

(No Model.)

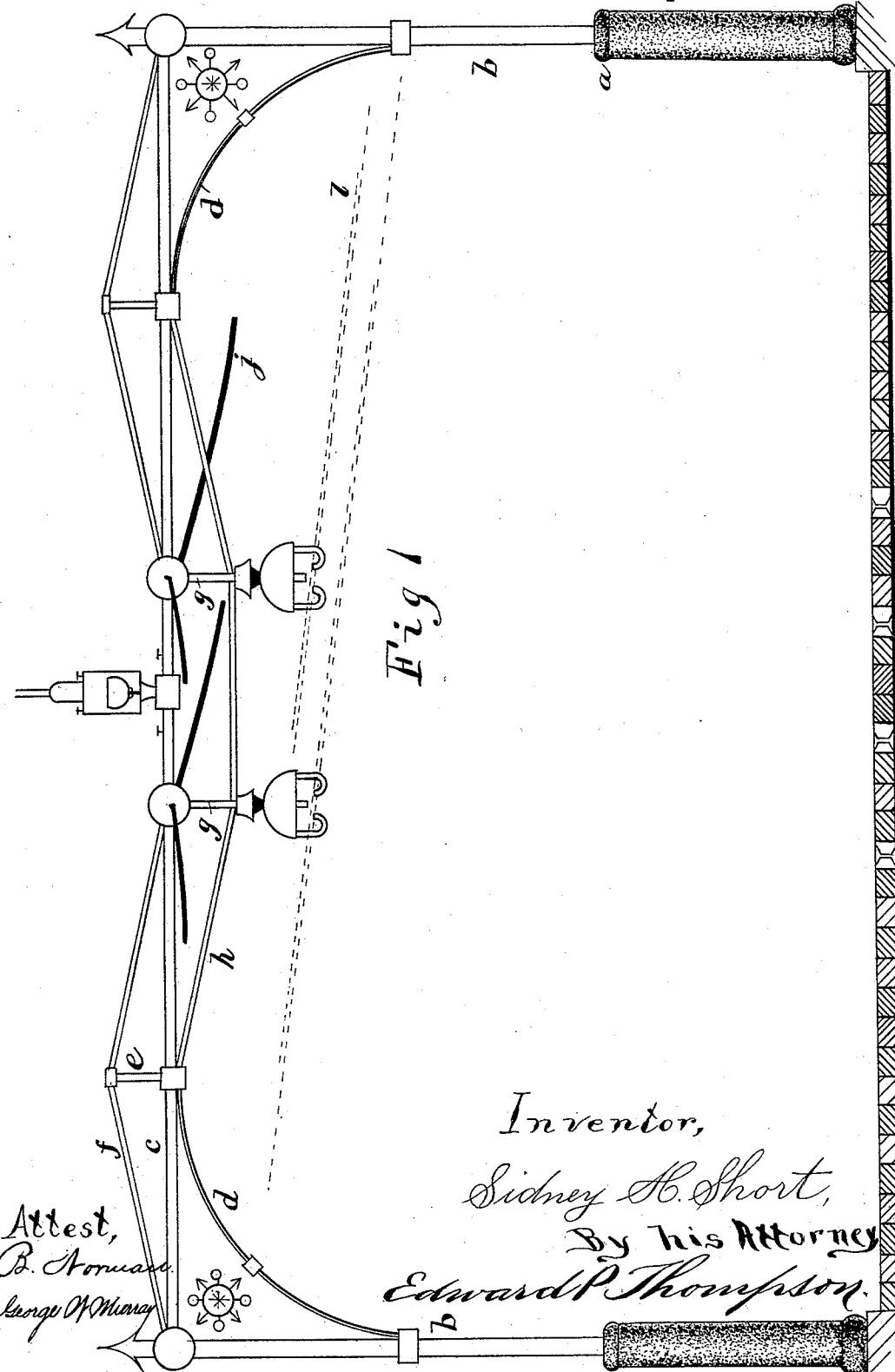
5 Sheets—Sheet 1.

S. H. SHORT.

ELECTRIC RAILWAY SYSTEM.

No. 401,796.

Patented Apr. 23, 1889.



(No Model.)

