

J. B. Eads, *Truss Bridge.*

No. 89745.

Patented May 4, 1869.

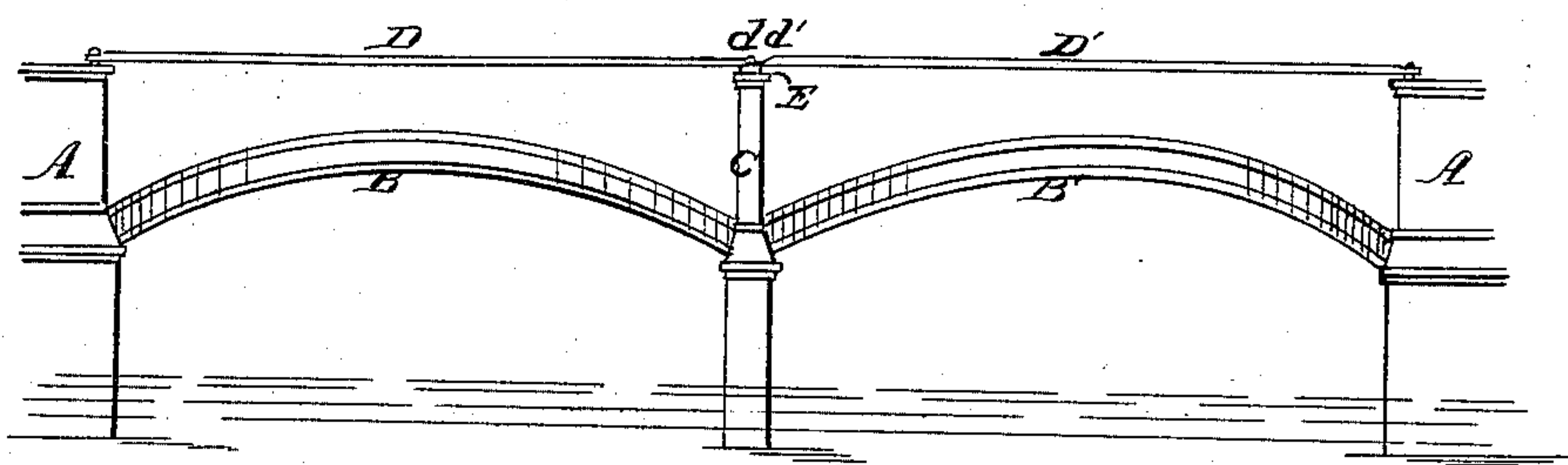


Figure 1.

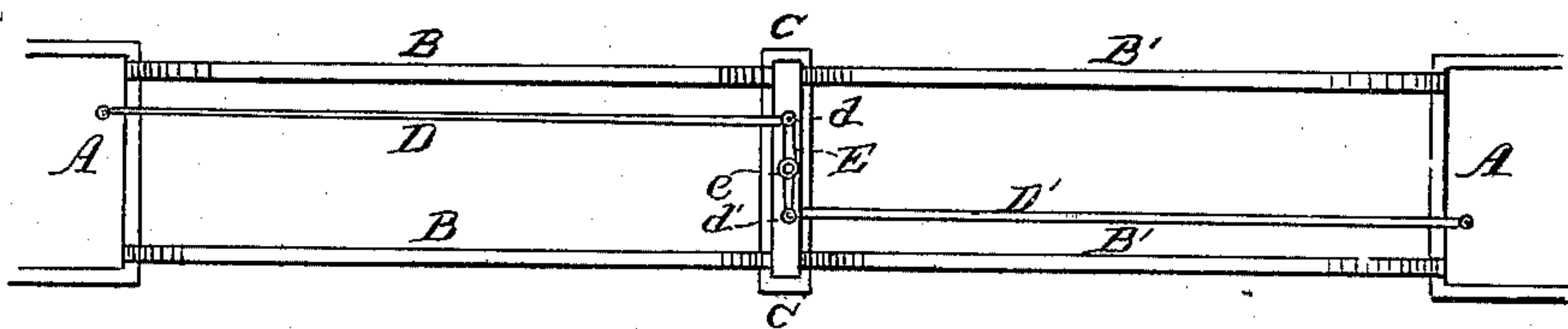


Figure 2.

Witnesses:

H. Paulin

Robert Burns

Inventor:

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Randolph Hertel

United States Patent Office.

