No. 773,729. PATENTED NOV. 1, 1904.

A. GEISEL.

BRIDGE.

APPLICATION FILED DEC. 26, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

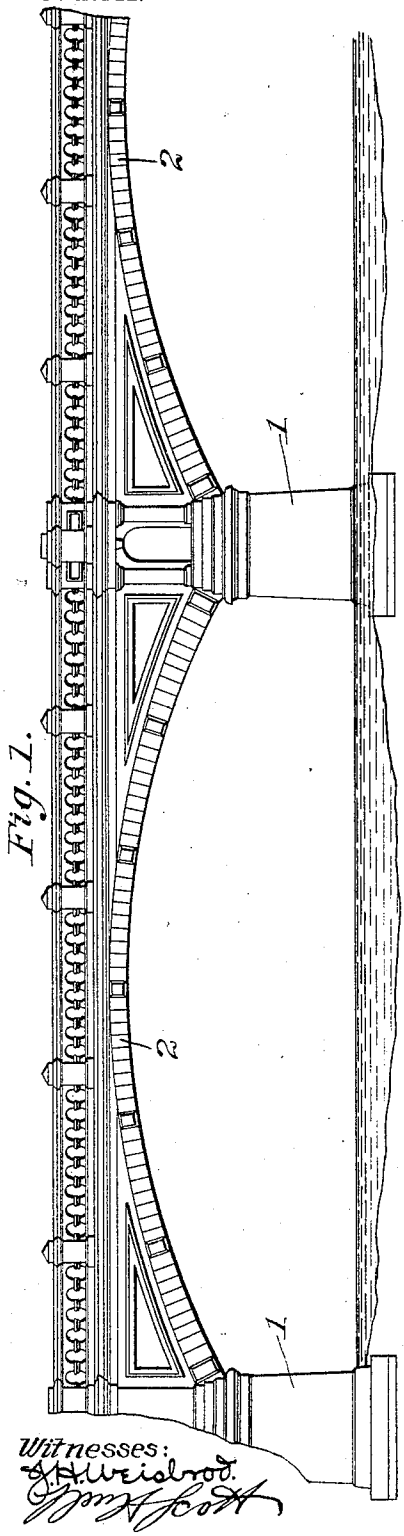


Fig. 1.

