Oct. 14, 1958 K. G. A. BROMS ET AL 2,855,617

BRIDGE SUPPORTING STRUCTURE

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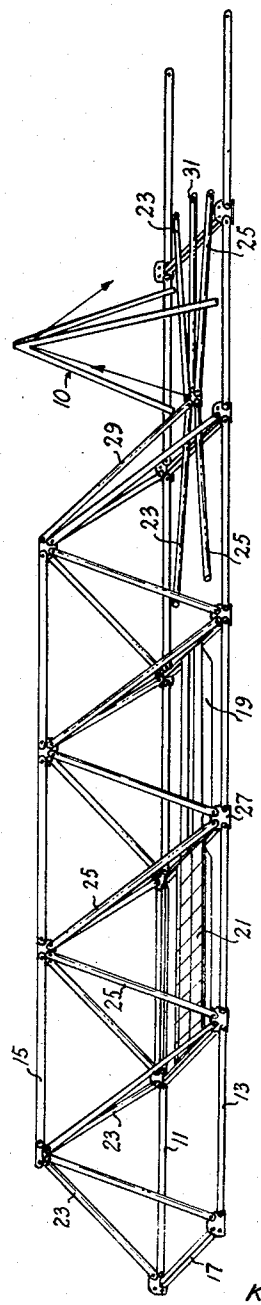


Fig. 1

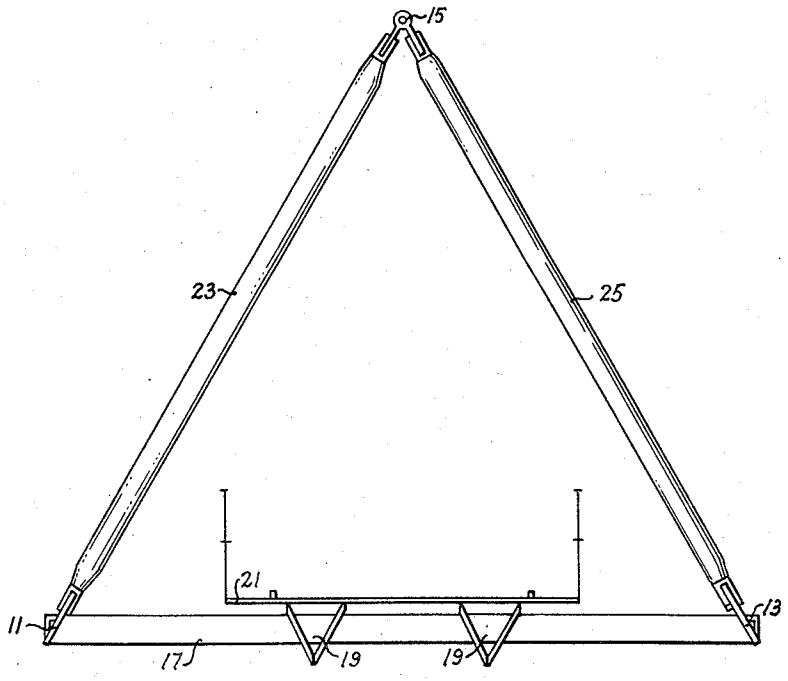
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Fig. 2



