

No. 785,676.

PATENTED MAR. 21, 1905.

D. B. LUTEN.

ARCH.

APPLICATION FILED JULY 25, 1904.

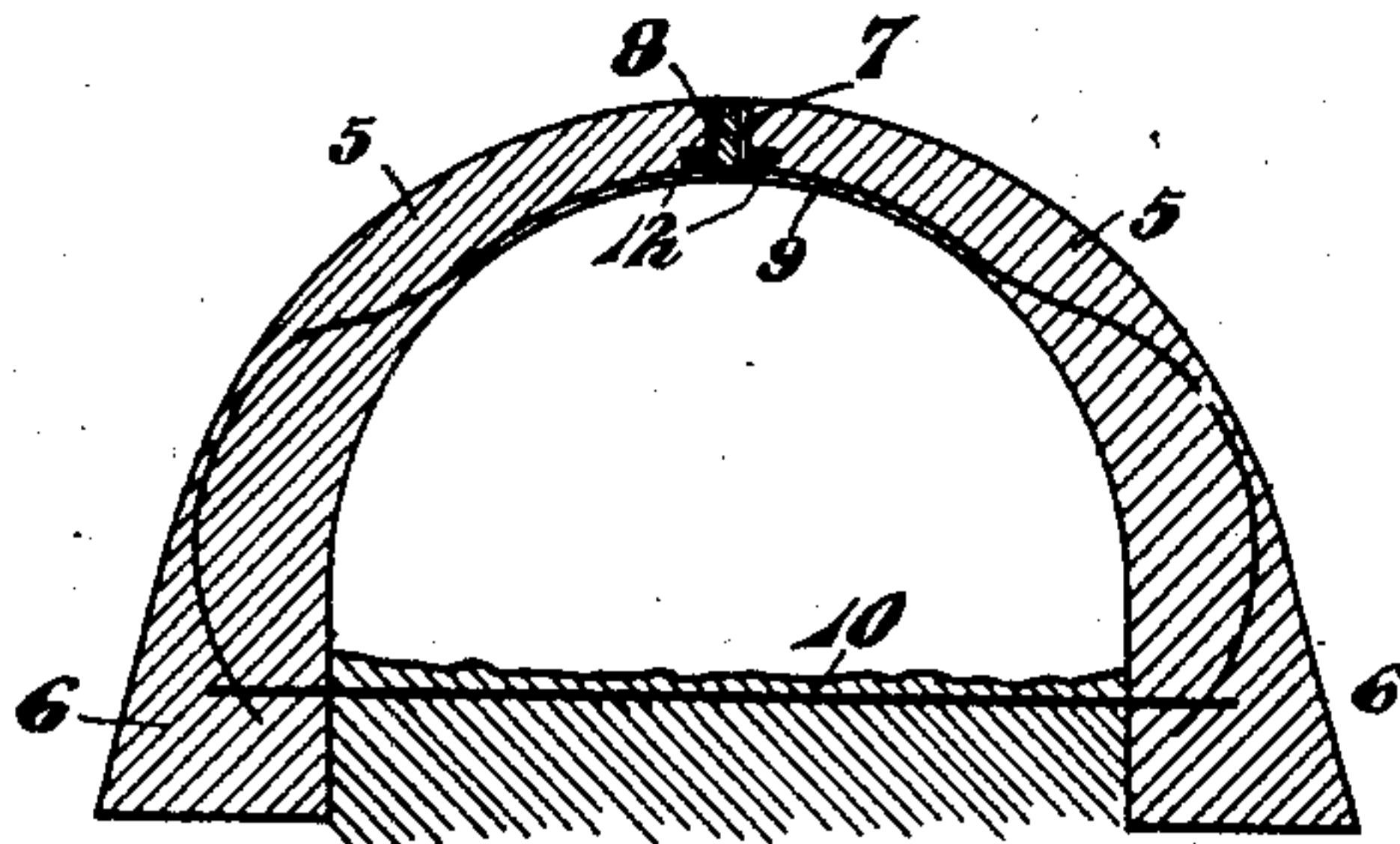


Fig. 1.

