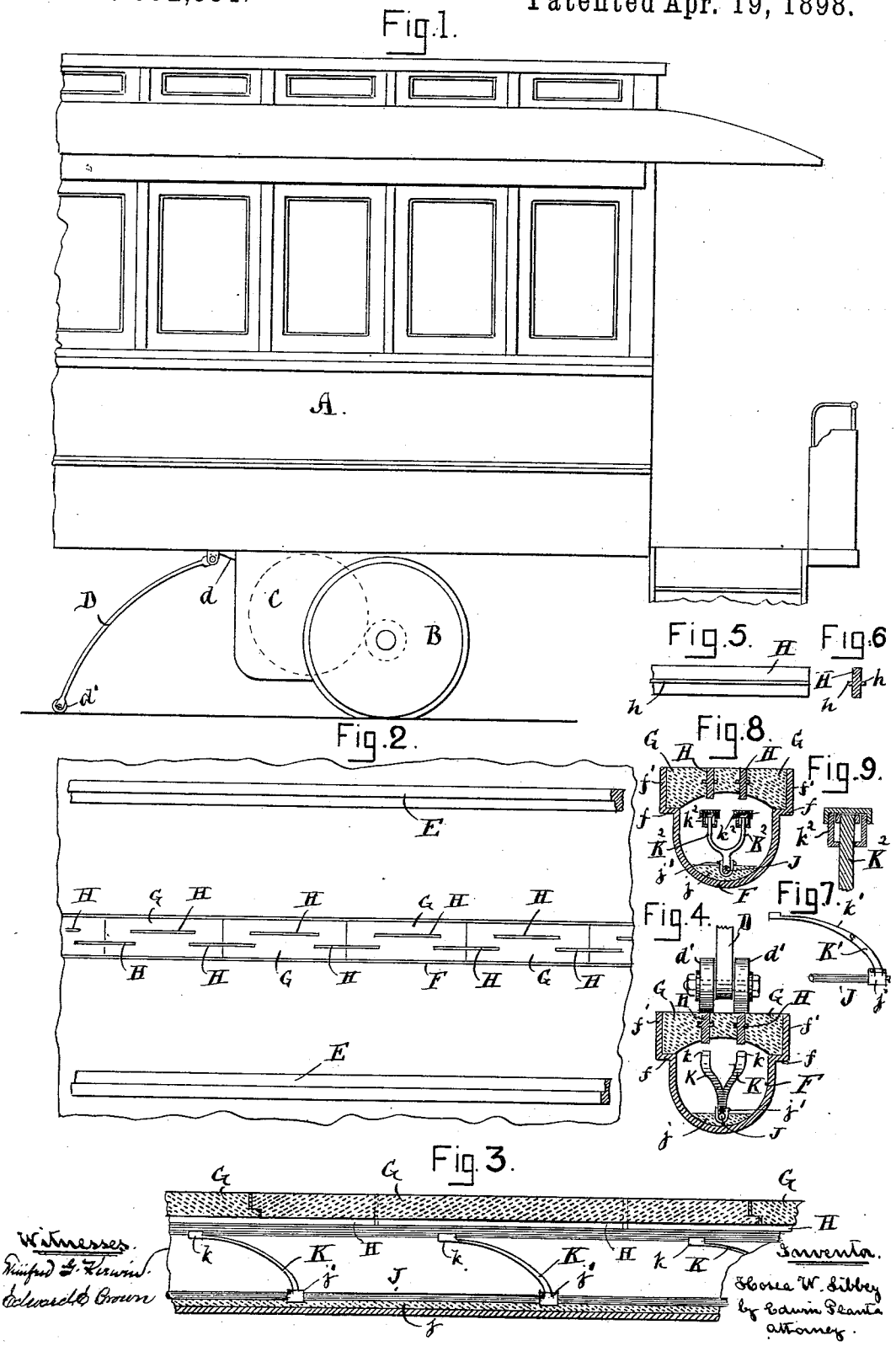
(No Model.)

H. W. LIBBEY.

ELECTRIC RAILWAY.

No. 602,584. Patented Apr. 19, 1898.



Witnesses.
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UNITED STATES PATENT OFFICE.

HOSEA W. LIBBEY, OF BOSTON, MASSACHUSETTS.

ELECTRIC RAILWAY.

SPECIFICATION forming part of Letters Patent No. 602,584, dated April 19, 1898.

Application filed December 10, 1894. Serial No. 531,428. (No model.)

To all whom it may concern:

Be it known that I, HOSEA W. LIBBEY, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Electric Railways, of which the following, taken in connection with the accompanying drawings, is a specification.

The object of my invention is to produce a means for supplying electricity to drive cars, whereby all danger from the electric fluid will be prevented.

The invention consists of an underground conduit in which the supply-wire is placed, said wire having secured to it at suitable intervals springs or contact-pieces which are free to be drawn up into contact with strips of metal secured in the covering of the conduit upon a connecting-piece attached to the car passing over said strips of metal, thereby forming a circuit, as hereinafter fully described, and pointed out in the claims.

Referring to the accompanying drawings, Figure 1 represents a car with a connecting-piece embodying my invention attached thereto. Fig. 2 is a plan view of a track embodying my invention. Fig. 3 is a vertical longitudinal section through the conduit drawn to a larger scale. Fig. 4 is a vertical cross-section of same. Figs. 5 and 6 are respectively side and end views of one of the metal strips embedded in the concrete covering of the conduit. Fig. 7 is a side view of a hinged contact-piece. Fig. 8 is a vertical transverse section of a conduit, showing another modified arrangement for making connections between the wire and the embedded strips. Fig. 9 is a sectional view of one of these connecting-pieces.