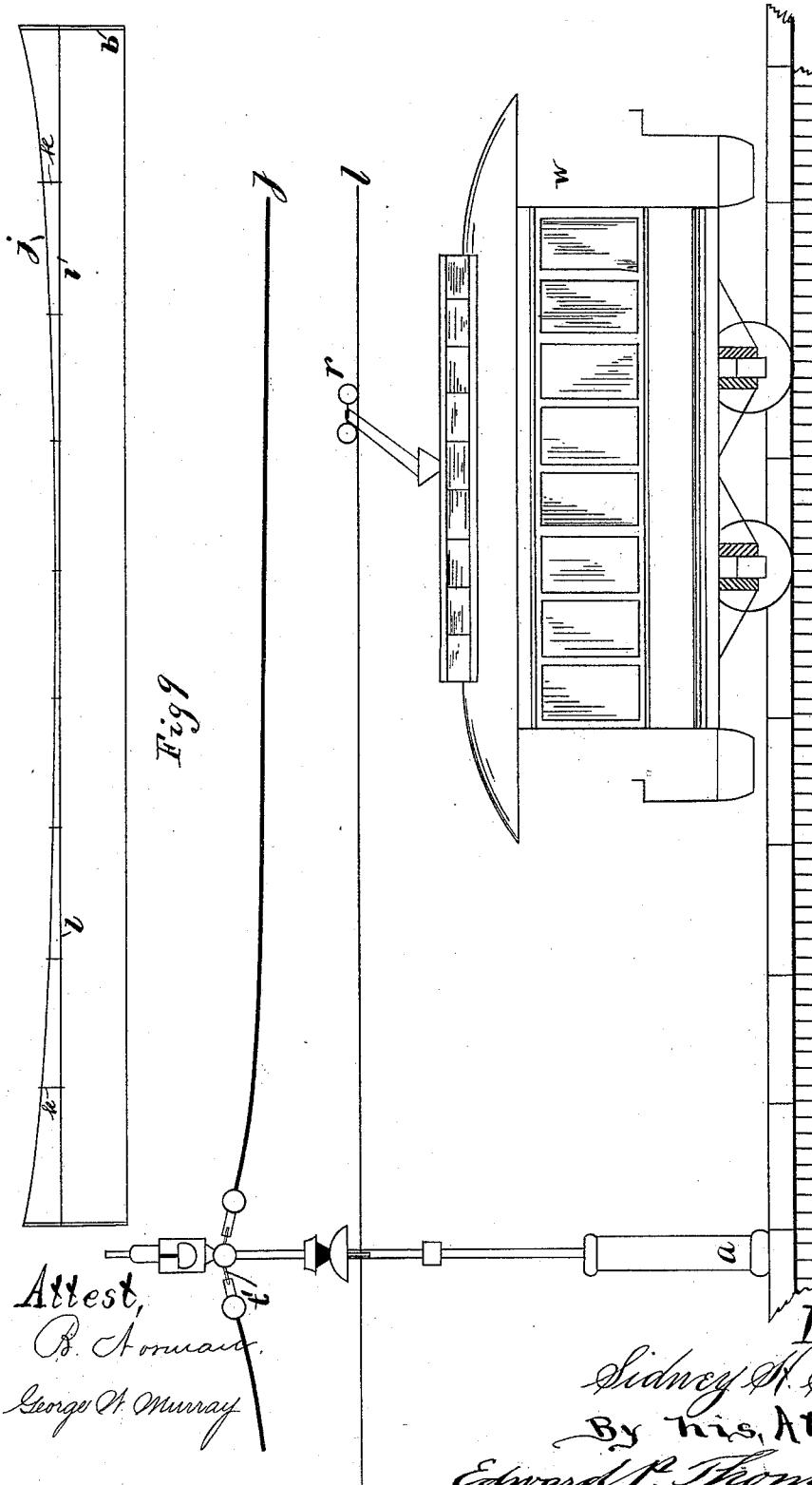
5 Sheets—Sheet 2.

S. H. SHORT.

ELECTRIC RAILWAY SYSTEM.

No. 401,796.

Patented Apr. 23, 1889.



(No Model.)