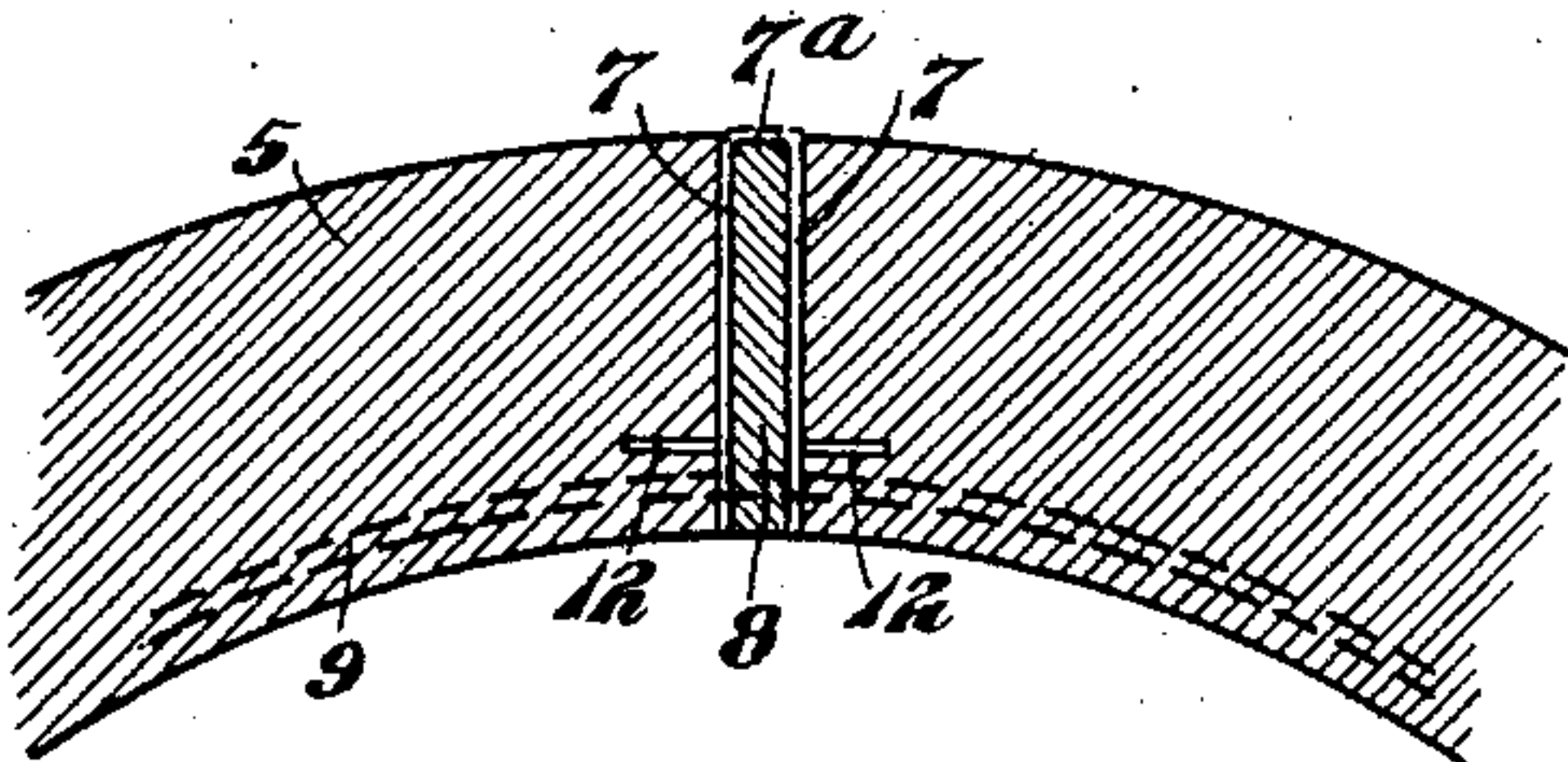


Fig. 2.