A represents the car; B, the front wheel; C, the motor, and D a trolley hinged to the under side of the car and connected to the motor by a wire *d*.

The free end of the trolley D is preferably provided with two wheels *d*, one on each side, which with the trolley are highly magnetized and form a powerful magnet, either permanent or electro, as is common in such constructions.

E E are the rails upon which the wheels of the car run, and may be of ordinary construction. In the center between said rails E is arranged a conduit constructed as follows:

F is metallic casing rounded at the lower end, as will be best seen in Figs. 4 and 8, and near the upper end it is formed with ledges or flanges *f*, that project laterally on each side for a short distance. Then the sides *f'* from said ledges project upward to such distance as may be required to come to the level of the road-bed. G G are blocks of cement preferably formed arched or crowning on their under side, which blocks have a bearing upon the ledges *f'* of said conduit. In these blocks are embedded two rows or series of metal bars H, the bars in one row being opposite to the spaces in the other row. The bars H are formed on each side with a central flange or projection *h*. (See Figs. 5 and 6.) The object of these central flanges or projections *h* is that the bar will be held by the cement and not be liable to be forced down by any heavy weight, such as teams passing over same, and, further, by having the side flanges the projecting ends of the bars in one cement block can be let into grooves or recesses formed in the next adjacent cement block, and the said recesses can then be filled up with cement to form an even surface. The ends of the cement block are formed so as to overlap each other, as shown in Fig. 3, so that after they are laid cement can be run into the joints and make them water-tight.

In the conduit proper is laid the electric supply-wire J, which is embedded in cement or other suitable material *j*. The sides of the conduit are also coated with any suitable insulating material.

At suitable intervals furcated contact-springs K are secured to the wire J by clamps *j'* or other suitable means. The free end of each of these springs is formed with a block or enlargement *k*, so that as the trolley-wheels *d'* pass over the bars H said bars become magnetized and attract the ends *k* of the springs K and draw them into contact with the under side of said bars H, thus forming a connection through which the electric fluid passes from the wire J to the trolley D, forming a circuit through the motor C to ground.

Instead of springs K rigid hinged bars K', as shown in Fig. 7, might be employed, the

hinge being so arranged that the end k' can be easily raised, but cannot fall beyond a certain distance below the bars H; or rigid furcated pieces K^2 might be secured to the wire J, the end of each prong being fitted with a sliding head or piece k^2, which will be attracted and drawn up by the metal bars H when the trolley-wheels d' pass over same, thus completing the circuit, and when the wheel has passed off the bar the head will fall of its own weight.

It will be seen that by this construction all danger from live wires is prevented, as no current passes to the bars H except the trolley-wheels are upon one of said bars and the corresponding contact-piece drawn up to the under side of said bars, and as each row of the bars is laid with a space almost equal to its length between them, the other row being laid opposite said spaces, the electric fluid first passes through one of the bars in one series and then through the next bar in the other series it is impossible for more than two of said bars H to be charged with electricity at the same time, and as said bars are under the center of car they cannot be accidentally reached by man or beast.

What I claim is—

1. In an electric railway, the combination, with a closed conduit, of two rows of parallel alternately-arranged metallic bars, insulatingly embedded in the top, and extending from the upper to the lower surface thereof, a supply-wire within the conduit, movable conductors between the wire and the bars, and a magnetic trolley, the free end of which is provided with two contact-points, side by side, and adapted to engage with the alternately-arranged bars, substantially as set forth.

2. In an electric railway, the combination, with a conduit, of two rows of parallel alternately-arranged bars insulatingly embedded in the top thereof, and extending from the upper to the lower surface thereof, a supply-wire within the conduit, movable conductors upon the wire, each of which is provided with two contact-points, one for each row of bars, and a magnetic trolley, the free end of which is provided with two contact-points, one for each row of bars, substantially as set forth.

3. In an electric railway, the combination, with a conduit, of two rows of parallel alternately-arranged bars insulatingly embedded in the top thereof, and extending from the upper to the lower surface, a supply-wire within the conduit, bifurcated conductors upon the wire, the free end of each arm thereof being movable into and out of contact with the bars, a magnetic trolley, the free end of which is provided with two contact-points, one for each row of bars, substantially as set forth.

4. In an electric railway, the combination, with a conduit, of two rows of parallel alternately-arranged bars insulatingly embedded in the top thereof, and extending from the upper to the lower surface, a supply-wire within the conduit, bifurcated conductors upon the wire, a movable cap upon each arm of each conductor, said caps being movable into and out of contact with the bars, and a magnetic trolley, the free end of which is provided with two contact-points, substantially as set forth.

5. In an electric railway, the combination, with a conduit, of two rows of parallel alternately-arranged bars insulatingly embedded in the cover thereof, a supply-wire within the conduit, movable conductors between the wire and the bars, and a magnetic trolley, the free end of which is provided with two wheels, one upon each side thereof, and each in electrical connection therewith, substantially as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 30th day of November, A. D. 1894.

HOSEA W. LIBBEY.

Witnesses:
CHAS. STEERE,
EDWIN PLANTA.