July 12, 1932. F. AURYANSEN 1,866,613

BRIDGE

Filed June 6, 1929 3 Sheets-Sheet 1

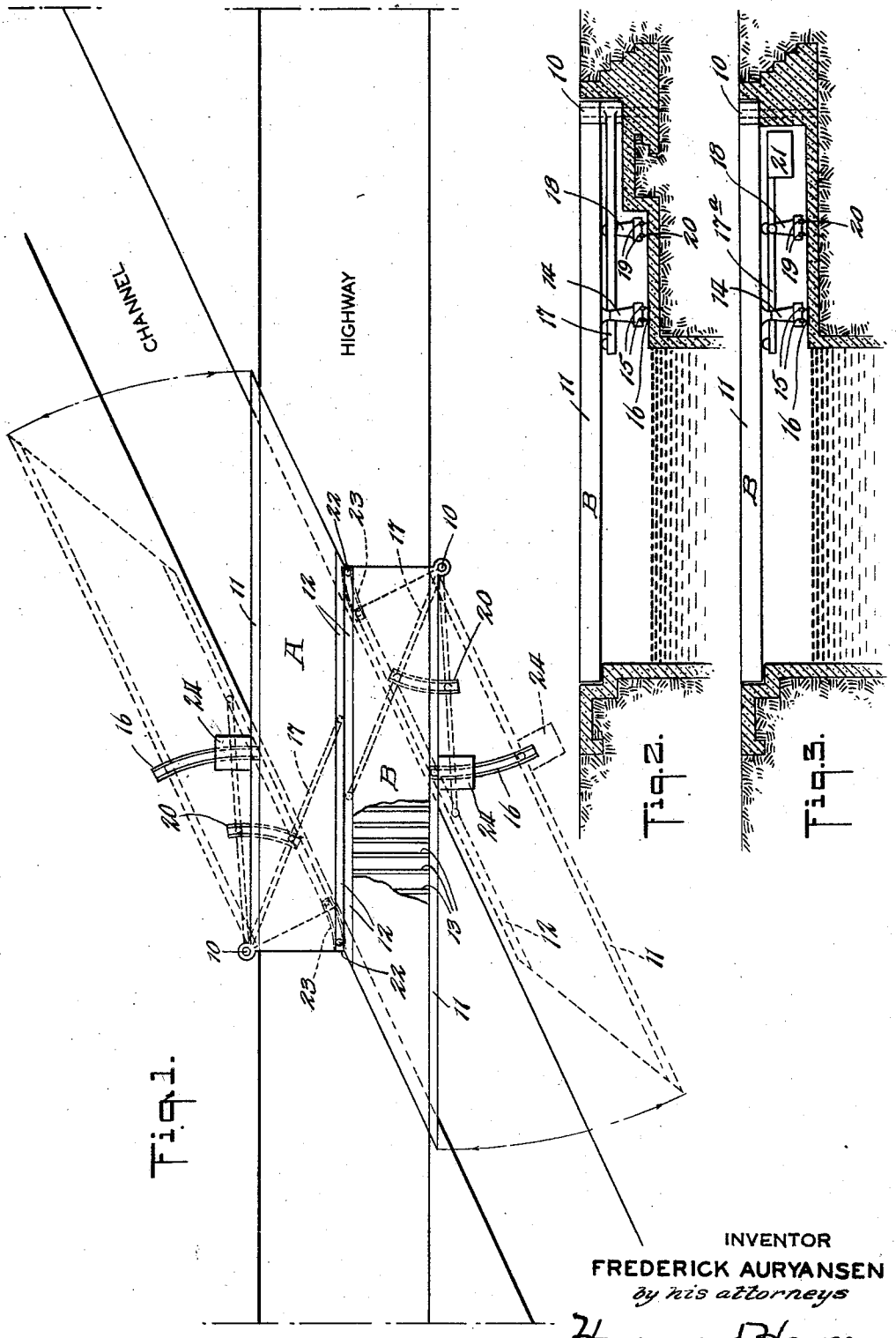


Fig. 1.

