No. 711,107. Patented Oct. 14, 1902.

W. S. HILL.

ELECTRICAL TRACTION SYSTEM.

(Application filed Mar. 31, 1902.)

(No Model.) 2 Sheets—Sheet 1.

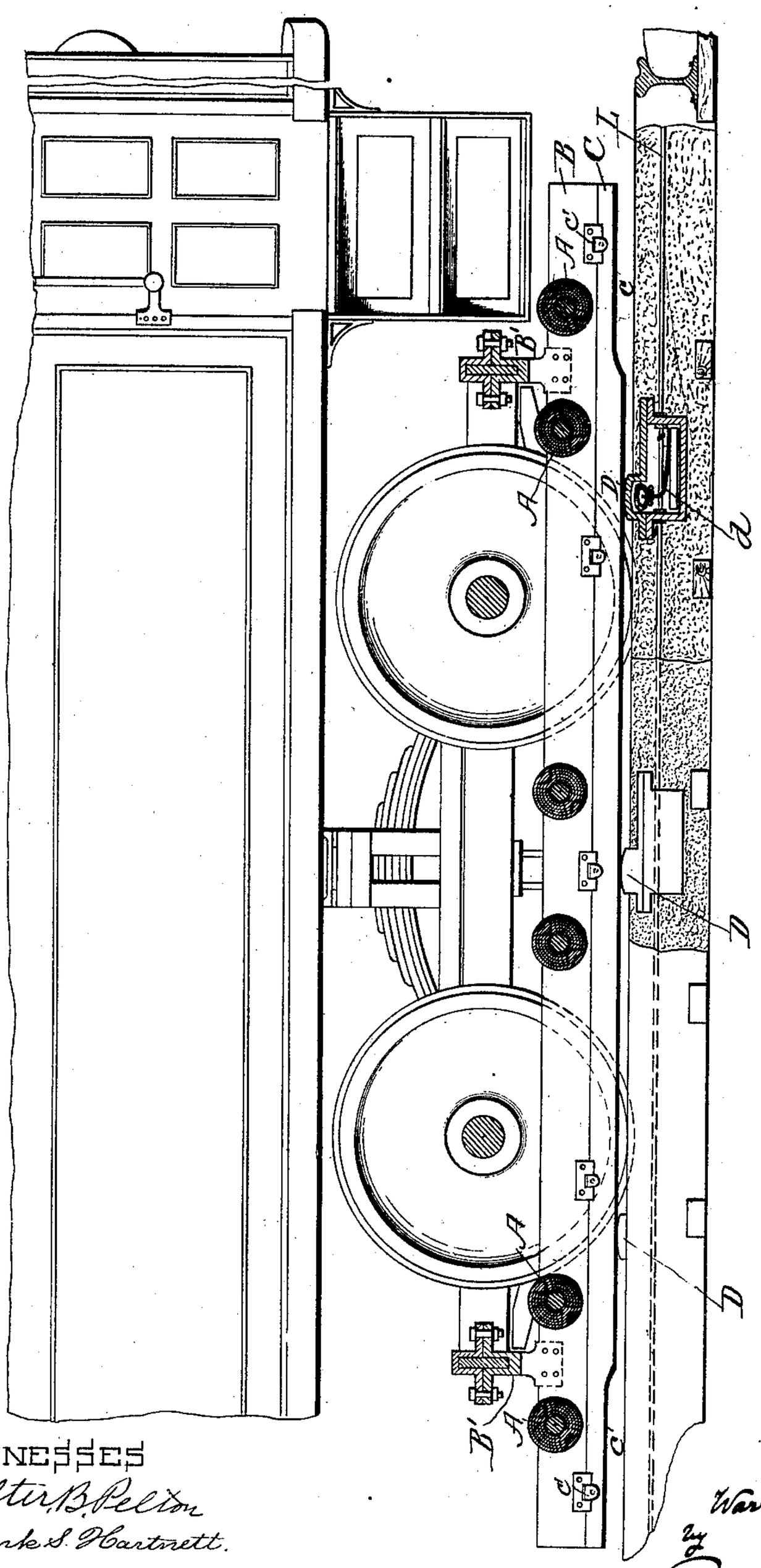

FIG. 1.