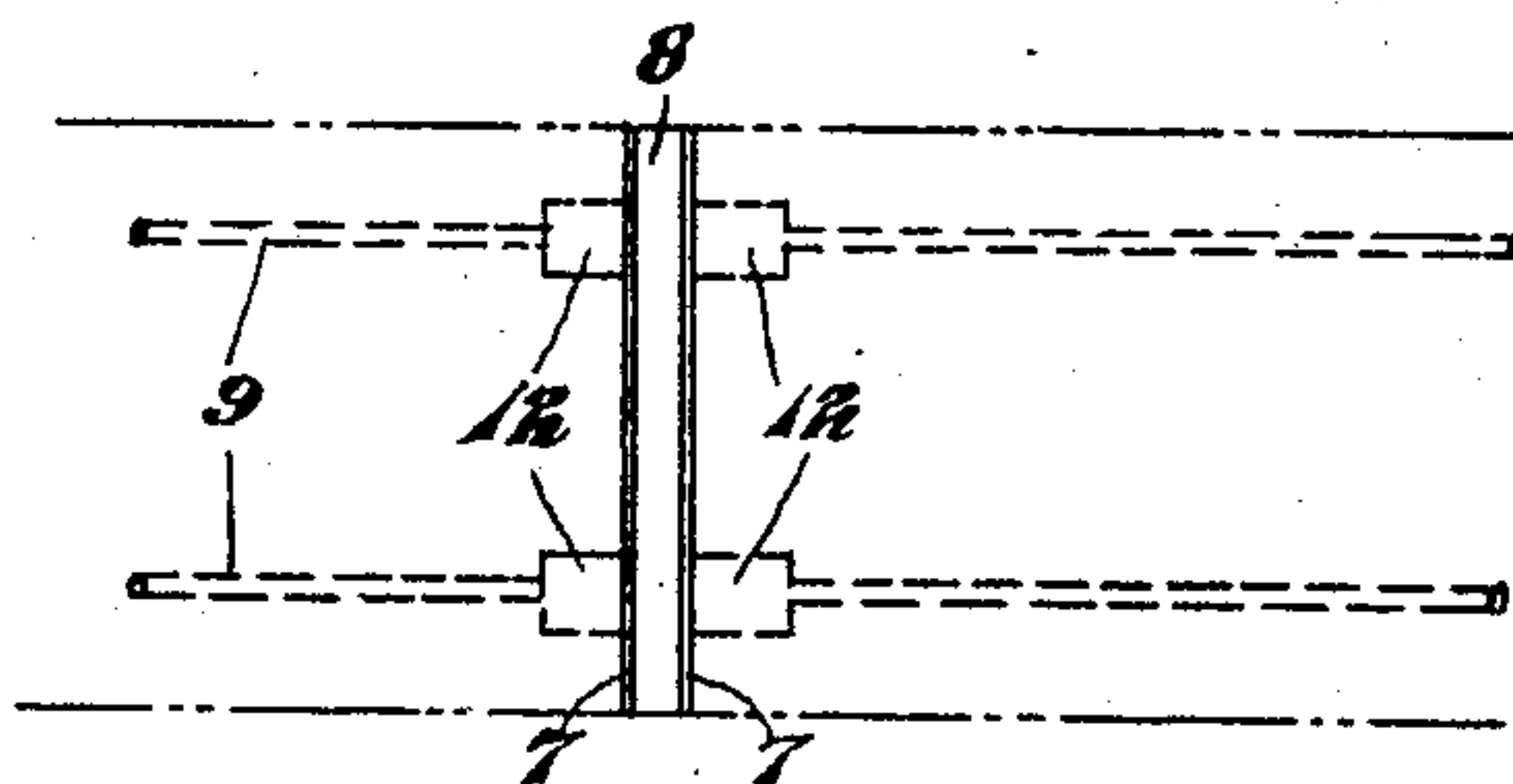


Fig. 3.