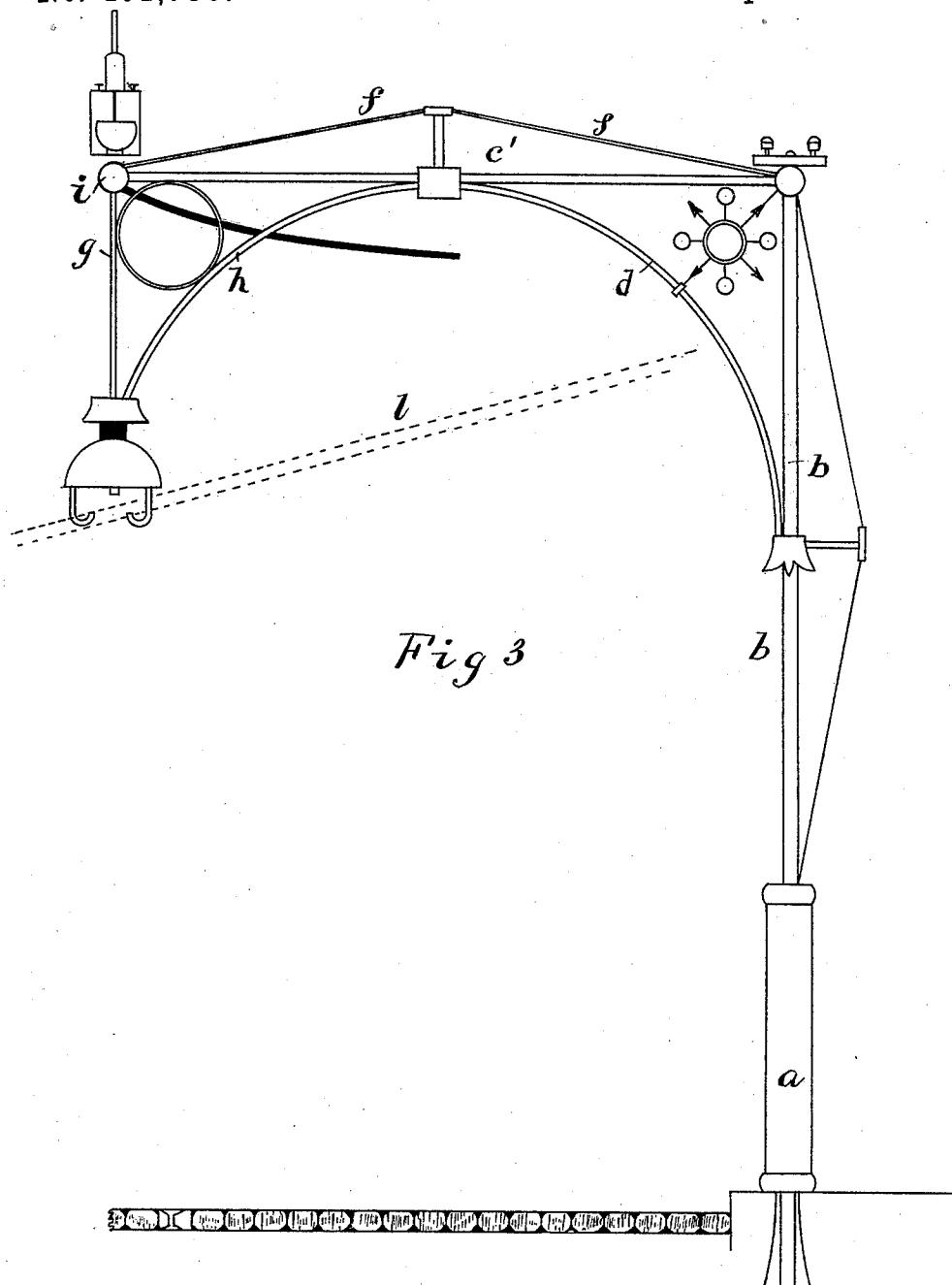
S. H. SHORT.

5 Sheets—Sheet 3.

ELECTRIC RAILWAY SYSTEM.

No. 401,796.

Patented Apr. 23, 1889.



Attest,  
B. Atman.  
George W. Murray.

Inventor,  
Sidney H. Short,  
By his Attorney,  
Edward P. Thompson.

(No Model.)

5 Sheets—Sheet 4.

S. H. SHORT.

ELECTRIC RAILWAY SYSTEM.

No. 401,796.

Patented Apr. 23, 1889.