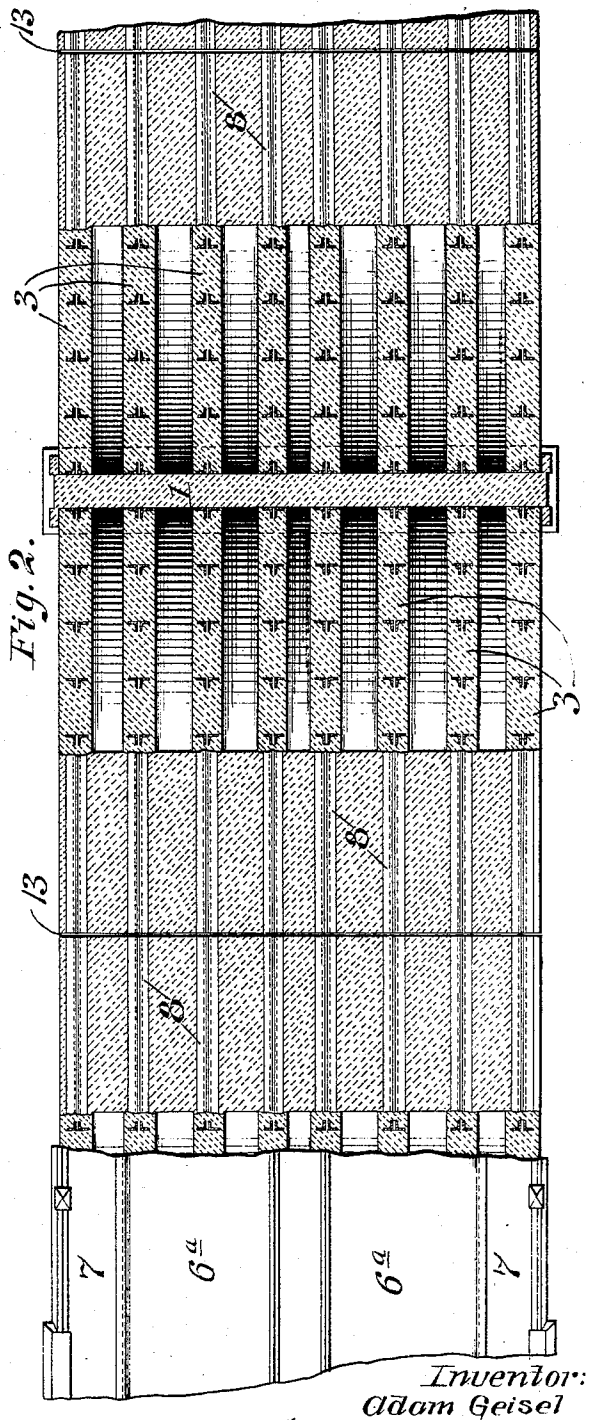


Fig. 2.

Witnesses:
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Wm. H. Scott

Inventor:
Adam Geisel
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NO MODEL. 2 SHEETS—SHEET 2.

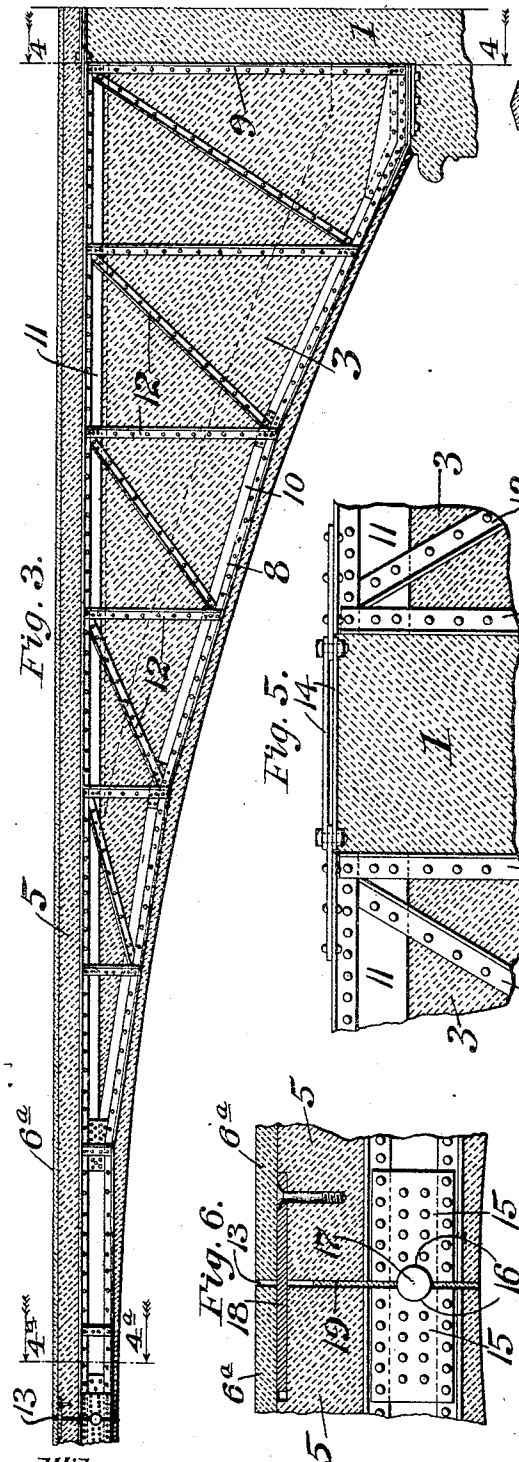


Fig. 3.

Fig. 5.