Fig. 2.

Fig. 3.

INVENTOR
FREDERICK AURYANSEN
by his attorneys
Howson and Howson

July 12, 1932. F. AURYANSEN 1,866,613

BRIDGE

Filed June 6, 1929 3 Sheets-Sheet 2

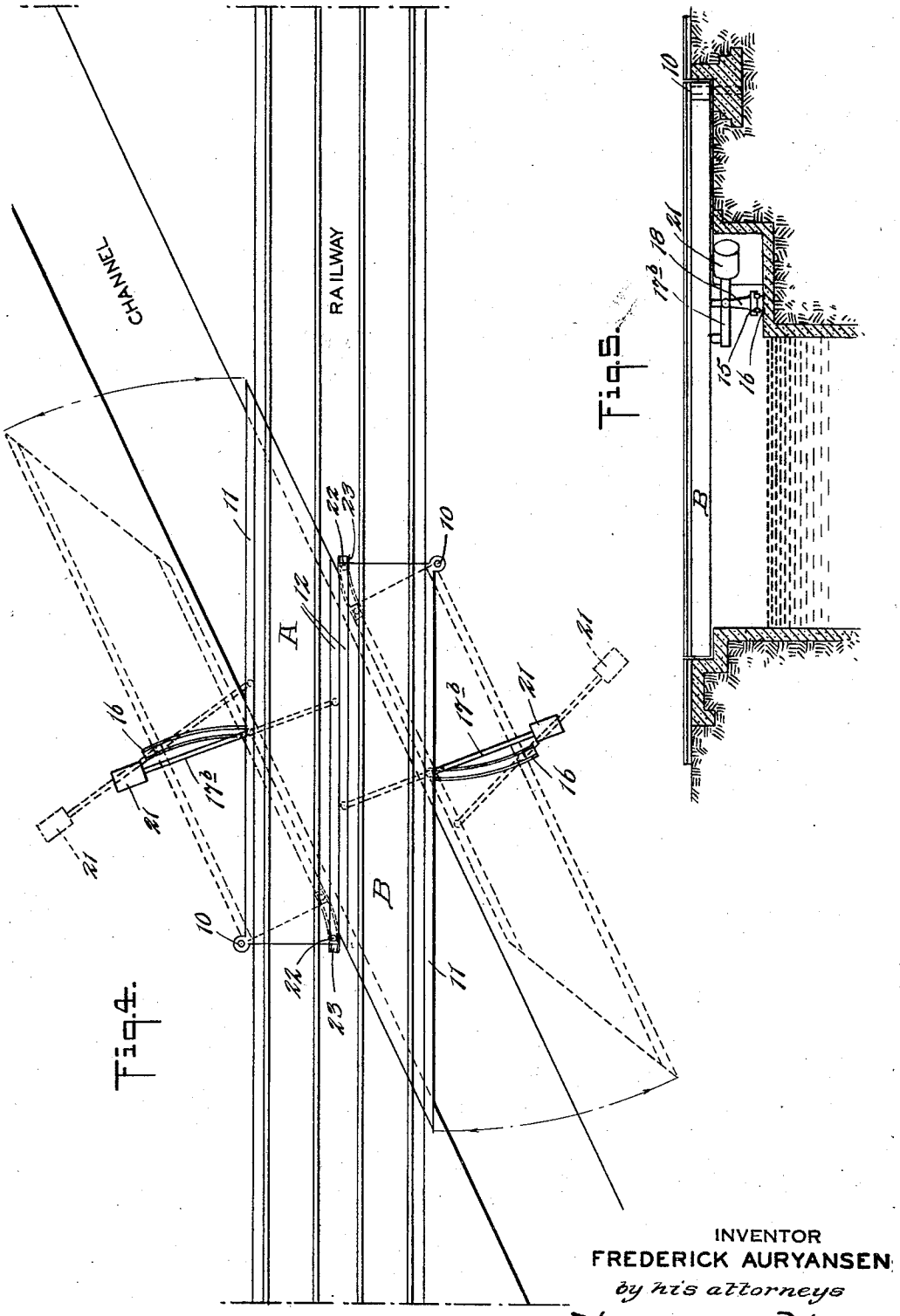


Fig. 4.

