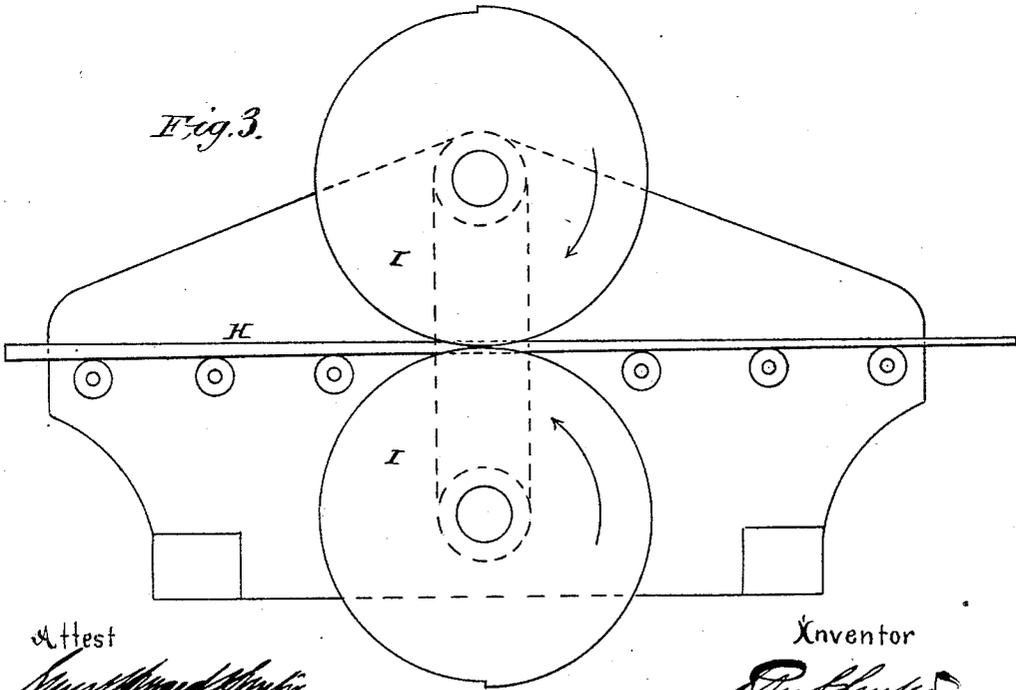
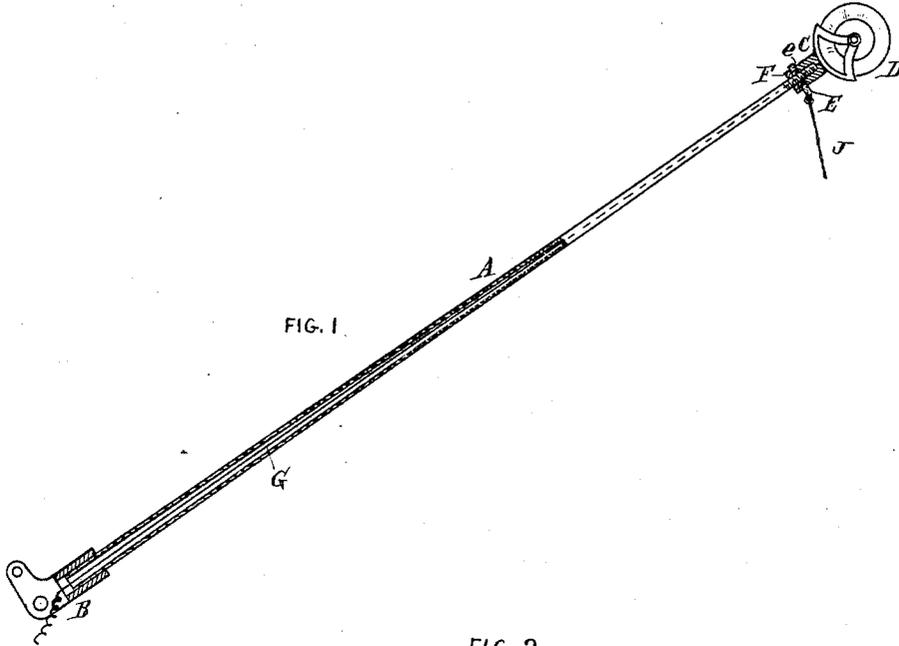


(No Model.)

R. M. HUNTER.  
CURRENT COLLECTING DEVICE.

No. 454,437.

Patented June 16, 1891.



Attest  
*Wm. M. Hunter*  
S. S. Yerkes.

Inventor  
*R. M. Hunter*

# UNITED STATES PATENT OFFICE.

RUDOLPH M. HUNTER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE THOMSON-HOUSTON ELECTRIC COMPANY, OF CONNECTICUT.

## CURRENT-COLLECTING DEVICE.

SPECIFICATION forming part of Letters Patent No. 454,437, dated June 16, 1891.

Application filed December 18, 1889. Serial No. 334,156. (No model.)

*To all whom it may concern:*

Be it known that I, RUDOLPH M. HUNTER, of the city and county of Philadelphia, and State of Pennsylvania, have invented an Improvement in Current-Collecting Devices for Electrically-Propelled Vehicles, of which the following is a specification.

My invention has reference to current-collecting devices for electrically propelled vehicles; and it consists of certain improvements which are fully set forth in the following specification, and shown in the accompanying drawings, which form a part thereof.