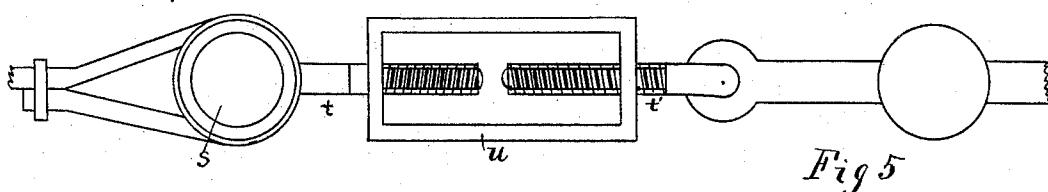


Fig 5

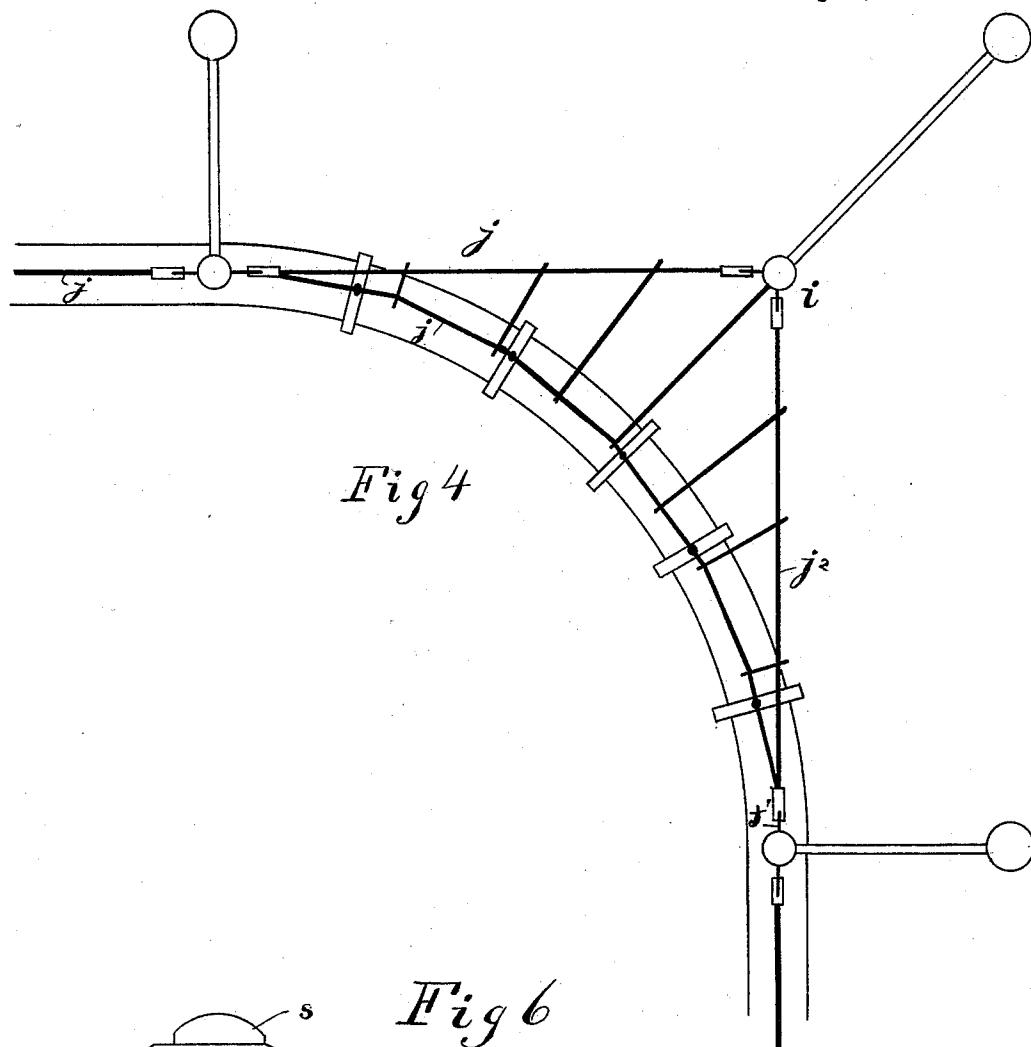
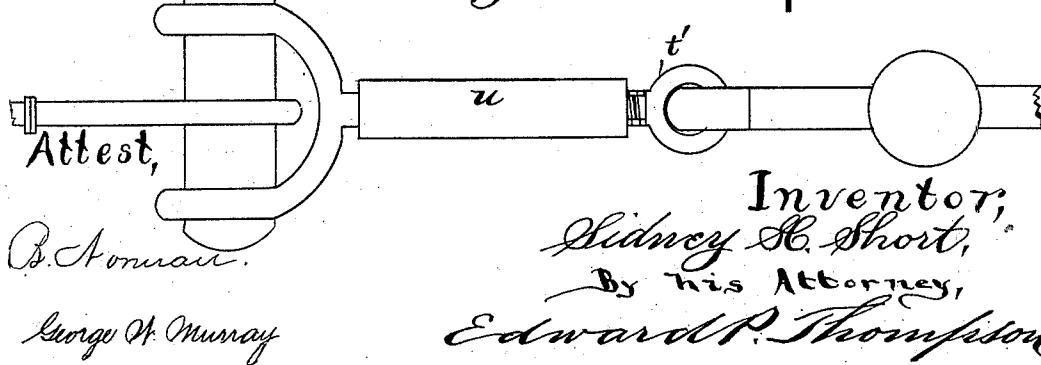


