Feb. 25, 1964 G. W. ROBINSON ETAL 3,122,347

SUPPORT STRUCTURE

Filed Aug. 15, 1961 2 Sheets-Sheet 1

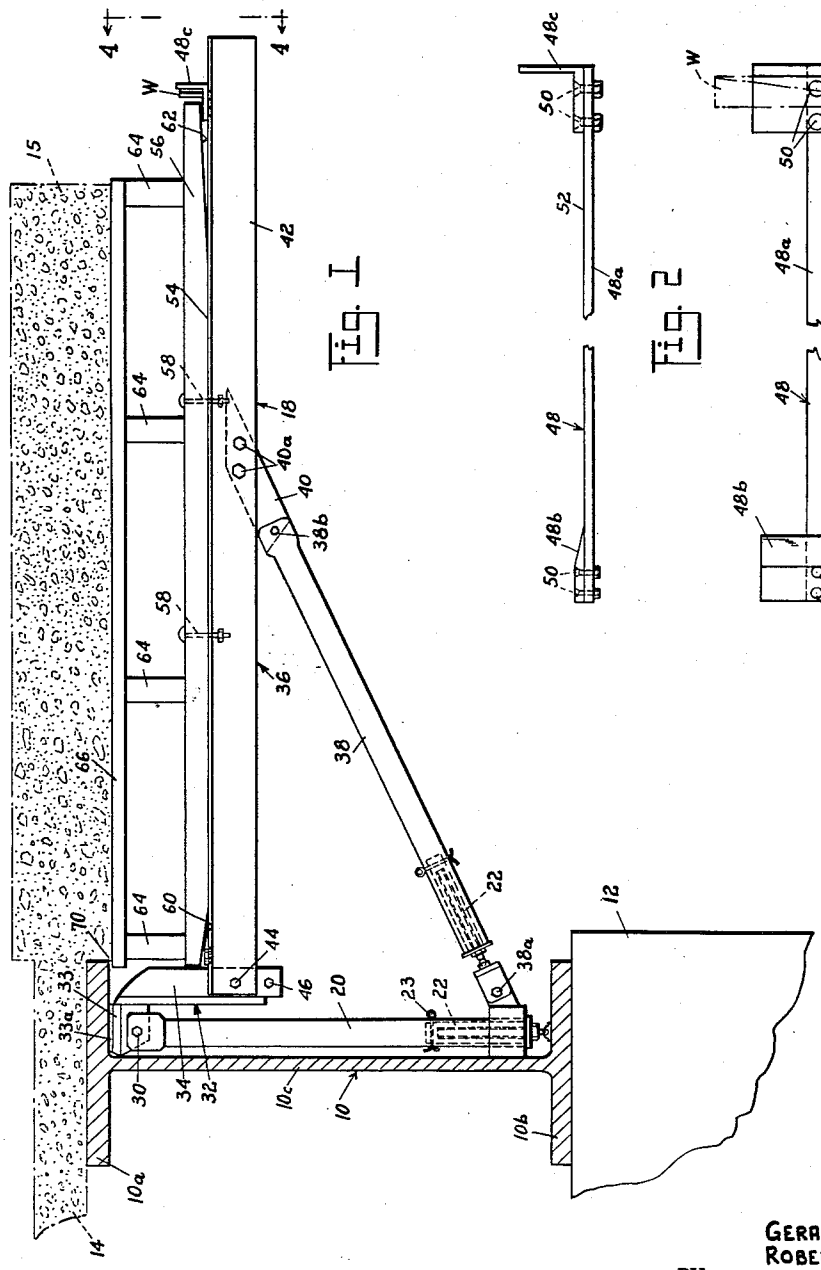


Fig. 1

Fig. 2

Fig. 3

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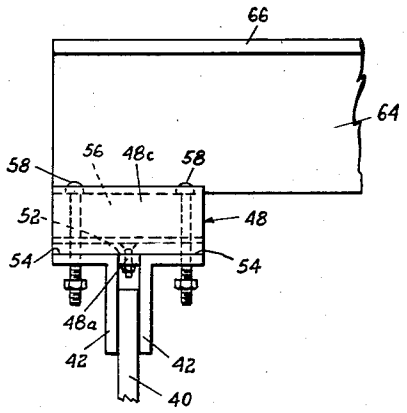
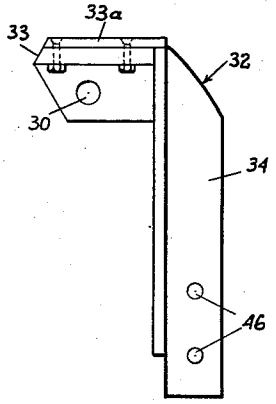