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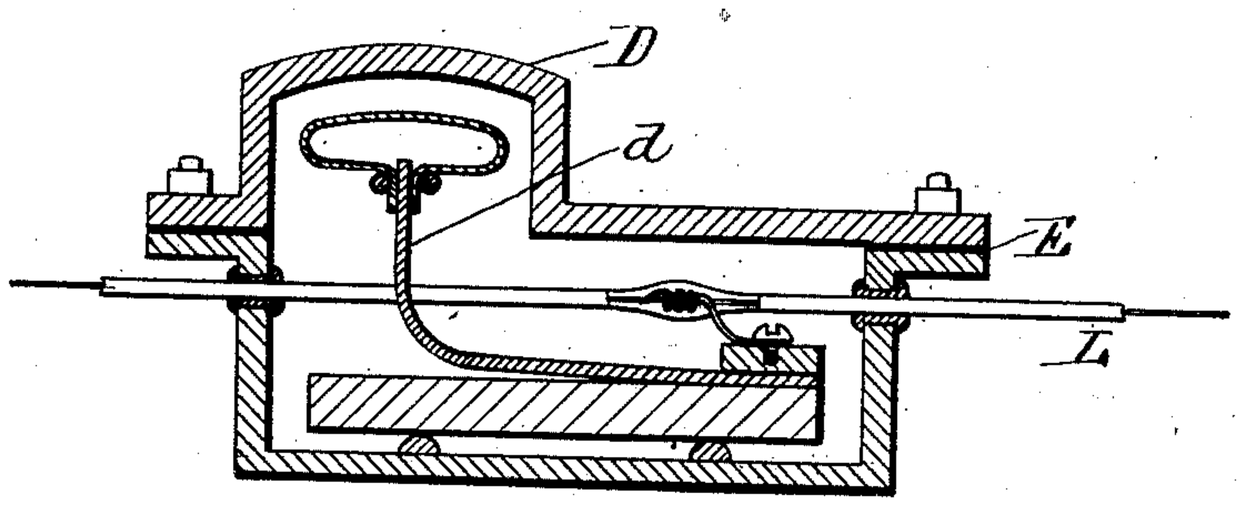