Fig 4

Fig 6



Attest,

B. A. Murray.

George H. Murray

Inventor,

Sidney H. Short,

By his Attorney,

Edward P. Thompson,

(No Model.)

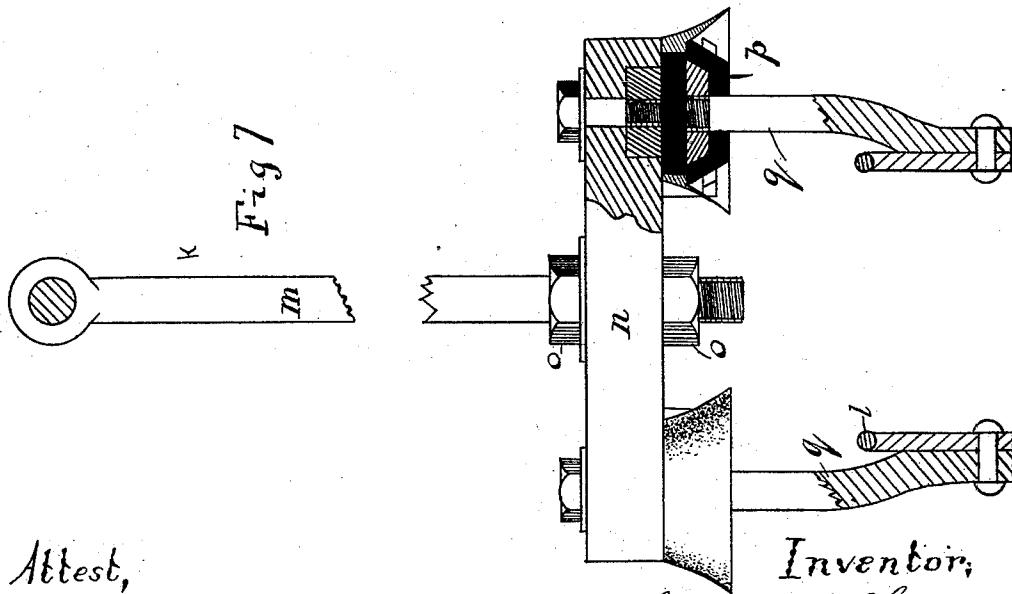
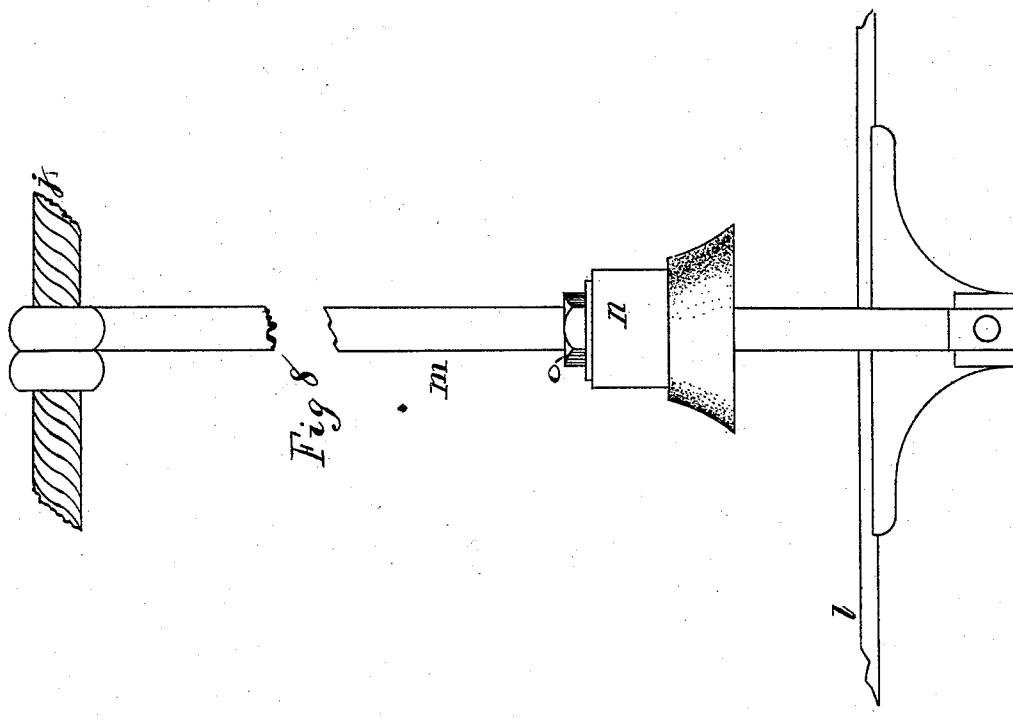
5 Sheets—Sheet 5.