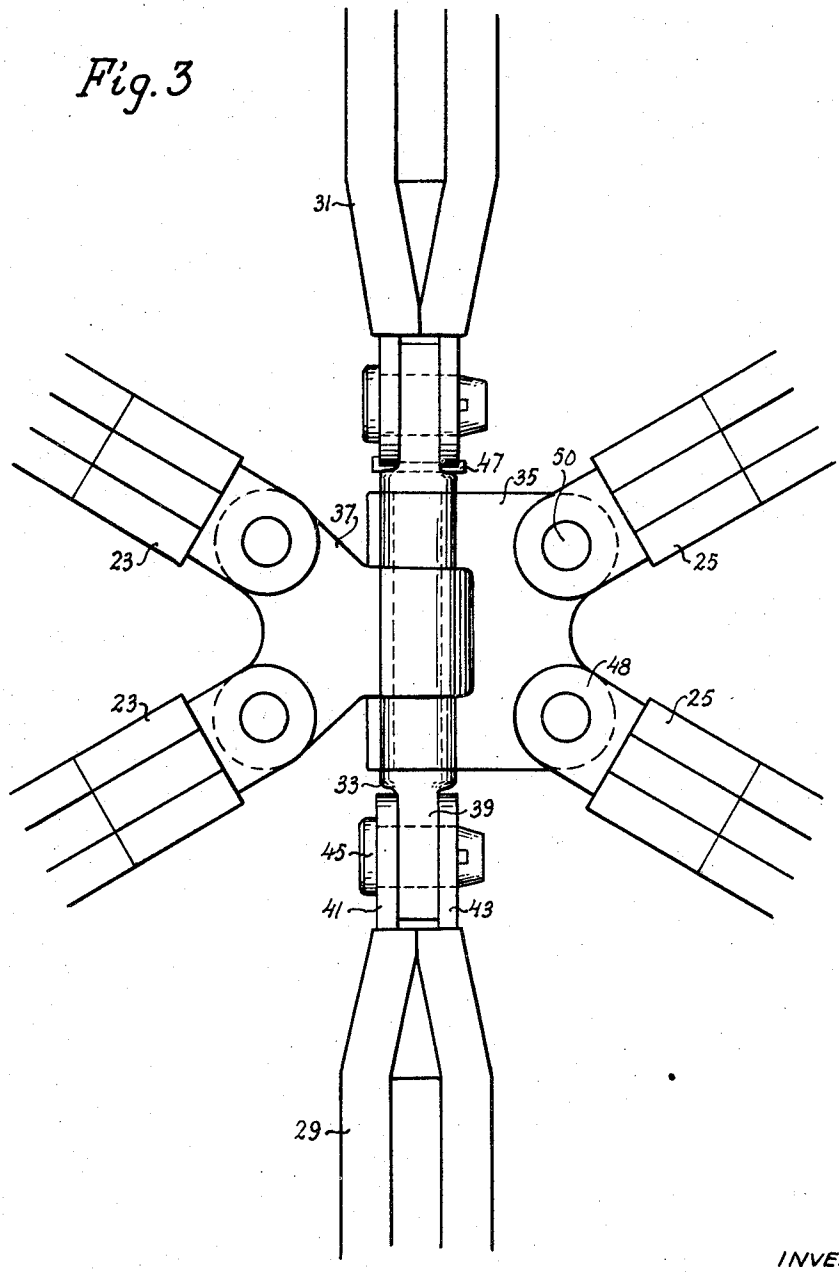
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Fig. 3



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BRIDGE SUPPORTING STRUCTURE

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Fig. 4

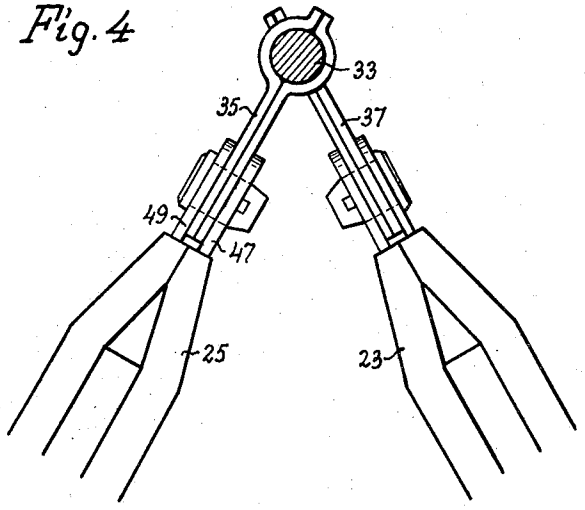
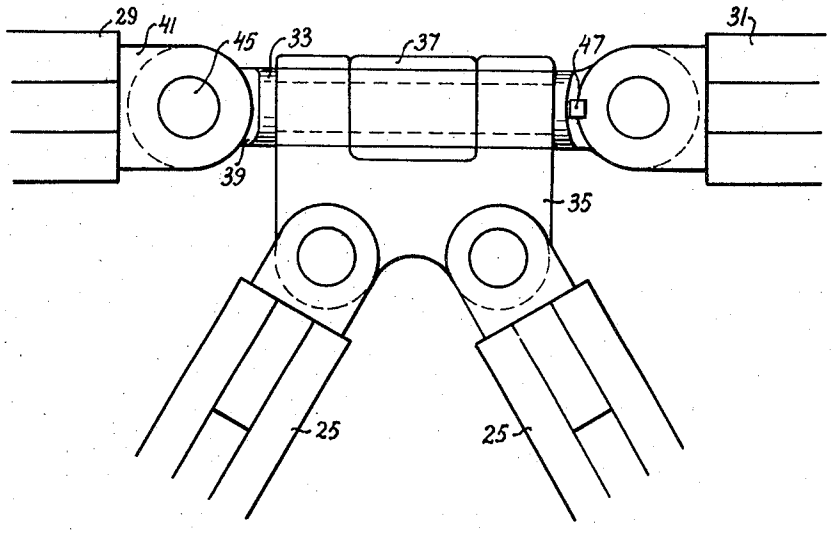


