

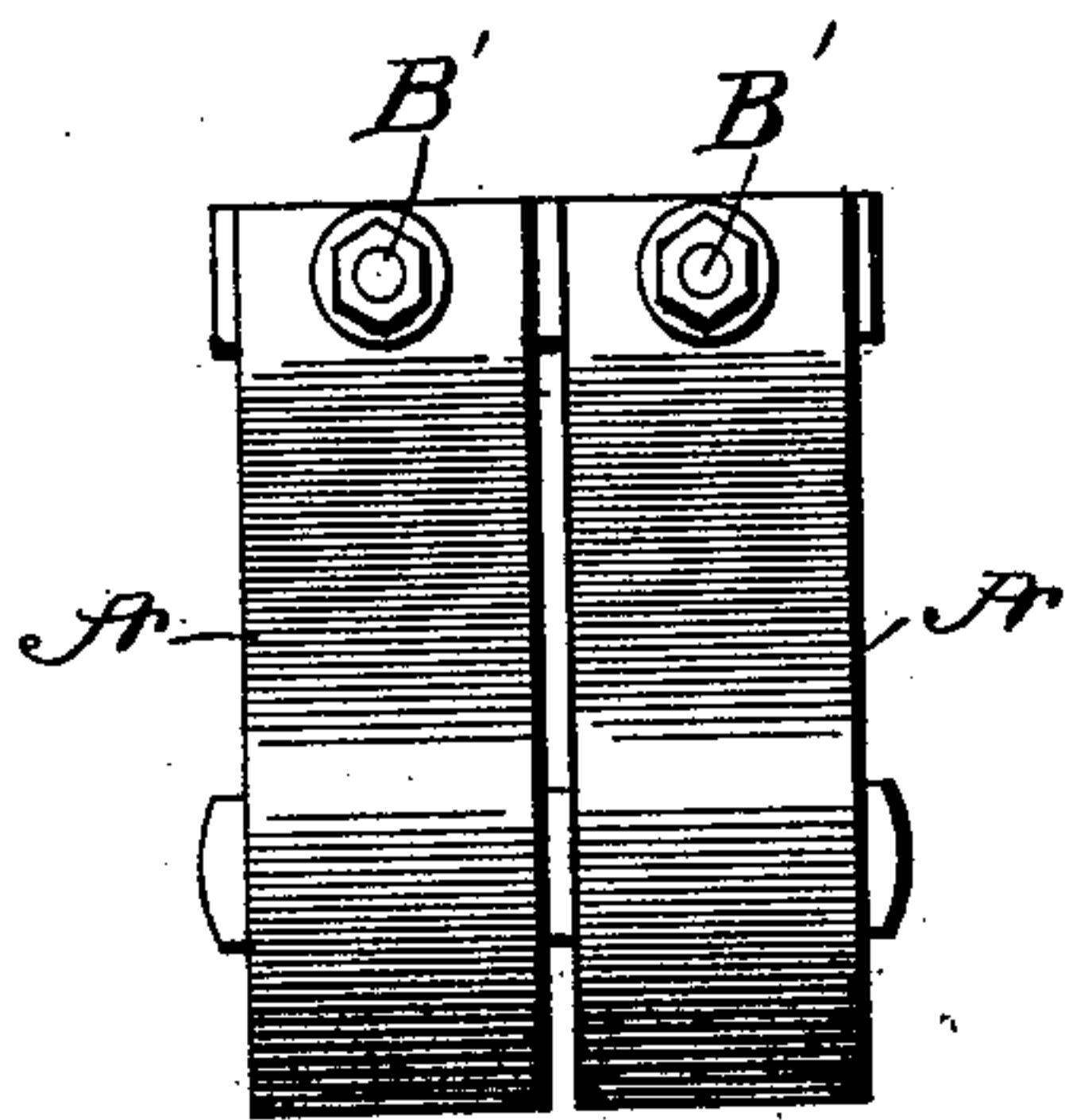
(No Model.)