S. H. SHORT.

ELECTRIC RAILWAY SYSTEM.

No. 401,796.

Patented Apr. 23, 1889.



Attest,

P. A. Murray.

George H. Murray.

Inventor,

Sidney H. Short,  
By his Attorney  
Edward P. Thompson,

# UNITED STATES PATENT OFFICE.

SIDNEY HOWE SHORT, OF COLUMBUS, OHIO.

## ELECTRIC-RAILWAY SYSTEM.

SPECIFICATION forming part of Letters Patent No. 401,796, dated April 23, 1889.

Application filed April 10, 1888. Serial No. 270,185. (No model.)

*To all whom it may concern:*

Be it known that I, SIDNEY HOWE SHORT, a citizen of the United States, and a resident of Columbus, in the county of Franklin and State of Ohio, have invented certain new and useful Improvements in Electric-Railway Systems of Overhead Conductors, of which the following is a specification.

My invention relates to improved means for supporting the electrical conductors of a system of electrical railways.

The object of the invention is to provide such a means that the number of poles, arches, or similar ground supports is reduced, and that the conductors are more nearly parallel with the railway-track.

The invention consists of poles or similar standards or supports situated at intervals along a railway, cables joining and attached to the said supports, insulated hangers suspended from the supports and from the cables, electrical conductors carried by the said hangers, and a trolley serving as a current-collector located upon the conductors and connected with an electric car of the system, all in combination, as hereinafter set forth.

In the accompanying drawings the system is described so that any one versed in the art may construct the same.

Figure 1 is a view in elevation of one of the arches spanning the street and adapted for two tracks. Fig. 2 is a side view of the arch shown in Fig. 1, a car being shown in connection with the conductors. Fig. 3 shows a half-arch in elevation, all the above-named figures showing an electric lamp carried by the arch above the central portion of the street. Fig. 4 is a plan of the system at a street-corner, where it becomes necessary that the conductors should lie as nearly as possible in a true curve, such as the arc of a circle. Figs. 5 and 6 represent, respectively, top and side views of means for stretching the cables. Figs. 7 and 8 show, respectively, two rectangular views of the hangers for suspending the conductors from the cables, Fig. 7 being shown partly in cross-section and each figure being broken into two parts. Fig. 9 is a diagrammatic view of the system, showing the poles or arches in side view, the cables connecting them, and the conductors suspended at intervals from the cables.

