(No Model.)

C. A. LIEB.

TROLLEY FOR ELECTRIC CARS.

No. 461,840. Patented Oct. 27, 1891.

Fig. 1.

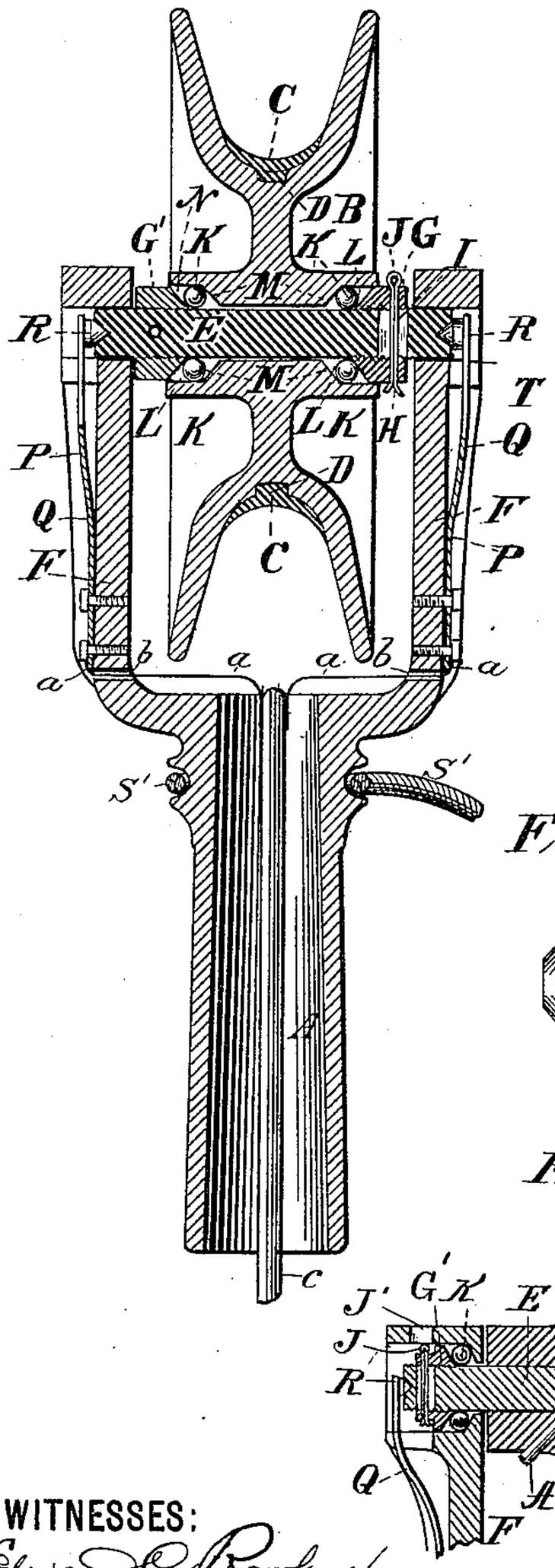

Fig. 2.