Fig. 4

Fig. 5



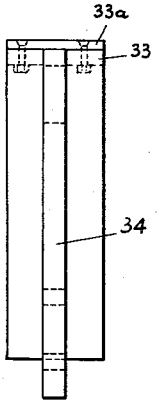


Fig. 6

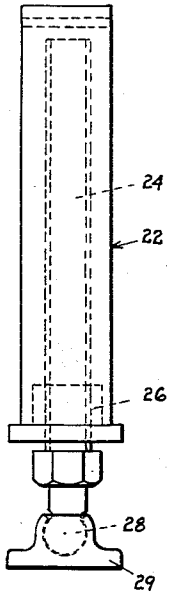


Fig. 7

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SUPPORT STRUCTURE

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This invention relates in general to support structure, and more particularly to an adjustable support structure for use in the bridge building field of endeavor.

In the construction of reinforced concrete bridges and the like, the bridge is often formed of elongated parallel girders, such as I-beams, supported on more or less vertical pier constructions. The bridge deck is supported on the tops of the I-beam girders, and often is provided with lateral overhangs of reinforced concrete, for use, such as for instance, as sidewalk areas on the bridge. These overhanging portions are conventionally known in the bridge building art as outrigger or cantilever constructions. Heretofore, the necessary pouring forms for producing such outrigger or cantilever construction have conventionally been supported on support structure which has been individually tailored to suit the dimensions of the respective bridge, and has generally been a construction produced of wooden struts which have been anchored at spaced intervals along the outermost bridge girders. Such prior art support construction has several major disadvantages, one of which is that the time and labor required for fabricating and attaching the support structure is considerable and thus expensive. Each assembly had to be generally custom fitted to the particular dimensions of the bridge girder, which varies considerably with different bridge constructions, and had to be assembled and fitted on the site. Due to the irregularities or variations in the dimensions of the girders, it was necessary to adjust the particular support structure to the particular girder, as for instance by driving wedges between the support structure and the girder at various points, to level the support structure for receiving the pouring forms. Another disadvantage of prior art arrangements is that often times the support structure had to be anchored to the bridge girder by drilling holes in the girder and utilizing fastener means therein, which of course is undesirable from a strength standpoint and in some areas is prohibited by law.

The present invention provides a fabricated support structure which is adjustable and thus can be adapted for use with varying girder sizes, and which is effective to support the necessary pouring forms for forming the overhanging or cantilever portion of a bridge structure.

Accordingly an object of the invention is to provide an improved support structure.

Another object of the invention is to provide a support structure which is particularly adapted for use with bridge construction, and which is readily adjustable for use with varying sizes of girders in bridge construction.

Another object of the invention is to provide a support structure of the latter mentioned type which embodies means for facilitating a tight joint between the support structure and a flange of an associated girder, in order to make a satisfactory joint therewith for containing the concrete utilized in forming the cantilever or overhanging portions of the bridge.

Briefly, the foregoing objects are accomplished in accordance with the invention by the provision of a support structure comprising a generally horizontally extending arm which is mounted upon a post. The post is adapted to extend vertically along the web of an outermost I-beam girder of a bridge, and is provided with a jack mechanism by which it may be anchored frictionally against the underside of the top flange and against the upper side of

the bottom flange of the bridge girder. Additionally, there may be provided a diagonal brace, extending between the arm and the post with the brace having a jack form of adjustment, and being pivotally connected to the post and to the arm, so that it may likewise be adjusted to contribute toward obtaining a horizontal supporting surface at the top of the support structure. The support structure embodies novel wedge means associated with the arm, so that the top portion of the support structure, which is adapted to form a bottom surface for supporting the concrete defining the cantilever portion of the bridge, may be vertically adjusted, so that a tight joint between the girder and the top portion of the support structure, can be obtained, and thus prevent concrete from leaking out of such joint.