A. S. KROTZ, W. P. ALLEN & O. S. KELLY.  
TROLLEY.

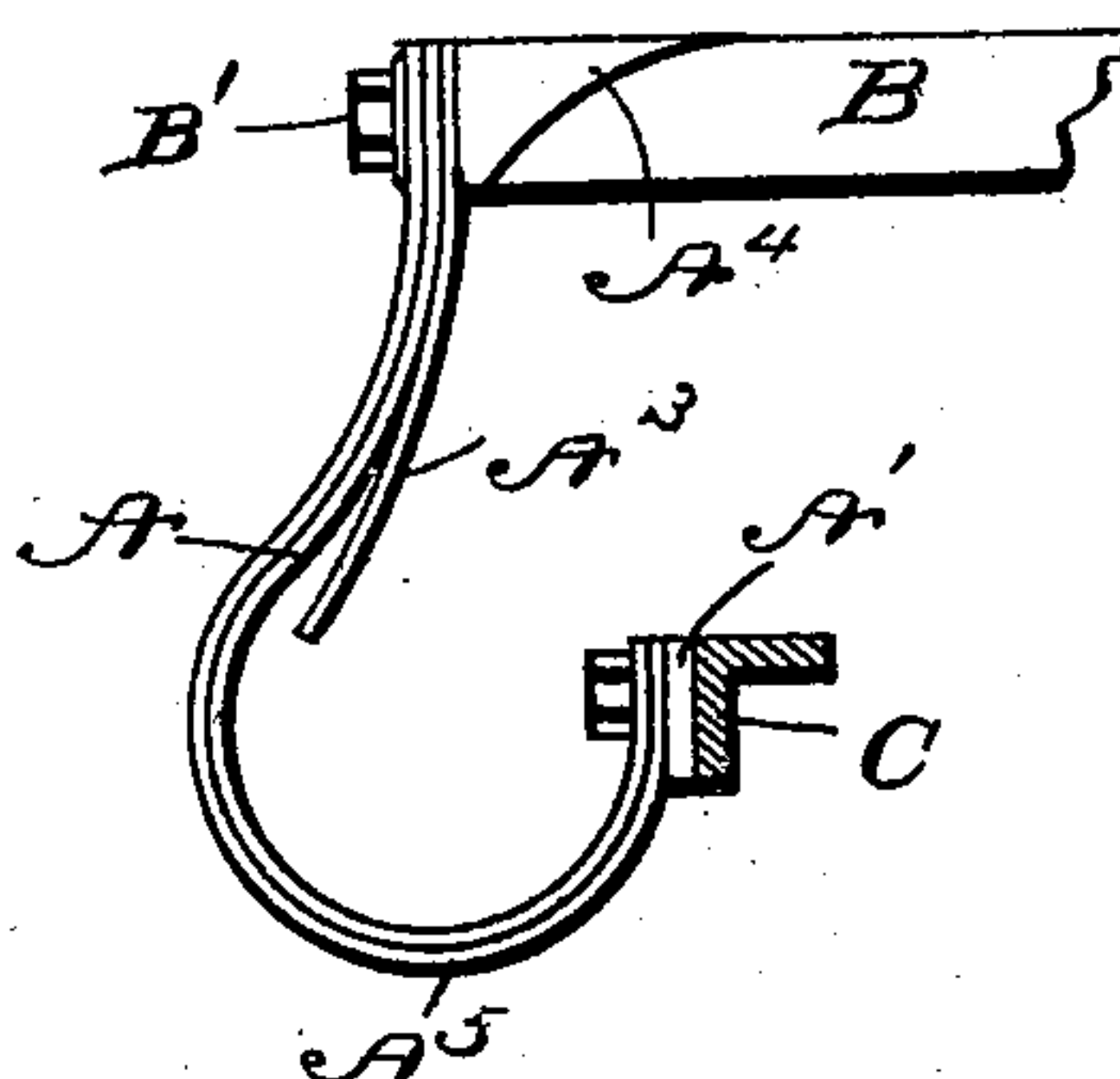
No. 587,214.

Patented July 27, 1897.