Fig. 6.

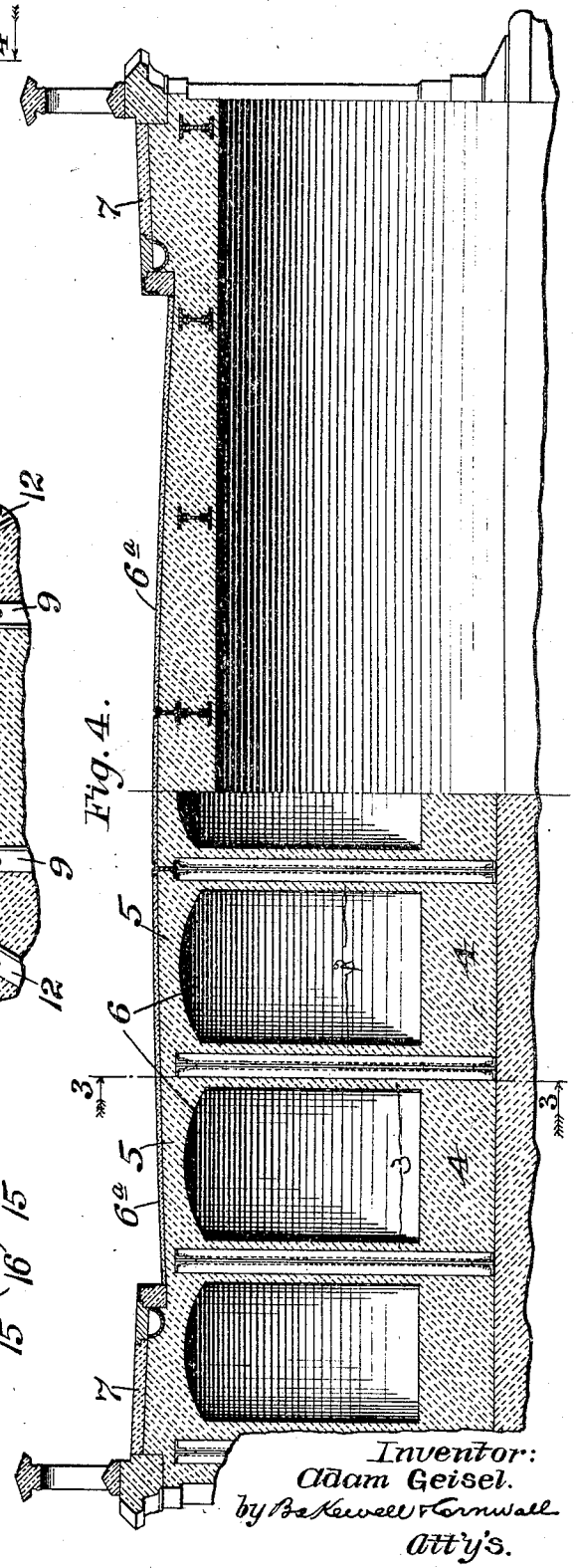


Fig. 4.

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No. 773,729. Patented November 1, 1904.

UNITED STATES PATENT OFFICE.

ADAM GEISEL, OF ST. LOUIS, MISSOURI.

BRIDGE.

SPECIFICATION forming part of Letters Patent No. 773,729, dated November 1, 1904.

Application filed December 26, 1903. Serial No. 186,747. (No model.)

To all whom it may concern:

Be it known that I, ADAM GEISEL, a citizen of the United States, residing at St. Louis, Missouri, have invented a certain new and useful Improvement in Bridges, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a side elevation of a bridge constructed in accordance with the present invention. Fig. 2 is a top view, partly in plan and partly in horizontal section. Fig. 3 is a vertical sectional elevation on about the line 3 3 of Fig. 4. Fig. 4 is a transverse sectional elevation, partly on about the line 4 4 of Fig. 3 and partly on about the line 4^a 4^a thereof. Fig. 5 is an enlarged fragmentary longitudinal section showing those ends of adjacent trusses which are supported directly upon a pier, and Fig. 6 is an enlarged fragmentary longitudinal section showing the meeting ends of adjacent trusses in the center of an arch.