Other objects and advantages of the invention will be apparent from the following description taken in conjunction with the accompanying drawings wherein:

FIG. 1 is a side elevational view of one of the platform support structures as mounted on the bridge girder;

FIG. 2 is a side elevational, broken view of the slider wedge member utilized in the support structure, for selectively raising or lowering the supporting platform portion of the support structure, upwardly into a tight joint engagement with the upper flange of the bridge girder;

FIG. 3 is an enlarged, broken, top plan view of the FIG. 2 slider wedge member;

FIG. 4 is a fragmentary, end elevational view taken generally along the plane of line 4—4 of FIG. 1 looking in the direction of the arrows;

FIG. 5 is an enlarged, side elevational view of the bracket member used to pivot the arm and platform portions of the support structure to the post;

FIG. 6 is an end elevational view taken generally from the right hand end of FIG. 5;

FIG. 7 is an enlarged, elevational view of a fabricated jack member that can be utilized in the support structure of the invention to respectively adjust the length of the post and of the brace member.

Referring now again to the drawings, 10 represents a bridge girder which, in the embodiment illustrated, is in the form of an I-beam, having upper and lower flanges 10*a* and 10*b* respectively, connected by web portion 10*c*. The bridge girder 10 is supported on generally vertical pier construction 12, and with the deck 14 of the bridge being supported on the bridge girder. The cantilever or overhanging portion 15 of the bridge construction is adapted to be produced by the use of suitable pouring forms (not shown) which forms are adapted to be supported in place by the support structure 18 of the present invention.

Such support structure 18 comprises a post member 20 which may include a threaded jack element or member 22 (FIG. 7) for adjusting the length of the post and thus adapting the support structure for use with different heights of girders. The jack member 22 is secured to the post leg as at 23 and embodies a threaded shank portion 24 which is adapted to threadingly coact with threaded sleeve 26 mounted on the jack member, and with the end of the shank 24 being provided with a universal joint connection 28, which provides for turning of the shank with respect to the base 29 of the jack and adjusting the length of the post member.

The upper end of the post member 20 is pivoted, as at 30, to a bracket member 32 (FIG. 5) which bracket member embodies a head portion 33 and a web portion 34. Web portion 34 is adapted to support the platform portion 36 of the support structure thereon. Head portion 33 may have a wear plate 33*a* secured thereto. The support structure is also provided with a diagonal brace member 38 pivoted at one end, and as at 38*a*, to the lower portion

of the post, and as at 38*b*, to a bracket member 40 attached as at 40*a* to the platform portion 36. Brace 38 may include jack mechanism 22 similar to that of the post member for selective adjustment of the length of the brace.

Referring now to FIG. 1, the platform portion of the support structure includes a pair of laterally spaced, elongated arm members 42, attached as at 44, and as by means of a bolt and nut, to the aforementioned web 34 of bracket 32. It will be seen that the web 34 has a plurality of vertically spaced openings 46 therethrough, for adjusting the position of the platform portion with respect to the web of bracket 32.

The aforementioned bracket 40 is disposed intermediate arms 42 and is secured thereto as by means of threaded fasteners. Mounted on arms 42 is a wedge slider member 48, which comprises an elongated body 48*a* having on one end thereof an inclined plane portion 48*b*, and on the other end thereof an abutment bracket member 48*c*. Portions 48*b* and 48*c* may be secured to the body 48*a* of the slider member as by means of threaded fasteners 50. The body 48*a* is received in the space or passageway defined by arms 42, and is movable lengthwise on the latter. In other words it will be seen that the top surface 52 of body portion 48*a* of slider 48 is substantially flush with the top surfaces 54 of arms 42.

Supported on the arms 42 is a nailer member 56, generally formed of a wood 2 x 4, and with such nailer member being loosely attached to the arm portions 42 as by means of threaded fasteners 58. The inner end of the nailer member is tapered, as at 60, and is adapted for coaction with the inclined plane portion 48*b* on the slider member 48 upon lengthwise movement of the latter in an outward direction. The outer end of the nailer member is likewise tapered as at 62, for clearance with respect to the abutment bracket 48*c* on the slider member 48. Stringer members 64, which may be of wood, are attached to the nailer member and a top platform portion 66 is secured to the stringer members 64. Platform portion 66 may define a supporting surface for the concrete, and also the surface to which the forms are attached for retaining the concrete forming the overhanging or cantilever portions on the bridge construction. It will be understood of course that there are a plurality of support structures attached to the girder and that the stringer members 64 and platform portion 66 extend between the nailer members 56 of adjacent of the support structures, to provide a continuous support for forming the overhanging portions of the bridge.