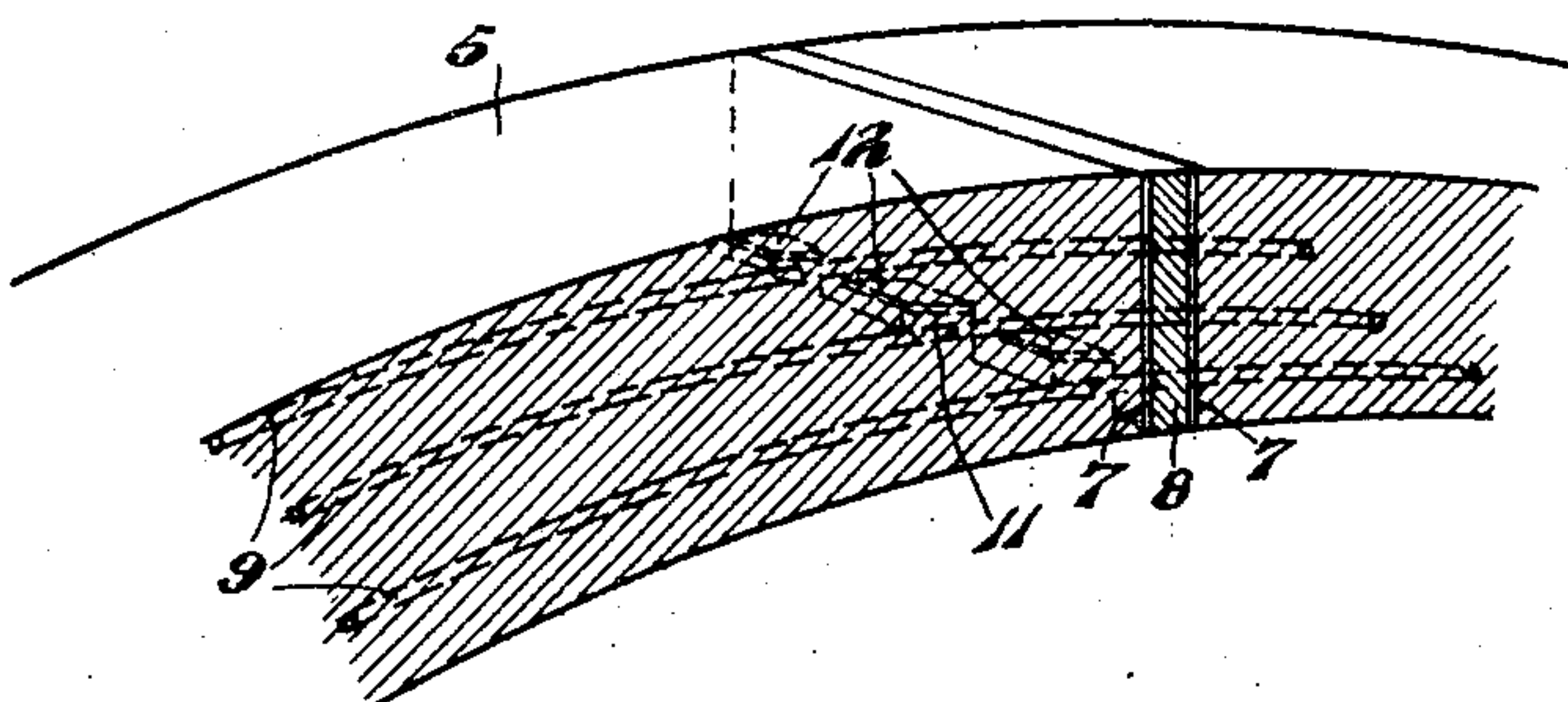


Fig. 4.

Witnesses.

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# UNITED STATES PATENT OFFICE.

DANIEL B. LUTEN, OF INDIANAPOLIS, INDIANA.

## ARCH.

SPECIFICATION forming part of Letters Patent No. 785,676, dated March 21, 1905.

Original application filed May 17, 1902, Serial No. 107,812. Divided and this application filed July 25, 1904. Serial No. 217,938.

*To all whom it may concern:*

Be it known that I, DANIEL B. LUTEN, a citizen of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented a certain new and useful Improvement in Arches, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

This invention relates to arches and bridges of concrete and similar materials; and it has for its principal object to provide a construction wherein the effects of temperature changes upon the arch and particularly upon its crown may be taken care of without danger of injury to the structure from such changes.

To this end the invention consists principally in an arch structure provided with a hinge located in the crown of the arch and of such formation and material as to allow the crown to rise and fall slightly under temperature changes.

The present application constitutes a division of an application filed by me on the 17th day of May, 1902, Serial No. 107,812.