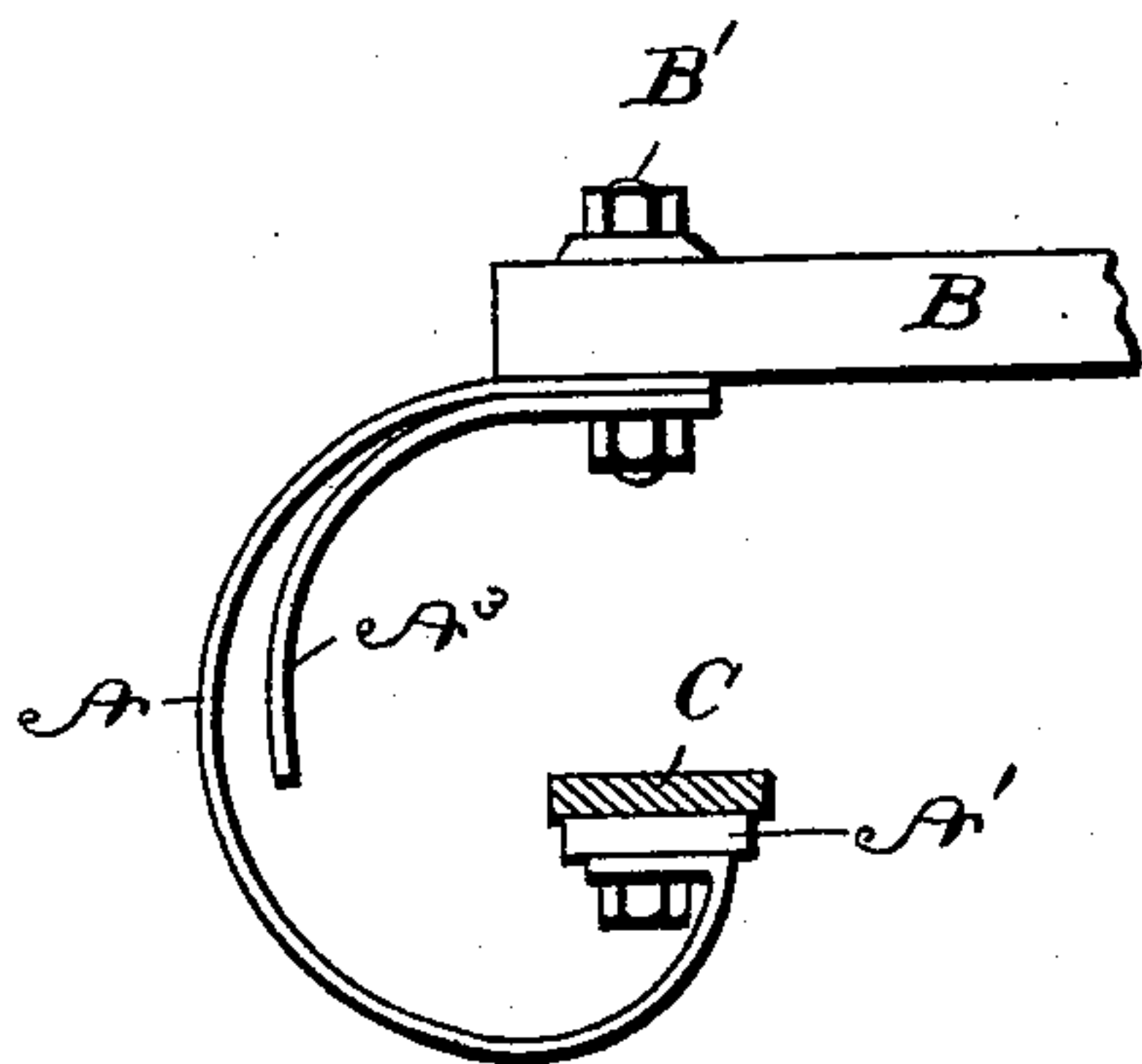
*Fig. 1.*



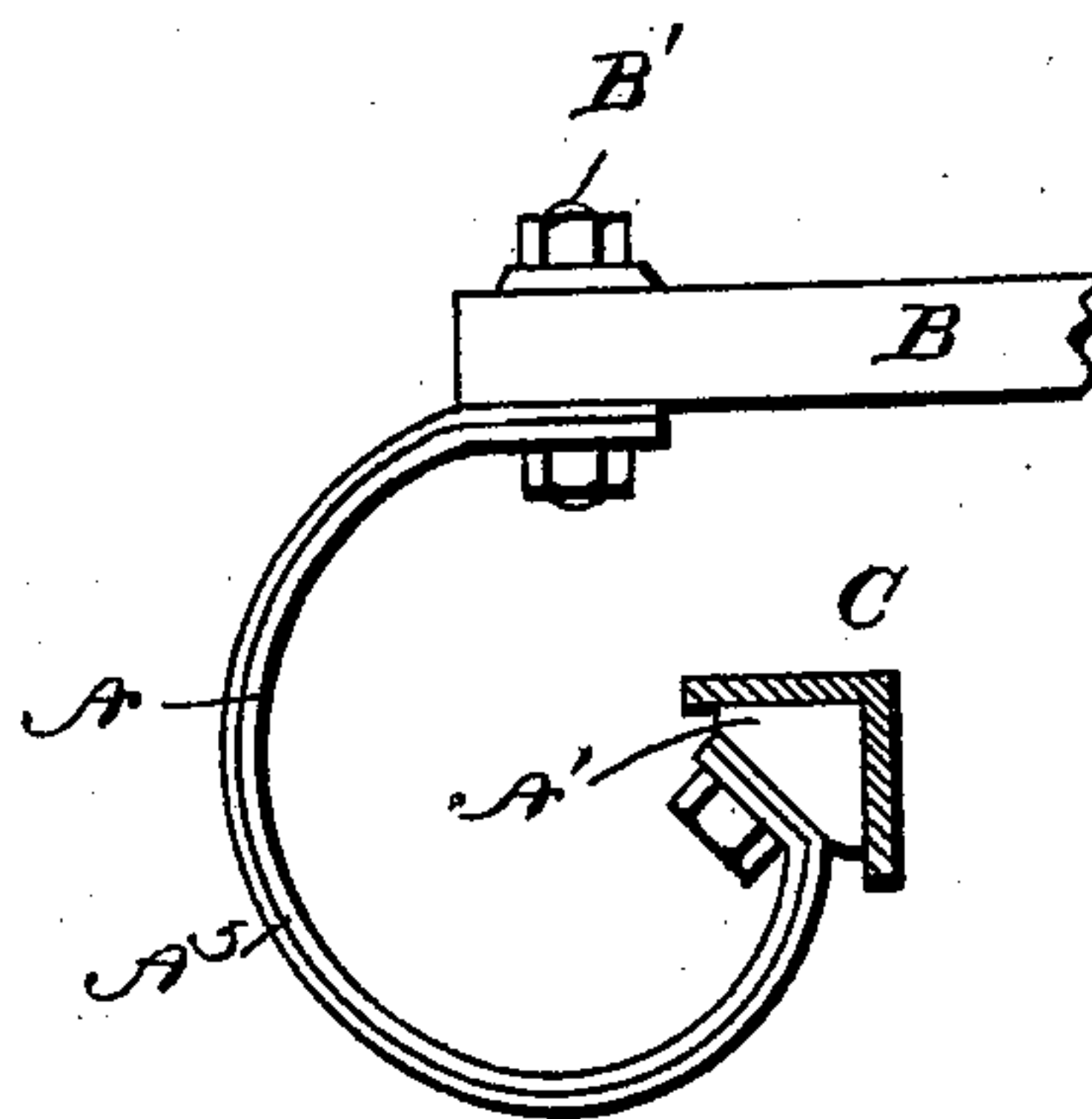
*Fig. 2.*



*Fig. 4.*



*Fig. 3.*



Witnesses.

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# UNITED STATES PATENT OFFICE.

ALVARO S. KROTZ, OF SPRINGFIELD, OHIO, WILLIAM P. ALLEN, OF CHICAGO, ILLINOIS, AND OLIVER S. KELLY, OF SPRINGFIELD, OHIO.