The system consists of the combination of a post or base, *a*, of suitable material—such as cast iron—vertical metallic tubes forming extensions to the said posts and lettered *b*, a chord, *c*, connecting the tops of the metallic tubes in the case of a full arch which spans the street, or half-chord *c'* in the case of the half-arch shown in Fig. 3; curved braces *d*, 55 extending from the central portion of the extension *b* to the center of the half-chord *c'*, or to about one-quarter of the chord *c*, an upright, *e*, at the upper extremity of the brace *d* and suitably called a “short strut,” ties *f* 60 from the top of the strut and extending to the top of the extension *b*, and to that point of the chord at which the principal hanger *g* is suspended, the principal hanger being a term applied to those hangers for the conductors 70 attached to the arches, a tie connecting the principal hanger to the bottom of the strut *e*, and lettered *h*, stretchers *i*, attached to the cables and to the chord *c* or *c'*, and adapted to be adjustable, so as to put a greater or less 75 tension upon the cables, the cables being lettered *j*, hangers *k* fixed to the cables at intervals between the arches, and shown on an enlarged scale in Figs. 7 and 8, and electrical conductors attached to the hangers and indicated by the letter *l*.

The hangers consist of the combination of a rod or tube, *m*, secured to the cable *j*; a short beam, *n*, fastened by nuts *o* in an adjustable manner to the said rod; insulators *p*, 85 carried by the said beam at each end thereof; protecting-coverings above the said insulators, and conductor-holders *q*, secured to the insulators and hanging downward in such a manner that the current-controller *r*, which 90 runs on the conductors, may pass by the arches without interruption.

The cable-stretchers (shown in detail in Figs. 5 and 6) consist of the combination of an insulating cylindrical block, *s*, to which the cable is attached by a loop, a forked screw-holder, *t*, for the block *s*, and a pivoted screw, *t'*, secured to the arch, a frame, *u*, having holes opposite each other and into which the said screws respectively screw. When the frame *u* is rotated, the screws approach each other and stretch the cable or loosen it, according to which way the said frame is turned.

The principle of construction at the street-

corner or at a similar sharp curve in the roadway is substantially as above described in reference to a rectilinear line; but the details of construction are different, as shown 5 in Fig. 4. This construction consists of the combination of three arches or semi-arches, each provided with suitable stretchers, as above described, two cables,  $j'$  and  $j^2$ , connecting, respectively, two of the posts or arches 10 with the middle post or arch which overhangs either one of the tracks at an angle of about forty-five degrees, and a third cable, or the main cable,  $j$ , connecting the first and third arches and provided with tie ropes or wires 15 which extend from itself to the cables  $j'$  and  $j^2$ , the tie-wires being of such length and tension as to hold the cable  $j$  in an approximate curve. From the curved portion of the cable  $j$  the hangers are suspended at comparatively 20 numerous points and the hangers support the conductors, as above described. The wires or cables  $j'$  and  $j^2$  being comparatively short will be practically rectilinear, as shown in the drawings.

25 By the application of my invention it becomes possible and practical to reduce the number of poles or similar ground supports to such an extent that there are only about twelve to the mile, or in the city only one or 30 two per block. It is preferable in the city to place them at street intersections, where it is desirable also to have a large electric light.

I find that the number of hangers may be such as to be about the same distance as poles 35 are at present placed in the ordinary systems. In curves the hangers are placed closer together, so as to make the curve more truly a curve.

40 The cables are preferably constructed of iron wire, which may be stretched without danger of breaking.

If the conductors are small in diameter, and it is desired not to subject them to

strain, the number of hangers may be increased per mile or unit of length. The 45 greater the number of hangers the greater the degree of parallelism between the conductors and the railway-track.

I claim as my invention—

1. In an electric-railway system of overhead 50 conductors, the combination of elevated supports located at intervals along the railway, insulated hangers suspended from the supports, cables connecting and secured to the said supports, a second set of hangers suspended from the cables, electrical conductors supported upon the said hangers, and a current-collector located upon the conductors and connected with the electric car of the system. 60

2. In an electric-railway system of overhead conductors, the combination of two posts, a chord connecting the upper portions of the posts, tie-rods connecting the chord and posts, insulated hangers supported upon the chord 65 and ties, cables supported upon the chord, a second set of insulated hangers suspended from the cables, and conductors supported upon the hangers.

3. The combination of three fixed supports 70 not located in the same straight line, but substantially in the same horizontal plane, cables connecting every two supports, tie-wires connecting one of the cables with the remaining two, and insulated electrical conductors suspended from that cable which is held by tie-wires to the remaining two cables. 75

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 4th day of April, 80 1888.

SIDNEY HOWE SHORT. [L. S.]

Witnesses:

HARVEY BANCROFT,  
F. C. McELROY.