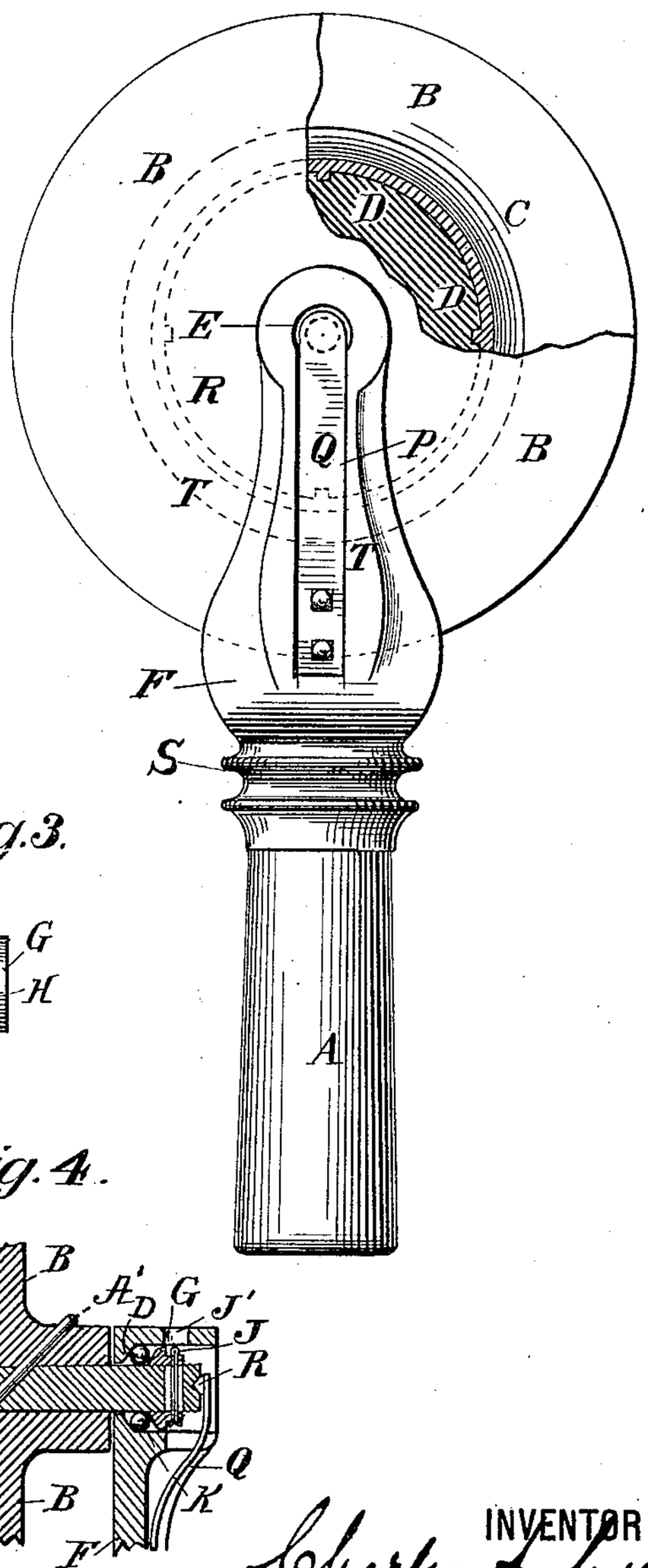

Fig. 3.

Fig. 4.

WITNESSES:

Edward C. Rowland

Charles Ryder

INVENTOR

Charles A. Lieb

BY Phillips & Abbott

his ATTORNEY

UNITED STATES PATENT OFFICE.

CHARLES A. LIEB, OF NEW YORK, N. Y.

TROLLEY FOR ELECTRIC CARS.

SPECIFICATION forming part of Letters Patent No. 461,840, dated October 27, 1891.

Application filed March 23, 1891. Serial No. 385,993. (No model.)

To all whom it may concern:

Be it known that I, CHARLES A. LIEB, a citizen of the United States, and a resident of New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Trolley Devices, of which the following is a specification.

My invention relates to improvements in trolley-wheels; and it consists in the construction of the wheel and its frame, and also in the device for making the electrical connection from the wheel to the car—in other words, the "contact."

Figure 1 illustrates a vertical sectional view of the invention. Fig. 2 illustrates an elevation partly broken away. Fig. 3 illustrates an elevation of the adjusting-collar G shown in Fig. 2. Fig. 4 illustrates an alternative construction showing part of the wheel and its frame in vertical section.

A is the pole.

B is the wheel. It is composed, preferably, of aluminium or of any alloy in which aluminium forms a considerable part, although any other suitable material may be used. I prefer the aluminium because it is relatively very light in weight, also because of its good electrical conductivity, also because it is non-resonant, or measurably so, as compared with other metals of which such wheels are made, and also because it is not so greatly affected by exposure to the elements as most other metals; but, although I prefer it, I do not limit myself to it, nor to the metals at all, because certain features of the invention can be availed of even if the wheel be made of a non-metallic substance, provided always, however, that the needful electrical connections be made by means of suitable conductors.

I show a bushing C of harder material than the body of the wheel, and which is in any suitable manner fastened in the trough of the wheel, and which preferably has transverse ribs or lugs D formed on it at suitable points, whereby its connection with or hold upon the wheel B may be strengthened. I do not claim this feature as part of my invention, however, because it is not of my own invention. I show it simply because I believe it to be a good feature, and I may adopt it in connection with the other improvements recited herein.