This invention relates to improvements in bridges, the primary object being to provide a strong and efficient structure which can be readily built.

To this end and also to improve generally upon structures of the character indicated the invention consists in the various matters hereinafter described and claimed.

Referring now more particularly to the drawings, 1 indicates the piers of a bridge, between which extend the spans or arch-sections 2. Each span or arch-section is composed of a plurality of longitudinally-extending arched webs 3, which are connected at their bottoms by means of horizontal cross-sections 4 and at their tops by horizontal cross-sections 5, which are arched at their under surfaces, as shown at 6. These horizontal cross-sections adjoin each other, as well as the before-mentioned longitudinally-extending webs 3, so that a continuous top and bottom are presented for the bridge. The surfacing for the roadway 6^a and sidewalks 7 is placed upon this continuous top. The connected longitudinally-extending arched webs 3, the connection between the tops of said webs being produced by the arch-sections 5, present, as will be apparent, a very strong structure capable of sustaining great weight.

Trusses or girders 8, of steel or the like, are embedded in the webs 3. The construction of the trusses is best illustrated in Fig. 3, each truss having a vertical end member 9 at its outer end—*i. e.*, the end which rests upon the pier or abutment—a compression member 10, a tension member 11, and suitable braces 12 extending between said compression and tension members. Each truss is of a generally triangular shape, as illustrated in Fig. 3. A truss of the general construction just described is old and well understood, and therefore needs no detailed description at this time. Two such trusses are employed in the length of each span between adjacent piers, the inner ends of the trusses being adjacent to each other at the crown of the arch and the outer ends resting upon the piers 1 in a manner which will be readily apparent.

The present structure is particularly applicable to bridges which are composed chiefly of concrete or cement. After the trusses are placed in position upon the piers or abutments the cement webs 3 and cross-sections 4 and 5 are molded, the said trusses being thus embedded in the concrete, forming a bond with and strengthening the latter in a manner which will be readily apparent and the concrete serving to protect the metal trusses and preventing rusting of the latter. Each cement web 3 extends across the bridge, (except that the bridge is preferably transversely split at the crown of each arch, as shown at 13,) and preferably tie-plates 14 extend between the outer ends of adjacent trusses and are embedded in the concrete between such trusses, whereby the various sections of the bridge are firmly tied together.

As previously indicated, the bridge is preferably split transversely at the crown of each arch, as shown at 13, whereby each span of the bridge is a sectional one composed of two sections in order to permit expansion and contraction without injurious effects upon the bridge. Preferably the inner end plates 15 of each truss are provided with substantially

semicircular recesses 16 in their outer faces, whereby a pin or rod 17 can be received in the recesses of adjacent trusses, and thus serve to hold the inner ends of the trusses from displacement with respect to each other. A plate 18, extending transversely across the bridge, extends across the space between the inner ends of the arch-sections, as clearly shown in Fig. 6, this plate being bolted or otherwise secured to the concrete of one of the arch-sections and being freely movable upon the other of said sections. The roadway 6^a is above this plate 18. Such plate serves to prevent moisture or dirt from entering the crack between the inner ends of the adjacent arch-sections. Preferably this space between said adjacent inner ends of arch-sections is filled with lead or asphalt, as shown at 19.

A bridge constructed as herein disclosed is extremely strong and permits the employment of spans of great length in bridges which are primarily constructed from cement or concrete. The use of the trusses or girders 8 permits a minimum amount of concrete to be employed, the webs 3 requiring to be only a little thicker than are the trusses and the thickness of the main arch produced by the cross-sections 4 being reduced to the minimum. Filling of earth or the like between the webs 3 is entirely unnecessary, the transverse arches 6 in the top of the bridge affording great strength to this top and rendering the latter a firm foundation for the roadway and sidewalk.