FIG. 2

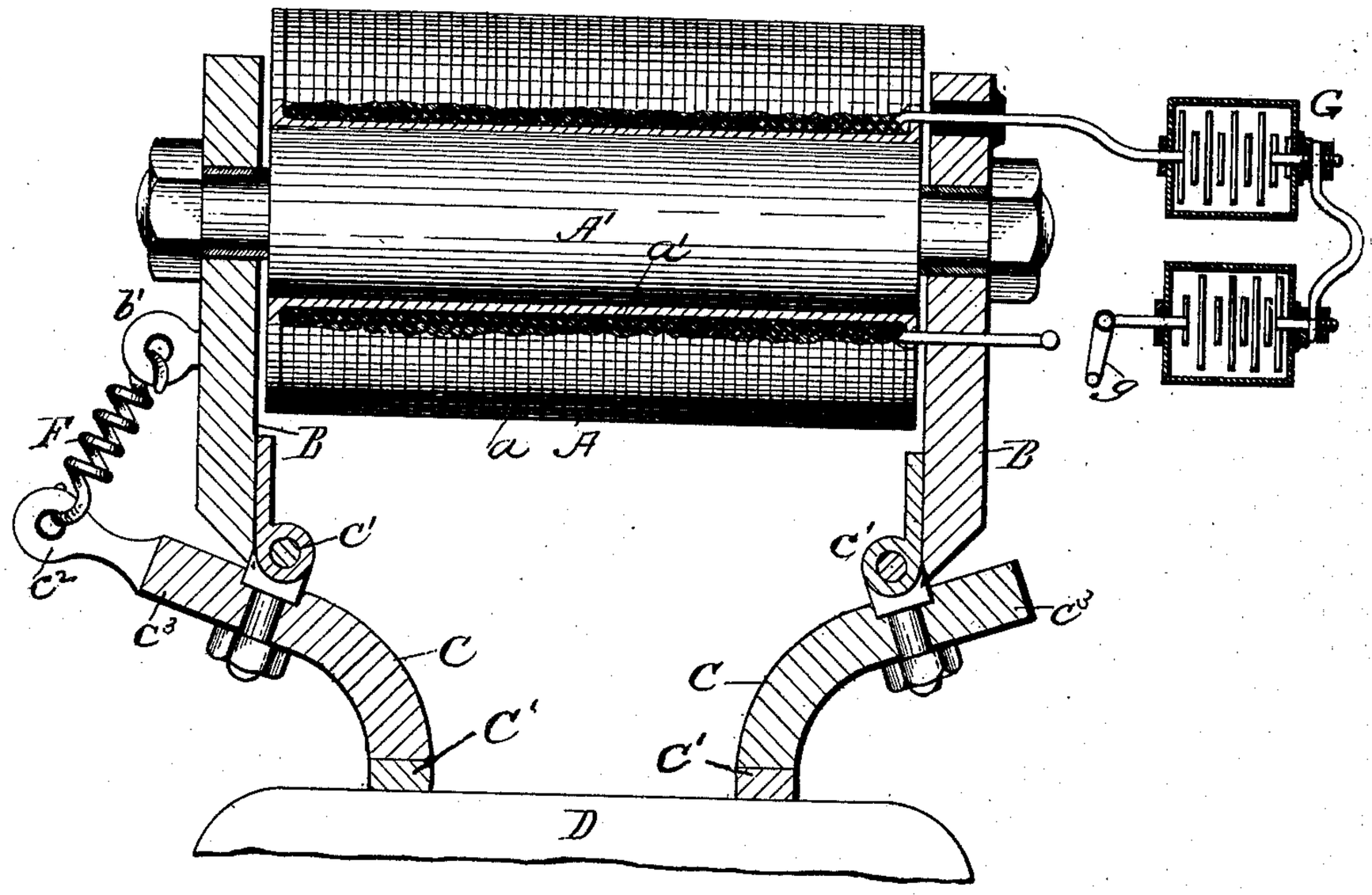

FIG. 3

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UNITED STATES PATENT OFFICE.

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ELECTRICAL TRACTION SYSTEM.

SPECIFICATION forming part of Letters Patent No. 711,107, dated October 14, 1902.

Application filed March 31, 1902. Serial No. 100,684. (No model.)

To all whom it may concern:

Be it known that I, WARREN S. HILL, a citizen of the United States, and a resident of Hydepark, in the county of Norfolk and State of Massachusetts, have invented new and useful Improvements in Electrical Traction Systems, of which the following is a specification.

My invention relates to electrical traction systems of the general character described in Van Depoele's patent, No. 458,866, dated September 1, 1891, wherein movable circuit-closers arranged in road-bed boxes are lifted successively by an electromagnet attached to the moving car or truck.

My improvements relate to the circuit-closer-actuating magnet, its pole-pieces, and the contact-shoes which take the cable-current to the car-motors.

In the drawings hereto annexed, which illustrate an embodiment of my invention, Figure 1 is a longitudinal vertical section of the controlling-magnet, its pole-pieces, and contact-shoes, showing its relation to a car-truck and track-contacts. Fig. 2 is a detail showing a track-contact plate or road-bed plate in cross-section. Fig. 3 is an end elevation, partly in section, of my improved controlling-magnet and its attendant parts.

The underlying idea of traction systems of the character indicated is the provision of an electrical connection with the power-supply which shall move with the motor-driven vehicle and automatically break when the vehicle passes on, so that the contact-plates in the road-bed shall be "dead," except when the motor-driven vehicle is immediately over them.

My improvements presently to be described are contrived with a view to the establishment and discontinuance of the motor-circuit through the road-bed plates with certainty, with a minimum of electrical resistance at the points of contact, and without danger of destructive arcing as the contacts are made and broken. I have also contrived an arrangement of battery connections whereby the controlling-magnet can be energized independently of the power-circuit when necessary, as when the vehicle is to be started.

The road-bed contact-plates D, which rest upon insulation E (see Fig. 2) and serve to cover and inclose the spring-armature circuit-closers *d*, which are connected with the main wire L, Fig. 2, are spaced with equal intervals in the road-bed between the rails. The vehicle-truck carries the magnet-coils A by means of the hangers B′, which are secured to the truck-frame and to the elongated pole-pieces B. The pole-pieces B comprise contact-shoes C, which are articulately joined to the rigid pole-pieces B, so that the poles of the magnet are as a whole flexible. The treads of the shoes C are cut away at the ends, as at *c*, so that the contact-surface of the shoes is appreciably shorter than the magnet-poles themselves.

The length of the magnet-poles calls for a corresponding elongation or distribution of the magnetic field, and this I provide for by subdividing the coils A, using in the instance illustrated six coils secured to the pole-pieces B.