Referring to Figs. 1, 2, and 3, E is the shaft for the wheel. It preferably revolves in bearings on a bifurcated wheel-frame F. Although it may be rigid, if preferred, I deem it better to have it revolve, because then the movement will take place where there is the least resistance, and if for any reason the anti-friction balls, hereinafter described, should become clogged and refuse to work or should work imperfectly, then the shaft could turn upon its bearings as though there were no balls present, and thus the device and also the trolley-wire be preserved from much destructive wear. The shaft has collars G G′ on it, one of which (G in the present instance) is threaded interiorly and travels on a threaded section of the shaft. This collar has likewise a series of holes H (see Fig. 3) in it arranged radially, and the shaft has a slot I in it, through which a pin J passes. This pin extends through one or the other of the holes in the collar G, through the slot in the shaft, and through an opposite hole in the collar, and projecting therefrom is secured by diverging spring-points or other suitable means. The slot in the shaft allows longitudinal movement of the pin J as it is carried to the right or left during adjustments of the collar and at the same time locks the collar in its adjusted position. K K are double series of anti-friction balls. They are received in annular recesses L L at each end of the interior of the hub of the wheel, and M M are faces thereon, which are the counterparts of the faces N N on the two collars G G′. P P are the contacts. There may be but one of them, or, if preferred, two, one on each side of the wheel, as shown. They comprise a spring-like part Q Q, which is not necessarily elastic in and by itself, although that construction is preferred, because it may be made to assume and maintain a proper position by other means. R R are "center points," so called, on the free end of the parts Q. They enter conical or otherwise shaped recess in the center of the end of the wheel-shaft, as shown, although they may simply rest against the end of the shaft, if preferred. The lower end of the spring-like

parts Q is attached by screws, rivets, or otherwise to the frame of the wheel, and with it the electrical connections are made in any preferred manner. I show them in Fig. 1 as flat strips of metal *a a* or ordinary wires soldered to the lower ends of the springs Q and extending, respectively, through holes *b b* made in the wheel-frame, and connected by solder or otherwise with a metallic rod or wire *c*, which is inclosed within the trolley-pole, and which conducts the current to the car in the well-known manner. The object in making the contact-piece in this form is that, being connected with the shaft at or near the center of motion, (providing the shaft revolves, as before stated,) the speed is relatively slight, and consequently there are but little friction and wear on the parts, and the contact, electrically, is also better. The shaft and wheel frame being both of conducting material, the current would ordinarily be conveyed without these contacts; but sometimes the oil gums in the journal, which increases the electrical resistance, and also sometimes the bearings for the shaft are made of non-conducting material, such as lignum-vitæ. For these reasons I show and prefer the contacts. S is a groove in the sockets of the frame, to which the down-haul cord or rope S′ is attached in the usual manner. In order that the contact may be protected from injury should the trolley leave the wire and come in contact with other surfaces, I prefer to locate the spring-like parts Q and the point R in a recess T made in the wheel-frame.

In Fig. 4 I show an alternative construction in which the shaft of the wheel coacting with other parts holds the two sides of the frame together. In this construction the wheel is keyed to the shaft by a pin A′ and revolves with it, and the balls K rotate against suitable surfaces B′ on the frame, and the collars G and G′ are moved in the same manner as before upon threaded sections of the shaft. The pins J J, which confine them upon the shaft, are introduced through openings J′ J′, made in the upper part of the frame F. It will be observed that the bearing-surfaces of the collars G G′ in this construction have an inward presentation, and that the counterpart surfaces on the frame have an outward presentation. This is an exceedingly important feature, because any tendency of the frame to spread, which frequently occurs, will be prevented by the impingement of the balls against these two surfaces. Thus the frame will be held in proper position and the contacts will be permanently maintained in proper relation to the ends of the shaft, which might not be the case if the frame should spread.

I do not limit myself to the details of construction shown and described, because it will be apparent to those who are familiar with this art that many alterations may be made in them and still the essentials of my invention be employed.

I claim—

1. In a trolley device, a wheel in electrical connection with its shaft, and a contact-piece supported on the frame and which engages with the end of the shaft, substantially as set forth.

2. In a trolley device, a wheel in electrical connection with its shaft, and a spring contact-piece which engages with the end of the shaft, substantially as set forth.

3. In a trolley device, a wheel in electrical connection with its shaft, a contact housed in a recess or aperture in the frame and which engages with the end of the shaft, substantially as set forth.

4. A trolley-wheel supported upon a rotatable shaft which is supported in a frame, a bearing-surface for anti-friction balls upon the periphery of the shaft and upon the frame and other bearing-surfaces for the balls upon both the shaft and a frame, to provide for lateral pressure, and anti-friction balls placed between the said several bearing-surfaces, substantially as set forth.

5. A trolley device comprising, essentially, a wheel supported upon a shaft which is in turn supported by a wheel-frame, bearing-surfaces for anti-friction balls upon the periphery of the shaft and upon the frame, other bearing-surfaces upon the shaft and the frame to prevent separation of the frame, a series of anti-friction balls between the said several surfaces, and a contact attached to the frame and which engages with the end of the shaft, substantially as set forth.

Signed at New York, in the county of New York and State of New York, this 5th day of February, A. D. 1891.

CHAS. A. LIEB.

Witnesses:
PHILLIPS ABBOTT,
CHARLES RYDER.