My invention in its preferred form is illustrated in the accompanying drawings.

Referring to the drawings, Figure 1 is a cross-sectional view of a typical form of arch provided with my improved hinge. Fig. 2 is an enlarged fragmentary view of the crown portion, as shown in Fig. 1. Fig. 3 is a bottom plan view of Fig. 2, and Fig. 4 is a perspective view of the portions shown in Figs. 2 and 3.

Referring to the drawings, 5 designates each of two curved structural members, herein shown as the duplicate halves or longitudinal sections of an arch-rib springing from abutments 6 and slightly separated at the crown. In the space thus formed at the crown is inserted a hinge, which, as herein shown and as preferred, consists of a pair of steel plates 7, which may be independent or may be bent into the form shown from a single steel plate, with an integral transverse connection 7<sup>a</sup> at their upper ends. These plates

extend entirely through the material of the rib at the crown from extrados to intrados and have a lead filling 8. The construction of arch herein shown corresponds with a construction made the subject-matter of a companion application heretofore filed by me on the 23d day of July, 1904, Serial No. 217,767, which has as its general characteristic the provision of a series of tension members passing alternately across the material of the rib and so disposed as to strengthen the regions in tension. This tension-rod is herein indicated at 9 and is shown as extending along the intrados at the crown, thence along the extrados at the haunches, and thence down into the abutments and intersecting a tie-rod 10, connecting the abutments through the bed of the stream, whereby the two halves are reinforced each against the thrust of the other. Where these tension-rods are employed, the steel plates and the filling are provided with openings 11 for the passage of the rods, the openings in the plates being preferably formed by slitting the material to form tongues 12, which are then bent outwardly, so as to extend into the adjacent concrete, to thereby anchor the hinge in place.

The construction described in connection with the lead filling is especially advantageous, as lead is found to be a material well adapted for the purposes of the hinge, permitting the necessary expansion and contraction of the latter under the movements of the crown and adhering well to the steel, which latter adheres with equal effectiveness to the concrete. This hinge eliminates the disruptive strains that sometimes would otherwise occur under severe temperature changes in the material of the arch itself, and thus introduces a factor of safety, with but slight additional trouble and expense in the construction.

I do not limit the invention to the exact construction and materials specified, as other relatively hard and soft metals or materials might be employed for the lining and core, and variations of construction which would be within the spirit and purpose of the invention might readily occur to others skilled in



this art upon an acquaintance with the form of the invention herein shown and described.

I claim—

1. An arch having a hinge of relatively  
5 hard and soft plates, substantially as described.
2. An arch having a hinge of lead and steel plates, substantially as described.
3. An arch having a hinge of relatively  
10 hard and soft plates interposed in the crown of the arch, substantially as described.
4. An arch having a hinge of lead and steel plates interposed in the crown of the arch, substantially as described.
- 15 5. An arch having a hinge composed of a pair of hard-metal plates and an interposed filling-plate of soft metal, substantially as described.
6. An arch having a hinge composed of a  
20 pair of steel plates and an interposed lead filling-plate, substantially as described.
7. An arch having a transversely-apertured hinge, and tension-rods in said arch passing through the apertures of said hinge,  
25 substantially as described.
8. An arch having a transversely-apertured hinge formed of hard and soft metal plates interposed in the crown of the arch, and ten-

sion-rods in said arch passing through the apertures of said hinge, substantially as de- 30 scribed.

9. An arch of concrete or other material having a hinge and a continuous reinforcement passing through the hinge, substantially as described. 35

10. Two curved structural members with ends abutting and each reinforced by rods along the extrados against the thrust of the other, substantially as described.

11. Two curved structural members with  
40 ends abutting and each reinforced against the thrust of the other by rods passing along the extrados and thence across the arch to resist a load at the crown, substantially as described. 45

12. Two curved structural members with abutting ends, and each reinforced against the thrust of the other, and a tie to take the thrust of both, substantially as described.

Signed by me at Indianapolis, county of 50 Marion, State of Indiana, in the presence of two witnesses.

DANIEL B. LUTEN.

Witnesses:

B. C. REINHART,  
A. C. BROWN.