Fig. 5



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BRIDGE SUPPORTING STRUCTURE

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Application March 9, 1954, Serial No. 414,990

Claims priority, application Sweden March 12, 1953

3 Claims. (Cl. 14—13)

The present invention relates to a bridge supporting structure of the type comprising a top boom and two bottom booms connected to each other by struts so as to form a trussed framework on both sides of the bridge. In a cross section the bridge structure has the configuration of an isosceles triangle, the booms being placed at the points of the triangle. At least four inclined struts are connected to each joint of the top boom. Such a structure may form a bridge in itself, the flooring being arranged within the same between the two bottom booms, or two such structures, each forming a girder of the bridge, may be placed at the side of each other and carry the flooring between them.

The object of the invention is to make said type of bridge suitable for military or similar purposes where it is desired to assemble or disassemble the bridge rapidly and in a simple and convenient manner. It is also an object of the invention to develop a bridge design which is adapted for pre-fabrication and mass production, thus reducing the cost of the bridge. According to the invention these objects are attained by having the top boom consist of boom members pivotally connected to each other, and providing at least four struts which are connected to each joint of the top boom in such a manner as to be universally connected. Due to said feature, when assembling the bridge, said boom members and struts may be connected together while they lie on the ground and are easily accessible, and they may afterwards be raised to their final positions which they take up in the finished bridge. According to a further development a particular connector means is inserted between successive top boom members, and one or both of said members and all struts are pivoted to said connector means. Said connector means preferably comprises strut attachment means rotatable about an axis parallel to the top boom. The oblique struts may be rotatable on their attachment means about axes forming right angles to the first-mentioned axis. In a preferred embodiment, the attachment means for struts on the same side of the bridge are built together to form a unit in the shape of a hinge.

The invention will be more closely described in the following with reference to the accompanying drawings. Fig. 1 is a perspective view of a bridge constructed according to the invention showing parts assembled and other parts disassembled. Fig. 2 is a cross section of the bridge. Figs. 3, 4 and 5 show a joint between the top boom and four oblique struts, Fig. 3 is a top plan view of the different parts in their spread position, Fig. 4 is a front elevational and partly cross-sectional view of the erected bridge, and Fig. 5 is a side elevational view.

As shown in Figs. 1 and 2, the bridge has a supporting structure in the shape of a framework having a triangular cross section, which comprises three parallel booms and struts between them. Two bottom booms **11** and **13** are arranged with a suitable distance at the side of each other, and a top boom **15** is placed above and centrally between the bottom booms, so that in a cross section of the bridge the booms are located at the points

of an equilateral or isosceles triangle. The bottom booms are held together by cross bars **17** serving also to carry the flooring of the bridge. Said flooring consists of longitudinal triangular trussed beams **19** or common beams, the ends of which are supported by the cross bars **17**, and of planks, boards or similar laid across said beams. The top boom **15** is connected to the bottom boom **11** by means of oblique bars or struts **23** in such a manner that these parts form together a plane lattice on the far side of the bridge (in Fig. 1). The top boom **15** is connected in the same manner by means of oblique bars or struts **25** to the bottom boom **13**, forming a plane lattice on the near side of the bridge. The booms consist of a number of individual boom members following upon each other and each being of a length corresponding to the distance between the points where the struts are attached. The boom members as well as the struts have their ends suitably designed for easy connection to a special connector means arranged at the joints of the bridge framework. In the bottom boom these connector means consist of junction plates **27** of a conventional design, whereas the top boom members and the diagonal struts are connected together by means of a connector means of the kind closer shown in Figs. 3 to 5. Said connector means is of a new design developed especially for facilitating the assembling and disassembling of the bridge. If desired, the connector means may be made integral with one of the top booms.

Referring to Figs. 3 to 5, **29** and **31** designate two substantially horizontally aligned spaced portions or members of the top boom. Inserted between them is a connector means consisting of a short cylindrical rod or bolt **33** and strut attachment hinges **35**, **37** turnable thereon to provide a hinge assembly. At each end the rod **33** is a flattened part **39** inserted between lugs **41**, **43** on the end of the top boom member **29** or **31**. A horizontal pin **45** projects through and connects said parts so that a joint allowing articulation in the vertical plane is formed. By means of a pin **47** inserted into a bore in the part **39** and into slots in the lugs **41**, **43** the rod **33** may be locked in a position in line with the top boom member **31**.