Fig. 5.

INVENTOR
FREDERICK AURYANSEN
by his attorneys
Howson and Howson

July 12, 1932. F. AURYANSEN 1,866,613

BRIDGE

Filed June 6, 1929 3 Sheets-Sheet 3

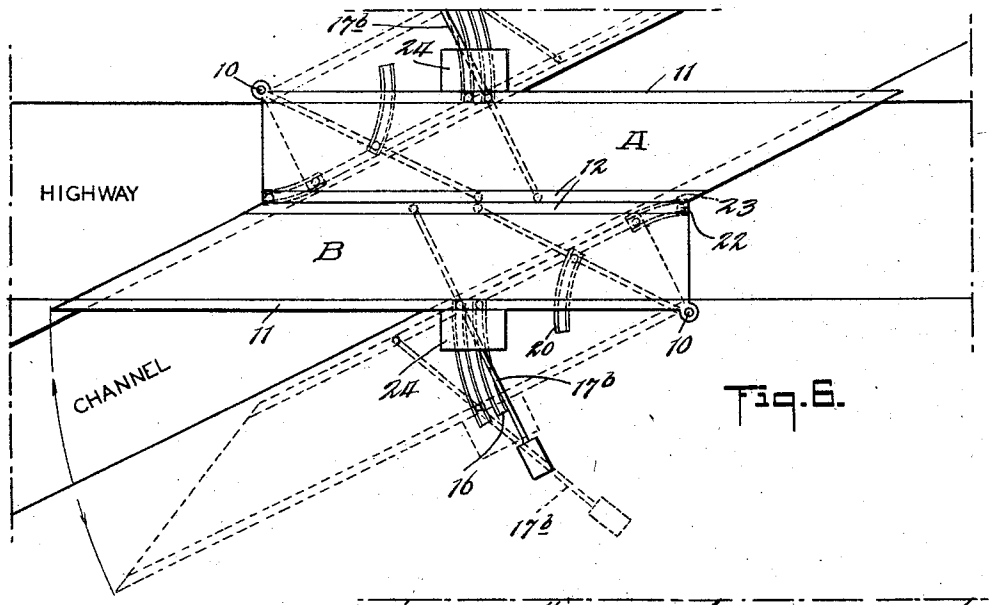


Fig. 6.

