or base surface 37 which bears on the upper surface of the concrete girder 11 when the hanger 10 is embodied therein. The upper portion 36 extends upwardly from the shoulder 37 and then curves outwardly to form a projecting end portion 38 which extends over the side of the girder 11 a sufficient distance to receive the coil bolt 13. An aperture 39 is formed in the projecting end portion 38 to receive the coil bolt 13. The aperture 39 is advantageously tapered and oversized in order to permit some tolerance in the positioning of the hanger 10 with respect to the girder, and also to account for dimensional tolerances in the deck forms 12. Another tapered and oversized aperture 41 is formed in the upper member 36 at an angle with respect to the top surface of the concrete girder 11 in order to receive the coil bolt 28 which secures the curb and sidewalk form 19.

The upper member 36 may have webs 42 and 43 formed therein to strengthen the hanger 10 and to reduce the amount of material used in order to obtain the strongest part with the least weight. The hangers could be made solid in these web areas, but they would weigh and cost considerably more. The hangers 10 can most easily be fabricated by casting them out of aluminum, cast iron, plastic or any other suitable material. However, many other conventional techniques can be utilized to make the hanger 10. Additionally, it is apparent that many different shapes of hangers can be utilized which embody the principles of the subject invention.

To secure the forms 12 to the hangers 10, a hoist or crane is used to raise the form 12 to a position where the coil bolt 13 can be inserted through the aperture 39 in the hanger 10 and nut 15 attached. Likewise, the other end of the form is attached to its hanger 10. Then the nuts 15 can be rotated to adjust the form 12 so that the upper surface 14 thereof is level and in the proper position with respect to the top surface of the girder 11. Ordinarily, the upper surface 14 is positioned slightly above the top surface of the girder 11 to provide greater thickness at the deck support points. The curb and sidewalk forms 19 are secured in a similar manner.

Ordinarily, the coil bolts 13 and 28 are greased prior to use so that they can be unscrewed after the concrete sets. After the concrete is poured and sets, the hangers 10 and nuts 15 are embedded in the concrete. Because of the large threads and the lubrication thereon, the coil bolts 13 and 28 can be unscrewed so that the forms 12 and 19 can be reused.

Referring now to FIG. 5, there is shown an alternative embodiment of a bridge deck form hanger which includes a separate upper member 50 and lower member 51. The lower member 51 has projections 52 and base 53 which are used to anchor the hanger 50 securely in the concrete girder 11. An enlarged section 54 is provided having a plurality of threaded apertures 56 therein to receive bolts 57 to attach the upper member 50 to the lower member 51. The upper member 50 is substantially similar to the upper portion of hanger 10 as shown in FIG. 3. The upper member 50 includes a base portion 58 having apertures 60 therethrough which are in alignment with apertures 56. The upper member 50 also has enlarged apertures 59 and 61 therein to receive the coil bolts 13 and 28, respectively. In use, the lower member 51 would be embedded in the proper positions in the concrete girders 11. The girders would then be shipped to the construction site and the upper member 50 would be attached to the lower member 51 by using the bolts 57 or some other conventional fastening means, such as gluing or cementing. The forms 12 and 19 can then be easily secured in position as previously described.

It is to be understood that the above described embodiments are merely illustrative of an application of the principles of this invention and that numerous other arrangements and modifications may be made within the spirit and scope of the invention.

What is claimed is:

1. In a bridge structure including a plurality of parallel spaced apart concrete girders and a plurality of deck forms positioned to define a bridge deck into which concrete can be poured, the combination therewith of: hanger means for suspending said deck forms from said girders, each of said hanger means having a first end portion embedded in the top of one of said girders and a second laterally projecting end portion, each of said hanger means having a shoulder portion intermediate said first end portion and said second end portion, said shoulder portion engaging the top of one of said girders for providing additional support for said hanger means; and means for connecting said deck forms to said laterally projecting end portions of said hanger means.

2. The combination as defined in claim 1 wherein a plurality of hanger means are embedded in spaced relationship in the top of each girder forming two rows, each row being adjacent to one side of each of said girders and having said second end portions projecting laterally over the adjacent sides thereof.

3. The combination as defined in claim 1 wherein means connecting said deck forms to said laterally projecting end portions of said hanger means comprises:

- aperture means defined in said laterally projecting end portions of said hanger means;
- coil bolt means extending through said aperture means and securing said deck forms to said hanger means; and
- said coil bolt means having means for adjusting said deck forms relative to said girders.
4. The combination as defined in claim 1 wherein said means connecting said deck forms to said laterally projecting end portion of said hanger means comprises:
substantially vertical first aperture means being defined in said second laterally projecting end portions of said hanger means;
second aperture means being defined within said second laterally projecting end portion of said hanger means and being disposed in angular relation with said first aperture;
coil bolt means extending through one of said aperture means and securing said deck forms to said hanger means; and
said coil bolt means having means for adjusting said deck forms relative to said girders.
5. The combination as defined in claim 4 wherein said aperture means is tapered downwardly and outwardly to facilitate interconnection of said deck form and said hanger.
6. The combination as defined in claim 1 wherein said first and second end portions of said hanger means comprise separate structural elements, means for securing said first and second end portions in assembly.
7. The combination as defined in claim 6 wherein said means for securing said first and second end portions comprise threaded aperture means formed in one of said end portions;
aperture means being defined in the other of said end portions;
bolt means extending through said aperture means and being threadedly received by said threaded aperture means of said one of said end portions.

8. In a bridge structure including a plurality of parallel spaced apart concrete girders and a plurality of deck forms positioned to define a bridge deck into which concrete can be poured, the combination therewith of:
hanger means for suspending said deck forms from said girders, said hanger means comprising a body having:
a first end portion embedded in the top of one of said girders;
said first end portion having a plurality of projections thereon for anchoring said hanger means in said girder;
a second end portion adapted to extend over the top of said girder;
a shoulder intermediate said first and second end portions adapted to engage the top of said girder; and said second end portion having aperture means formed therein; and means being received by said aperture means and securing said deck form to said hanger means.
9. The combination as defined in claim 8 wherein said aperture means comprises:
first substantially vertical aperture means, second aperture means being disposed in angular relation to said first aperture means;
said means for securing said deck form to said hanger means comprising coil bolt means extending from said deck forms and extending selectively through said aperture means; and
means for adjustably securing said coil bolt means to said hanger means.

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