The contact-span of the shoes C between the cut-away portions *c* is sufficient to bridge at least two of the spaces between the road-bed plates D, so that there always are two of such plates in electrical contact with the shoes C, and three when contact with a road-bed plate is just made or about to be broken.

The contact-shoes C are hinged at *c′* to the inner faces of the pole-pieces B and project at c^3 across the ends of the pole-pieces. The shoes C are bent or curved downward to meet the road-bed plates D. In order to withstand wear, hardened treads C′, Fig. 3, may be applied to the shoes C, preferably by welding.

It is desirable to maintain a firm and constant pressure contact between the contact-shoes C and road-bed plates D at all times, and this desideratum is secured by my construction above described. The maget-pole being made in two pieces B and C′ movably secured together, the magnetic force exerted on the projections c^3 of the shoes C tends to pull the parts c^3 into contact with the end of the pole-piece B, and thus causes the tread of the shoe to bear down on the road-bed plates D. The air-space between the pole-piece B and shoe C is quite small, so that practically these two parts form one pole for the magnet-coils A. The metallic terminus of these poles is in close proximity to the road-bed plates D, so that a practical maximum of magnetic force is exerted on the circuit-

controlling armatures *d*, lying under the road-bed plates D.

The function of the above-described structure is further useful in its mode of picking up and dropping the road-bed armatures *d*. The magnetic poles extend at either end a considerable distance farther than the contact-span of the shoes C, so that as the cut-away portion *c* of the shoe reaches over a road-bed plate D the armature *d* is brought within the magnetic field before electrical contact is made by the shoe C. Then when the contact-tread of the shoe C strikes the road-bed plate D it finds the metallic circuit below the plate already established, and danger of arcing between the plate D and armature *d* is avoided. Moreover, when a road-bed plate is reached by the contact-tread of the shoes C there are still two other road-bed plates within the contact-span of the shoes which offer ample path for the power-current, and thus supply additional safeguard against arcing. When in the progress of the vehicle the contact-tread of the shoes C leaves a road-bed plate, the outside electrical connection is broken before the magnetic influence is withdrawn, and again the danger of arcing is avoided.

If it be desired, the magnetic pull on the projections *c* can be supplemented or, with appropriate structural changes, superseded by springs, as F, secured to the pole-pieces B and shoes C at b' and c^2, respectively.

It is necessary to have in reserve a battery for the purpose of energizing the magnet-coils A, as at starting the vehicle. I provide a battery, (conventionally represented at G, Fig. 3,) which is located in any convenient part of the vehicle and which is preferably a storage battery, which can be recharged after use. The coils of the magnet A are in two parts, one, *a*, in circuit with the power-current when the latter is established through the road-bed plates and contact-shoes, the other, a', in circuit with the battery G and controlled by the switch *g*. The battery-coil a' is of low resistance and wound close to the core A′ of the magnet. When for any reason the power-current has been interrupted, so that the coils *a* cease to energize the magnet and release the circuit-controlling armatures *d*, Fig. 2, and it is desired to reënergize the magnet so as to reëstablish the power-circuit and start the vehicle, the battery-current is turned on through the switch *g*. This, by virtue of the low resistance of the coil *a*, may be maintained in great volume for a second or two, which time is amply sufficient for the lifting of the circuit-controlling armatures *d*, which reëstablish the power-circuit.

What I claim, and desire to secure by Letters Patent, is—

1. In a traveling contact for an electrical traction system of the character indicated, the combination of a magnet, articulated pole-pieces depending therefrom, the lower members of said pole-pieces constituting contact-shoes, each joint of articulation being at one side of the pole-axis of the upper member, the contact-shoe hung thereto midway of its width, to enable the magnetic force exerted by the upper members to depress the contact edge of the said shoe, substantially as described.

2. In a traveling contact for an electrical traction system of the character indicated, the combination of a magnet, pole-pieces depending therefrom, downwardly-curved contact-shoes articulately joined to the inner faces of the pole-pieces and projecting across the ends of the pole-pieces, whereby the magnetic force exerted upon the contact-shoes draws the projections upward and depresses the contact-faces of the shoes, substantially as described.

Signed by me at Boston, Massachusetts, this 28th day of March, 1902.

WARREN S. HILL.

Witnesses:
WALTER B. PELTON,
FRANK S. HARTNETT.