This application (Case 126) has particular reference to the construction of the upwardly-extending arm, whereby it is made tapering to give the necessary lightness with the proper condition for strength.

Heretofore it has been customary to use a long bamboo or other wooden pole, a metal rod, a tube of uniform diameter throughout, or an arm composed of two sections of tubing of different diameters welded together over a solid piece of metal arranged within the tubing at the point of juncture. The wooden poles have been found entirely too light, and were speedily destroyed by the inclement weather and hard usage to which they were put. The solid rods are excessively heavy, and for the same amount of metal have not the resisting capacity of the tubes. The tube of uniform diameter is bulky and throws so much needless weight to the extremity or contact portion that excessively large springs must be used to sustain it in a vertical position, and, furthermore, this construction necessitates in practice such an arrangement that the spring shall constantly vary in its power to compensate for the great variation in the strain due to the differences in leverage of the arm, which differences in leverage are greatly augmented by the excessive weight near the contact ends, and the poles which are jointed are found in practice to be weak at the joints, and, furthermore, are not symmetrical, are not strictly proportioned to the duty which they are required to perform, and, in addition, prevent the possibility of inserting a copper conductor within the tube from the contact end to the base of support.

In carrying out my invention it is my ob-

ject to overcome the existing objections found in these various constructions of collector-arms, and to accomplish this result I first take a tube of metal, preferably of steel, of a length slightly shorter than that required in the arm, and then upon a mandrel by means of suitably-constructed rolls I cause the tube to be rolled either in the cold or heated condition down upon the said mandrel, producing an elongation, and at the same time a gradual reduction in diameter. After the tube is so tapered I drive out the mandrel and fit upon the small end thereof the contact device, and upon the large end thereof a socket-piece for connecting with the supporting device on the car. By this construction I have the diameter of the arm tapering and of smaller diameter as the end is approached, and at all parts through the arm there is a clear passage-way for a conductor, which may be placed through the tube leading from the contact device.

Referring to the drawings, Figure 1 is an elevation, with part in section, of a current-collecting device embodying my invention. Fig. 2 shows a piece of tubing from which the collector-arm is rolled, and Fig. 3 is a side elevation showing the mandrel and rolls for rolling my improved collector-arm.

First referring to the construction of the collector-arm, A is a tubular arm, which decreases in diameter from the socket end, or that which is next to the car, to the end which is connected to the contact device, such decrease being proportional to the shearing strain which is exerted by the pressure upon the contact, and also due to the weight of said contact and the arm adjacent to it, and the end of the arm next to the car is fitted in the socket B, formed of a casting or other suitable construction, which may be hinged or otherwise fastened to the car in any of the well-known manners now in use. The free or upper end of the arm is preferably screw-threaded, and upon it a socket-piece is secured, carrying the contact roller or shoe D.

F is a lock-nut, which is also secured upon the end of the arm A, and jams against the under part of the socket-piece C, and is reduced in diameter at its upper part, so as to form, in conjunction with the part C, an annular groove *e*, in which fits a ring E, to which

the trolley-guard J is secured. A conductor G may be connected to the socket-piece C or other part of the contact device and extend through the hollow tubular arm A and car, so as to convey the current to the motor without necessarily relying upon the connections in the various parts of the arm and its appendages.

The arm A is formed of a tube, (shown in Fig. 2,) which is placed upon a tapering mandrel H, (shown in Fig. 3,) and then passed between the rolls I, which may be made eccentric, so as to gradually decrease the aperture formed between them, making it of such a diameter as to correspond to the diameter of the mandrel plus double the thickness of the metal of the tube. After the tube and its mandrel are run between the rolls I it will be found that the tube has been made tapering, as required, and may be readily removed from the mandrel. It is quite evident that various kinds of machinery may be employed for producing this tapering of the contact-arm; but that described is exceedingly simple and well adapted to the purpose. It is also evident that in place of using a previously-formed tube a tube-skelp may be rolled into the tapering form; but I prefer to first form the tube in the ordinary way, and then roll it into the tapered form, as hereinbefore described. I do not limit myself to the exact degree of the taper, as it may be a uniform taper or one in which the amount of taper is of a variable quantity with uniform distance along the length of the arm; but in all cases there is a decided taper from one end of the frame to the other, and the arm is formed complete without joints.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A collector-arm for an electrically-propelled vehicle, formed of a tube of gradually-decreasing diameter and provided with an aperture throughout its length, combined with a grooved contact device at its smaller end and a socket piece or holder at its larger end.

2. A current collecting arm for an electrically-propelled vehicle, consisting of a continuous tube of gradually-decreasing diameter, the entire length of which is formed of an integral piece of metal without transverse joints or welds, and provided at the smaller end with a contact-wheel and a support for same mechanically secured to the tube.

3. The combination of a current-collecting device, of a tube made hollow throughout its length and of gradually-decreasing diameter, a contact device secured to and carried at its upper and smaller end, and an electric conductor extending from the contact end of the collector through the tube to the car.

4. In a current-collecting device, the combination of an upwardly-extending arm, a socket-piece secured upon the free end of said arm and carrying the contact device, a locking-nut F, formed with a reduced part and screwed upon the free end of the arm and against the under side of the socket-piece to form an annular groove *e*, a loose ring E, received in said groove, and a trolley-cord J, secured to said ring.

In testimony of which invention I have hereunto set my hand.

RUDOLPH M. HUNTER.

Witnesses:

ERNEST HOWARD HUNTER,  
S. T. YERKES.