It will be noted that the top of the bridge, produced by the transverse arches 6, merges into the main arch at the center of the span, whereby this top, which is the roadway foundation, is stronger, is produced with the use of a minimum amount of material, and any filling of earth or the like becomes unnecessary.

It will of course be apparent that the structure herein disclosed can be employed for other purposes than bridges. Such a structure, for example, could be advantageously employed for floors in buildings.

I am aware that minor changes in the construction, arrangement, and combination of the several parts of my device can be made and substituted for those herein shown and described without in the least departing from the nature and principle of my invention.

Having thus described the invention, what is claimed as new, and desired to be secured by Letters Patent, is—

1. In a structure of the character indicated, the combination with abutments, of a plurality of longitudinal webs extending between said abutments, and arched, transverse sections connecting said webs; substantially as described.

2. In a structure of the character indicated, the combination with abutments, of a plurality of longitudinal webs extending between said abutments, transverse sections connecting the bottoms of said webs, and arched, transverse sections connecting the tops of said webs; substantially as described.

3. In a structure of the character indicated, the combination with abutments, of a plurality of cement webs extending longitudinally between said abutments, transverse sections connecting the bottoms of said webs, transverse sections connecting the tops thereof, and trusses embedded in said webs; substantially as described.

4. In a structure of the character indicated, the combination with an abutment, of a web extending from opposite sides thereof, a truss embedded in said web upon each side of said abutment and supported upon said abutment, and connection between the adjacent ends of said trusses; substantially as described.

5. In a structure of the character indicated, an abutment, a web extending from opposite sides thereof, a truss in said web upon each side of said abutment and supported upon said abutment, and a tie-rod connected to the adjacent ends of said trusses and embedded in said web; substantially as described.

6. In a structure of the character indicated, the combination with abutments, of a sectional span spanning the space between said abutments, the free end of one of the span-sections having a recess extending transverse the span and opening upon the face of said free end of said section, and a member extending transverse the span and entering said recess in said span-section, said member also being in engagement with the free end of the adjacent span-section, whereby displacement of said sections with relation to each other is prevented; substantially as described.

7. In a structure of the character indicated, the combination with abutments, of a sectional span spanning the space between said abutments, the span-sections being provided in their adjacent free ends with recesses which extend transverse the span, and a pin extending transverse the span and entering said recess in each of said span-sections; substantially as described.

8. In a structure of the character indicated, the combination with supporting-sections which are separated and disconnected from each other, whereby a space is left between them, of a covering-plate extending across said space and detached from one of said sections, and a covering above said plate; substantially as described.

9. In a structure of the character indicated, the combination with supporting-sections which are separated from each other whereby a space is left between them, of a plate extending across said space, said plate being connected to one of said sections and disconnected from the other thereof, and a covering above said plate; substantially as described.

10. In a structure of the character indicated,

the combination with a central abutment, and abutments upon each side thereof, of a plurality of webs arched upon their lower sides and extending longitudinally between said abutments, said webs being split intermediate said abutments, whereby arch-sections are produced, transverse sections connecting the bottoms of said webs, transverse sections, arched upon their under sides, connecting the tops of said webs, trusses embedded in each of said webs in the portion of the web between an abutment and the free end of the arch-section, there being a recess in the end of each truss at the free end of its arch-section, pins fitting in the recesses in the adjacent free ends of adjacent trusses, and tie-rods connected to the inner ends of adjacent trusses and embedded in the portions of the webs extending between such trusses; substantially as described.

11. In a structure of the character indicated, a top, and a main arch which meets said top at the center of the span and is spaced from said top at the ends of said span; substantially as described.

In testimony whereof I hereunto affix my signature, in the presence of two witnesses, this 16th day of December, 1903.

ADAM GEISEL.

Witnesses:

GALES P. MOORE,

GEORGE BAKEWELL.