

J. B. EADS.
Metallic-Arch Bridge.

No. 163,854.

Patented June 1, 1875.

FIG. 1.

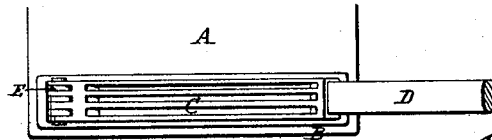
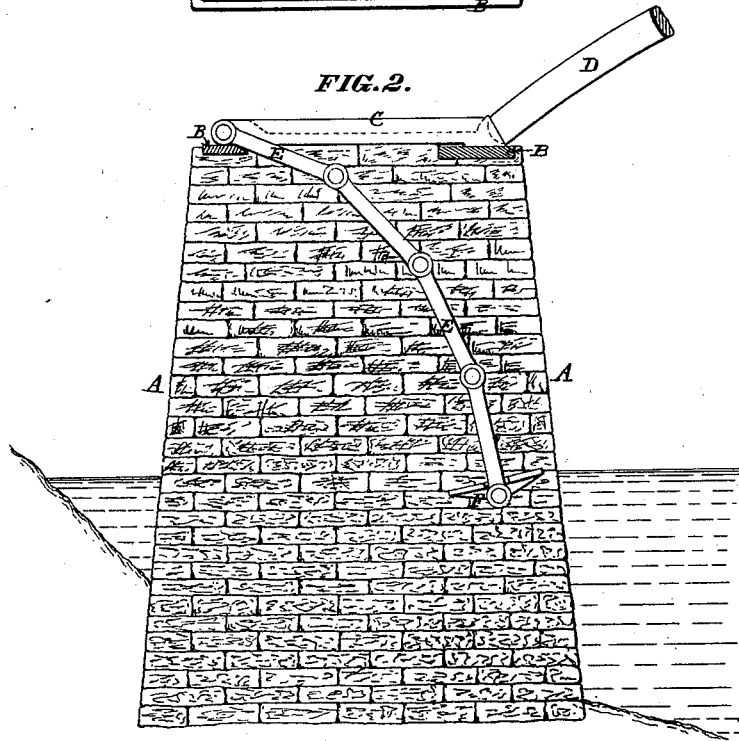


FIG. 2.



ATTEST:

Robt. Burns.
Henry Tanner,

INVENTOR:

James B. Eads
By Knight Bros.
Atty's.

UNITED STATES PATENT OFFICE.

JAMES B. EADS, OF ST LOUIS, MISSOURI.

IMPROVEMENT IN METALLIC-ARCH BRIDGES.

Specification forming part of Letters Patent No. **163,854**, dated June 1, 1875; application filed May 11, 1875.

To all whom it may concern:

Be it known that I, JAMES B. EADS, of St. Louis, St. Louis county, State of Missouri, have invented a certain new and useful Improvement in Arch-Bridges, of which the following is a specification:

My improvement consists in the combination of the skew-back of a metallic arch with a metallic chain or other metallic tie extending downward through the masonry of the abutment and anchored in the lower portion of the masonry, so as to make the weight of the abutment beneath the level of the skew-back available to resist the horizontal thrust of the arch.

In the drawings, Figure 1 is a top view, illustrating the improvement. Fig. 2 is a vertical section through the abutment at line *x x*, showing a side view of the anchor-chain, skew-back casting, and the end of the arch.

A is the abutment, formed of masonry or concrete. B is the bed-plate of the skew-back casting C, which should admit of a slight horizontal movement on the bed-plate, caused by the expansion and contraction of the metal resulting from changes of temperature. D is the portion of a metallic arch in direct connection with the skew-back or arch-rest C. The skew-back casting is connected (preferably by its rear end) to the upper end of a metallic chain or tie, E, whose lower end is secured to an anchor-block, F, of metal or stone, in the lower portion of the abutment A, so that the whole weight of the abutment may be made available to resist the horizontal thrust of the arch.

In the absence of the described anchor-chain, it is necessary that sufficient masonry should be built up above or to the rear of the springing of the arch to take its end thrust; but with this improvement the whole weight of the masonry in the abutment is made available for this purpose, thus very much lessening the cost of the structure.

As the compressive strain in the upright arch is no greater than the tensional one in a suspended arch or cable made of the same

curve, span, and weight, it is evident the push in the one and the pull in the other will be equal at the abutments of the one and at the saddles on the towers of the other. To resist the tensional strain upon the cable, it is made to extend from the towers down to the anchors of stone, having gravity sufficient to resist the strain.

In comparing the upright arched bridge with a suspension-bridge, it will be seen that the weight of the arched bridge, by the proposed improvement, is added to that of the masonry to resist the push of the arch, by which the necessary quantity of masonry is greatly reduced over what would be required in the suspension-bridge of the same curve, weight, and span, because in the latter no part of the weight of the bridge rests upon the anchorage masonry. Besides this, in a suspension-bridge the strain in the cable tends to raise the anchorage masonry, and thus its power of resistance to the horizontal element of the strain is lessened, and the amount of masonry must be augmented to meet this unfavorable feature. With my present construction the weight of the bridge increases the capacity of the abutment to resist this horizontal strain, by which the superior economy of the arch over the suspension system is increased by effecting this saving of masonry.

In the abutments of arched bridges as usually constructed, the horizontal forces of the arch are resisted by masonry built up above the level of the springing, and the friction of this superincumbent masonry, resulting from its weight, is relied upon to prevent the shearing off of the pier above the line of the thrust. The present improvement is designed to save the necessity of this masonry.

I claim as my invention—

The combination of the abutment A, skew-back C, chain or tension member E, and anchor-block F, substantially as described.

JAS. B. EADS.

Witnesses:

SAML. KNIGHT,
R. S. ELLIOTT.