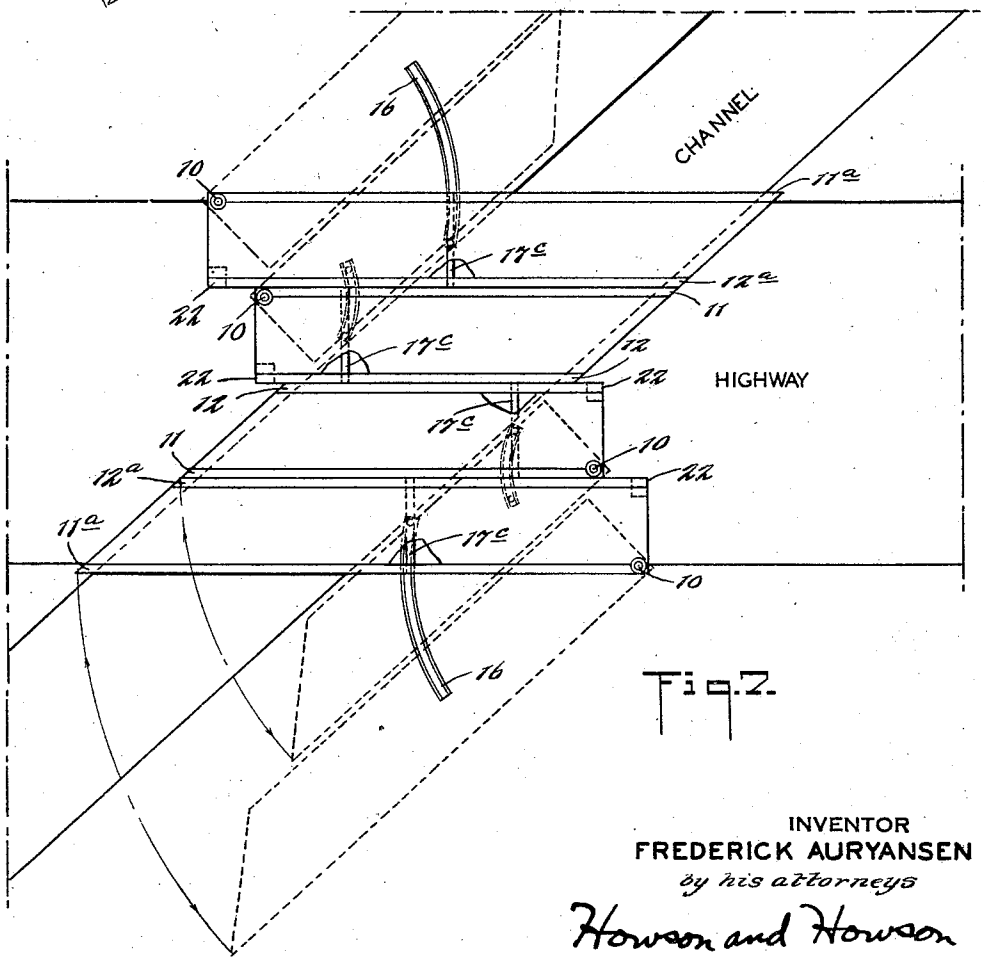


Fig. 7.

INVENTOR
FREDERICK AURYANSEN
by his attorneys
Howson and Howson

Patented July 12, 1932

1,866,613

UNITED STATES PATENT OFFICE

FREDERICK AURYANSEN, OF JAMAICA, NEW YORK

BRIDGE

Application filed June 6, 1929. Serial No. 368,800.

My invention relates to bridges, and more particularly bridges which swing horizontally. The invention is especially useful in connection with skew bridges, or bridges which cross a channel at an angle, but its use is not limited to such bridges.

An object of the invention is the provision of a swing bridge having a minimum weight and costing a minimum amount. Another object is the provision of a swing bridge which may be constructed in a minimum of headroom. A further object is the provision of a swing bridge which may be operated with a minimum of power. Still a further object is the construction of a bridge in multiple complete units, one or more of which may be in use before the other units are added, or the construction of units which may be added to widen an existing bridge. Other objects will be apparent upon consideration of the present specification.

The invention is illustrated by way of example in the accompanying drawings wherein—

Figure 1 is a plan view of a bridge constructed in accordance with the invention,

Fig. 2 is an elevation of Fig. 1, partly in section,

Fig. 3 is an elevation similar to Fig. 2 illustrating a modification of the invention,

Fig. 4 is a plan view of another modified form of the invention,

Fig. 5 is an elevation of Fig. 4, partly in section,

Fig. 6 is a plan view of a further modification of the invention, and

Fig. 7 is a plan view illustrating how different elements of a bridge constructed in accordance with the invention may be combined.

It is a well recognized fact that of all draw-bridges the swing bridge, which turns horizontally about a vertical axis is the most economical type, under surrounding conditions which make its use permissible. In many cases, however, the usual type of swing bridge, which is symmetrical both longitudinally and transversely about the central pivot, or vertical axis of rotation, cannot meet the requirements of the site. Under such conditions recourse must be had to other types of bridge or to a different type of swing bridge. Thus there has been developed what is known as the "bob tail" bridge, which is a swing bridge symmetrical transversely about the pivot but not longitudinally symmetrical about the pivot. The shorter end of the "bob tail" bridge must be counterweighted to compensate for the excess dead weight of the longer end when turning or open and therefore off of its wedge supports.

I have found that it is possible to construct a new type of swing bridge which is of lighter weight, less expensive, simpler, and more easily and economically operated than known types of bridges.