Now from FIG. 1 it will be seen that there is a slight clearance as at 70 between the platform portion 66 and the underside of the web 10*a* of the bridge girder. This would ordinarily permit wet concrete to run down through the joint which is clearly undesirable. Therefore, in accordance with the invention, in order to effect a tight joint between the top flange 10*a* of the girder and the platform portion 66 of the support structure, the slider member 48 is moved outwardly in its passageway between arms 42, thereby causing a wedging coaction between inclined plane portion 48*b* on the slider, and the inclined portion 60 on the nailer 56, thereby causing the loosely secured nailer and associated platform portion 66 to be moved upwardly into positive engagement with the underside of the flange 10*a* of the girder. Wedges W as illustrated in FIG. 3, may be readily used for so adjusting the joint between the platform portion 66 and the girder flange 10*a*.

In view of the fact that the pivot connection 30 between the bracket 32 and the upper end of the post is wedged against the top and bottom girder flanges upon tightening of the jack 22 associated with the post, the adjustment of the jack 22 associated with the brace 38 allows the platform to be leveled. This enables the platform portion 66 to be leveled quickly, whereas heretofore with the prior art support structure arrangements, it was necessary to

generally drive wedges between the girder flanges and the support structure. The combined adjustment of the adjustable brace and the wedge shaped slide enables the top surface of the platform portion to be quickly leveled, and locked against the top flange of the girder.

With this arrangement, it is estimated that about 75% of the labor cost of erecting and stripping operations connected with the production of the overhanging or cantilever portions of a bridge can be saved. A further advantage is that both the post element 20 and the brace member 38 can be swung around their respective pivots to make a fairly compact structure for ease of handling and transportation. The main parts of the support structure may be formed of high strength, but light weight material, such as aluminum, to increase the portability of the device.

From the foregoing description and accompanying drawings it will be seen that the invention provides a novel support structure particularly adapted for use in the construction of bridges having overhanging or cantilever portions, and wherein such support structure is readily adjustable for quickly and effectively erecting and leveling the support structure for supporting of the necessary forms for holding the concrete utilized in the production of the cantilever portions of the bridge.

The terms and expressions which have been used are used as terms of description and not of limitation, and there is no intention in the use of such terms and expressions of excluding any equivalents of any of the features shown or described, or portions thereof, but it is recognized that various modifications are possible within the scope of the invention claimed.

We claim:

1. A removable support structure for use in producing overhanging portions of a bridge construction or the like projecting outwardly of an I-beam supporting girder comprising, a post adapted for orientation between the upper and lower flanges of the bridge girder, means for selectively varying the length of said post, a bracket pivotally attached to the upper end of said post and adapted for engagement with the underside of the upper flange of the bridge girder, a support arm connected to said bracket and extending generally horizontally outwardly from said post, a bracing member extending between said support arm and said post, means on said bracing member for selectively varying the length of said bracing member, an elongated nailer member mounted on said arm and extending in the same general direction as said arm, means loosely connecting said nailer member to said arm for providing for limited vertical movement of said nailer member with respect to said arm, slider means on said arm, said slider means including wedge means adapted for lifting coaction with complementary wedge means on said nailer member upon predetermined lengthwise movement of said slider member, and means on said slider member for causing lengthwise movement thereof.

2. A support structure in accordance with claim 1, wherein said slider member comprises an elongated body portion, said arm having a lengthwise extending passageway therein, said slider member being adapted to be received in said passageway in said arm for movement lengthwise thereof, said wedge means on said slider member comprising a laterally extending plate having an inclined plane surface on the top surface thereof, and a laterally extending abutment plate on the other end of said body portion for supporting said slider member on said arm.

3. A removable support structure for use in producing overhanging portions of a bridge construction or the like comprising a post, means for selectively varying the length of said post, a generally horizontal supporting arm extending outwardly from said post, said arm comprising a pair of members spaced laterally with respect to one another to define a passageway therebetween, a nailer member supported on said arm and extending in the same general direction as said arm, means loosely connecting

said nailer member to said arm, means on said arm and on said nailer member for vertically adjusting the position of said nailer member with respect to said post, said last mentioned means comprising a slider member having a body disposed in said passageway and movable therealong, said body at one end thereof having an inclined plane portion adapted for coaction with a complementary inverted inclined plate portion on said nailer member, and on the other end thereof having an abutment portion adapted for coaction with said nailer member to force said slider member outwardly, thereby raising said nailer portion.

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