JAMES B. EADS, OF ST. LOUIS, MISSOURI.

Letters Patent No. 89,745, dated May 4, 1869.

IMPROVEMENT IN BRIDGES.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, JAMES B. EADS, of the city of St. Louis, in the county of St. Louis, and State of Missouri, have made certain new and useful Improvements in Securing the Piers or Intermediate Supports of Arched Bridges against Oscillations; and I do hereby declare that the following is a full and clear description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

It is well known that in arched bridges, having more than one span, and therefore needing piers or intermediate supports, such piers are subject to great thrusts, tending to move the same in the direction of the longitudinal bridge-axis, whenever the transient load upon the bridge is not equally distributed on the several spans. And said thrusts become a maximum when one or more spans are under action of the maximum load, which can be placed thereon, and the adjacent span is subject only to the action of its own weight.

In this case, the arch or arches under greatest strain flatten, and thereby increase in span, thus forcing the adjoining pier or piers toward the succeeding arches, compressing the same, until the thrust is finally received by the abutment.

It is also known that the oscillations of piers thus caused may seriously damage their structure, and destroy their safety, and that to prevent said consequences, said piers are generally constructed of such size and strength that each may act as an abutment, and remain firm under any thrusts thereon, and this construction necessitates great cost, and causes great difficulties in securing foundations, owing to their great area, and the superincumbent weight.

In view hereof, the nature of this invention is in connecting the upper ends of the piers with the fixed abutments, by means of thrust-bars, receiving on said bars the strains caused by unequally-distributed weights and affecting the piers to cause oscillations.

And the nature of said invention, therefore, requires the construction of said piers as beams held at the pier-foundation, and at upper ends by the thrust-bars, and subject, at the spring-line of the arches, to the thrust of said arches.

The nature of this invention is further in such construction of the thrust-bars, and their connection with the piers and abutments, as shall enable the same to act properly under all contingencies of temperature.

It is believed that in the successful development and construction of the features of my said invention, the said piers may be reduced to an absolute minimum of size and cost consistent with safety.

To enable those skilled herein to make and use my said improvement, I will now give a detail description thereof, referring to—

Figure 1 as an elevation, and to

Figure 2 as a plan, showing the general features thereof.

A represents the abutments, constructed in the

usual substantial manner, to resist the thrust of the metallic or wooden arches B B'.

C represents the intermediate support or pier.

The arches B B' carry the loads which are placed thereon in the manner usual, and this invention in no-wise relates to any special construction of said arches, or of the roadway resting on said arches.

It is plain that if the transient load should cover the roadway on the arch B, the same would deflect and thrust the pier C toward the arch B', unless said pier were of such great weight as to resist said thrust.

In order that said pier may be built of a very light and economical form, I prevent the movement of the same by the thrust-bars D D', which transmit the thrust to the abutments A.

And in order that the expansion or contraction of the bars D D', when the same are metallic, shall not interrupt their effective action, I arrange the bars D and D' to connect by the pins *d* and *d'* with the compensation-lever E, this being secured by the journal-pin *e* to the pier C.

The bars D D' may be secured to the abutments in any strong and durable manner.

Whenever the bars D and D' are of equal length, the arms of the lever E, at which they act, will be equal; but as any inequality in the length of said bars D D' causes them to expand and contract unequally, the arms of the lever E must then be proportionate to the expansion of said bars; thus the journal *e* will hold the pier C as a fixed point.

Now, as the pier C is held at its upper end by the thrust-bars D D', and at its lower end by its foundation-support, and is subject to the thrust of the arches B B', it is plain that the said pier must be constructed as a beam, capable of resisting the strain received as aforesaid.

In case that there are several intermediate piers, the thrust-bars D D' will, in each instance, reach to the abutments, and this condition of the problem involves, therefore, merely a multiplication of the devices D D' and E.

Owing to the height of the points of connection of the bars D D', above the arches B B', the strains in the said bars will be much less than the thrusts of said arches. Again, as the roadway may be arranged to act with thrust-bars, the details of execution may be achieved with great economy.

Having thus fully described my invention,

What I claim, is—

1. The thrust-bars D D' and compensating-lever E, when applied to prevent oscillations of the pier C, substantially as set forth.

2. Giving to bridge-piers, which are supported and held at their foundations, and which resist the thrusts of arches, an additional support by rods connecting their upper ends with each other and with the abutments, substantially as set forth.

Witnesses:

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