My invention consists of a swing bridge pivoted at one corner and adapted to rotate horizontally about the pivot. The bridge may be divided longitudinally, that is to say it may be formed in two independent longitudinal strips or segments each of which is a complete bridge across the channel. The separate strips or segments are preferably used in pairs similar in shape and design. The bridge preferably has no supports within the channel which it crosses.

Referring now more specifically to the drawings, there is shown a bridge formed in two longitudinal segments A and B. Pivots 10 are provided at opposite ends of the bridge about which the segments swing. The pivots are located at opposite outer corners of the segments.

The segments comprise two longitudinal main girders, consisting of an outer girder 11 and an inner girder, 12. (More than two main girders may, of course, be employed.) To these girders may be attached floor beams 13 which carry a deck or tracks. A pivot 10 is placed at one end of the outer girder 11 of one segment, and the corresponding pivot is placed at the opposite end of the outer girder 11 of the other segment. To open the bridge the two segments A and B are swung away from each other about their respective pivots.

The bridge is here illustrated as a skew bridge; that is to say, a bridge which crosses a channel at an angle. The pivoted end of each segment is square at the abutment, but

the opposite end is skewed or raked at an angle which conforms substantially with the angle which the channel makes with the bridge. Thus the outer main girder 11 is longer than the inner main girder 12. Each segment is pivoted at its most inland corner.

The bridge is supported by wedges in the usual way when it is closed. When the bridge swings or is open other means of support are provided. When the wedges are released for operating the bridge the outer main girder is anchored at the pivot and is supported at an intermediate point by a member 14 which is carried by rollers 15 running on an arcuate track 16. The end of the girder 11 most inland, is anchored to the pivot 10 by means which permit it to rotate about the pivot, and the pivot is anchored to its foundation, so that the pivot and its foundation perform the function of a counterweight to balance the portion of girder 11 which extends beyond member 14 and across the channel. The inner girder 12, however, extends over the channel for nearly its entire length. I prefer to support the inner girder by means of a balance beam 17 an end of which supports the girder at an intermediate point. The balance beam is carried near its midpoint by a member 18 which may be similar to the member 14. The member 18 is in turn carried by rollers 19 running on an arcuate track 20. The other end of the balance beam is counterweighted. In Figs. 1 and 2 the balance beam 17 is shown as counterweighted by being attached to the pivot 10 the foundation of which acts as a counterweight. In Figs. 3, 4 and 5 there is shown an actual counterweight 21 attached to the free end of the balance beam.

The bridge corner 22 which is nearest the pivot 10 may also be carried on rollers (not shown) running on an arcuate track 23.

I prefer to place the machinery for operating the bridge at a point 24 adjacent the member 14 which supports the outside girder 11. However, this machinery may be placed at any convenient point.

Where the pivot foundation will serve as a counterweight only to a limited extent, I may balance only part of the weight of the inner girder by means of a pivot foundation, supporting the remainder of the weight by means of a separate balance beam 17*b* such as that illustrated in Fig. 4. Such a construction is illustrated in Fig. 6. It is to be understood that although two adjacent tracks 16 and 25 are here shown for carrying the weight of the outside girder 11 and the separate balance beam 17*b*, a single track may be used for this purpose by employing a construction such as that illustrated in Fig. 4.

Still another construction of counterweight and balance beam is illustrated in Fig. 7. Here the weight of the inner main girder is carried on the end of a balance beam 17*c* whose other end is fastened to the outer main girder. The usual track support is provided for an intermediate point on the balance beam 17*c*. The unpivoted square corner 22 of the segment is counterweighted to complete the balance.

It is to be noted that the main girders 11, 12 of the divided bridge are shorter than would be the similar parts of an undivided bridge, which, together with supports for the main girders at intermediate points permits the use of girders of comparatively less depth, strength, and weight. This results in economy of material as well as making possible the construction of bridges of this type where very limited headroom is available. In addition, building the bridge in two segments makes it possible to build each segment of lighter construction; the floor beams are shorter, therefore of less depth, and weight, resulting in further economy of material not only in the floor system, but also in the main girders, supports, rollers, tracks and foundations.