The strut attachment means or hinge **35** consists of two plates riveted together and having semicircularly bent part embracing the rod **33**, whereby said hinge **35** is rotatable about said rod **33**. The same applies to the strut attachment means or hinge **37**. The hinge **35** embraces the ends of the rod **33**, whereas the hinge **37** embraces the centre part of said rod. The diagonal struts **23** located at one side of the bridge are fastened to one and the same hinge **37**, and similarly the hinge **35** is common to the diagonals **25** located at the other side of the bridge. Of course, it is possible as an alternative to provide four independent hinges, viz. a separate one for each diagonal strut. Each one of the struts ends in a fork **48** which encloses the outer edge of the hinge. A pin **50** extending through said fork and said hinge edge forms a joint, the turning axis of which is located at right angles to the axis of the bolt **33**. Each diagonal strut thus being pivoted about its individual pin **50** and also about the common bolt **33** at right angles thereto, a universal joint is formed at the upper end of each one of the struts. As a consequence thereof, the top boom members and the diagonal struts meeting at the upper junction points of the bridge supporting structure can be connected together in the convenient manner illustrated in the right-hand part of Fig. 1. While the top boom member **29**, previously having been fastened at one of its ends, takes the oblique position shown, a connector means **33** to **37** is attached thereto. Then four struts **23**, **25** and a further top boom member are attached to said connector means, while all these parts are placed in the horizontal plane

at the approximate level of the bottom booms. Preferably by means of a suitable crane **10** or any other lifting device, the top boom member and the struts are then raised, so that the ready-mounted joint reaches the same level as the other joints of the top boom. Thereafter the lower ends of the four diagonal struts are attached to the junction plates at the bottom booms. Finally the pin **47** is put into its place, this being the only measure that has to be performed at the level of the top boom. As an alternative, the rod **33** could be also locked automatically by means of a spring-operated catch or similar.

The above described invention may also be applied in cases where the struts differ somewhat from the one shown in the drawing. For instance, some of the struts connected to the joints between the top boom members may lie in a vertical plane perpendicular to the longitudinal direction of the bridge and thus form verticals or posters instead of diagonals in the lattice at one side or both sides of the bridge. Such vertical struts may replace one or more of the diagonal struts or may be present in addition thereto. In the latter case, the number of struts connected to one and the same upper joint will be greater than four.

We claim:

1. A bridge supporting structure having in combination, two spaced horizontal bottom booms, a sectional top boom between and above said bottom booms and substantially parallel thereto, struts connecting the top boom to said bottom booms, said top boom including spaced boom bars, a rod between and in axial alignment with adjacent boom bars, means pivotally connecting the ends of the rod to adjacent boom bars, a hinge assembly for providing a universal connection of the struts with said rod, said assembly including a hinge plate journalled to said rod for pivotal movement about the longitudinal axis of said rod, means pivotally connecting the struts on one side of the top boom to said hinge plate, a coacting hinge plate journalled to said rod for pivotal movement about the longitudinal axis of said rod, and means pivotally connecting the struts on the other side of the top boom to said coacting hinge plate, the parts being constructed and arranged so that the upper ends of the struts are pivotally connected to said plates to be movable thereon about axes substantially at right angles to the longitudinal axis of said rod.

2. A bridge supporting structure comprising two spaced parallel bottom booms, a top boom arranged above and between said bottom booms, said top boom including spaced boom members, rod means pivotally connecting said boom members together for relative pivotal movement thereof about an axis perpendicular to the axes of said members, hinge means journalled to said rod means for swinging movement about the longitudinal axis of said rod means, a plurality of struts, each of said struts having one end pivotally connected to said hinge means for pivotal movement about an axis perpendicular to the longitudinal axis of said rod means, and having another end pivotally connected to one of said bottom booms whereby said struts may pivot bodily with the hinge means with respect to the axis of said top boom and whereby each strut may pivot about the axis of its connection to said hinge means.

3. The structure defined in claim 2 wherein the hinge means comprises a plurality of plate members, each of said plate members having at least one circular sleeve therein loosely embracing the rod means and also having at least one circular aperture therein, a pivot pin extending through one of the struts and being mounted in said aperture, the axes of said pivot pin and said rod means being perpendicular to each other.

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