## TROLLEY.

SPECIFICATION forming part of Letters Patent No. 587,214, dated July 27, 1897.

Application filed June 16, 1896. Serial No. 595,826. (No model.)

*To all whom it may concern:*

Be it known that we, ALVARO S. KROTZ, residing at Springfield, in the county of Clark and State of Ohio, WILLIAM P. ALLEN, residing at Chicago, in the county of Cook and State of Illinois, and OLIVER S. KELLY, residing at Springfield, in the county of Clark and State of Ohio, citizens of the United States, have invented certain new and useful Improvements in Trolleys, of which the following is a specification.

Our invention relates to improvements in trolleys for electric cars as applied to railways.

The particular object in view is to provide a trolley of few parts and adapted to maintain an even and uniform sliding contact with the stationary conductor.

A further object we have in view is to provide a simple and easy renewal and adjustment of parts.

We accomplish these results by supporting the contact-shoe on one or more thin strips of spring metal and by giving them a proper curvature for a parallel movement of the contact-shoe.

In the accompanying drawings, Figure 1 is a side view. Fig. 2 is a cross view. Figs. 3 and 4 show curvatures for various application of the shoe.

It is obvious that the springs can be adapted to any position of the contact-rail without departing from the scope of the invention.

In Fig. 1, A is the spring-supports for the contact-shoe A'. A<sup>3</sup> is a rigid strip adapted to limit the movement of the contact-shoe when not in contact with the conductor-rail. The spring-support A and strip A<sup>3</sup> are clamped to a metal support A<sup>4</sup> or insulating-pieces B by means of bolts B'. These pieces B B' may be insulated from and attached to the truck or car-frame in the usual manner.

To increase the conductivity between the contact-shoe and the piece A<sup>4</sup>, a soft-copper strip A<sup>5</sup> is placed in position with the spring A, or a cable may be attached direct to the shoe A'.

Fig. 4 represents the spring and shoe adapted for an under contact; Fig. 3, for an angle-contact.

In all the figures, C represents the contact-rail.

The spring-supports are very wide and thin, and when curved, as shown in Figs. 2, 3, and 4, the shoe remains in perfect contact regardless of the swing of the car or unevenness of the contact-rail. We prefer to use two springs, as shown in Fig. 1. However, we do not confine ourselves to any number, neither do we confine ourselves to any particular curvature, although the one shown in Fig. 2 is preferable.

The supports A<sup>4</sup> or pieces B, or their equivalent, constitute a base to which the trolley-springs are attached.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a trolley, the combination of the base, one or more spring-supports rigidly attached at one end to said base, a contact-shoe supported on the free end or ends of said spring support or supports, said spring support or supports consisting of a flat sheet of elastic metal and a rigid stop adapted to limit the travel of said spring or springs, substantially as specified.

2. In a trolley, the combination with a base, one or more spring-supports rigidly attached at one end to said base, a contact-shoe supported on the free end or ends of said spring or springs, said spring or springs being backed or faced with a strip of soft copper or other good conducting material.

3. In a trolley, the combination with a base, one or more flat spring-supports, a contact-shoe attached to the free end of said spring-supports, a conductor-strip of high conductivity connecting the contact-shoe and metal support or base and a stop, substantially as and for the purpose specified.

4. In a trolley, the combination with a base, of a flat spring-support and a contact-shoe attached to and supported by said spring-sup-



port, and a conductor-strip of high conductivity connecting the contact-shoe with the base or metal support, said spring-support being curved to substantially a U shape with  
5 one arm shorter than the other, with the shoe mounted on the shorter arm so that said shoe will stand in a plane between the base and the curved portion of said spring-support so as to maintain an even contact with  
10 the stationary conductor and compensate for

vertical or lateral movement, substantially as specified.

In testimony whereof we have hereunto set our hands this 18th day of May, A. D. 1896.

ALVARO S. KROTZ.  
WILLIAM P. ALLEN.  
OLIVER S. KELLY.

Witnesses:

FLORENCE N. CAVILEER,  
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