The operation of the separate sections is exceedingly easy because of their lighter weight. The cost of the operating machinery may therefore be considerably less that that of such machinery on known types of bridges. The operating cost will be correspondingly less. Also the effort required to turn the bridge by hand in case of emergency will be much less than that required for a bridge consisting of a single moving structure of considerably more than twice the weight.

It will also be realized that only part (for instance, one longitudinal segment) of the bridge need be built at first, and that the other part need be built only when sufficient traffic develops to warrant the addition. Further, more units still may later be added to the bridge, as illustrated in Fig. 7, to take care of even greater traffic. The smaller units can be more quickly erected than can larger units: hence the partial bridge can be put in service sooner after a decision to build it is reached than would be the case with other types of bridges, and while in use the remainder of the structure may be completed.

In similar manner, an existing bridge may be further widened by building additional adjacent sections while the original bridge is in service. Fig. 7 illustrates a bridge which has been widened by the addition of two more segments: one on the outside of each of the original segments.

The examples here described and illustrated are merely given to indicate how the invention may be applied. Other embodiments which fall within the proper scope of the invention will readily occur to those skilled in the art.

I claim:

1. A swing bridge formed in two longitudinal segments and pivots at diagonally opposite corners of the segments about which the respective segments swing.

2. A swing bridge formed in two longitudinal segments, and pivots at opposite ends of the bridge at opposite outer corners of the respective segments about which the latter swing.

3. A swing bridge formed in two longitudinal segments each comprising a plurality of longitudinal main girders, and a pivot at one end of one outer main girder and another pivot at the opposite end of the other outer main girder, said pivots being the points about which the respective segments swing, in combination with a counterweighted balance girder supporting the inner main girder of each segment at an intermediate point thereon.

4. A swing skew bridge comprising a plurality of longitudinal segments, each segment being pivoted for horizontal swinging at its most inland corner, substantially as described.

5. A swing skew bridge formed in two longitudinal segments, each segment comprising an outer longitudinal main girder and an inner longitudinal main girder which is shorter than said outer main girder, each of said outer main girders being supported at an intermediate point upon an arcuate track, and each of said inner main girders being supported at an intermediate point by a counterweighted balance beam.

6. A swing skew bridge formed in two longitudinal segments, each segment comprising an outer longitudinal main girder and an inner longitudinal main girder which is shorter than said outer main girder, each of said outer main girders being supported at an intermediate point upon an arcuate track, each of said inner main girders being supported at an intermediate point by a counterweighted balance beam and a pivot about which each segment swings at one end of its outer longitudinal main girder, substantially as described.

7. In a counterweighted swing bridge, two longitudinal segments, pivots at opposite ends of the bridge and at opposite outer corners of the respective segments about which the segments swing, anchorages in which said pivots are fast, and a foundation carrying each anchorage, said pivots, anchorages and foundations acting as counterweights for their respective segments.

8. A swing bridge formed in two longitudinal segments each comprising a plurality of longitudinal main girders, and a pivot at one end of one outer main girder and another pivot at the opposite end of the other outer main girder, said pivots being the points about which the respective segments swing, in combination with a counterweighted balance girder supporting the inner main girder of each segment.

9. A swing skew bridge formed in two longitudinal segments, each segment comprising an outer longitudinal main girder and an inner longitudinal main girder, each of said outer main girders being supported at an intermediate point upon an arcuate track, and each of said inner main girders being supported by a counterweighted balance beam.

10. A skew swing bridge comprising a longitudinal segment having one end approximately at right angles to its length, crossing a channel and being pivoted at the corner of said end which is the more distant from the channel.

11. A skew swing bridge comprising a longitudinal segment having one end approximately at right angles to its length, crossing a channel and being pivoted at the corner of said end which is the more distant from the channel, said segment being adapted to cooperate with one or more similar segments to form a bridge wider than said segment.

In testimony whereof I have signed my name to this specification.

FREDERICK AURYANSEN.