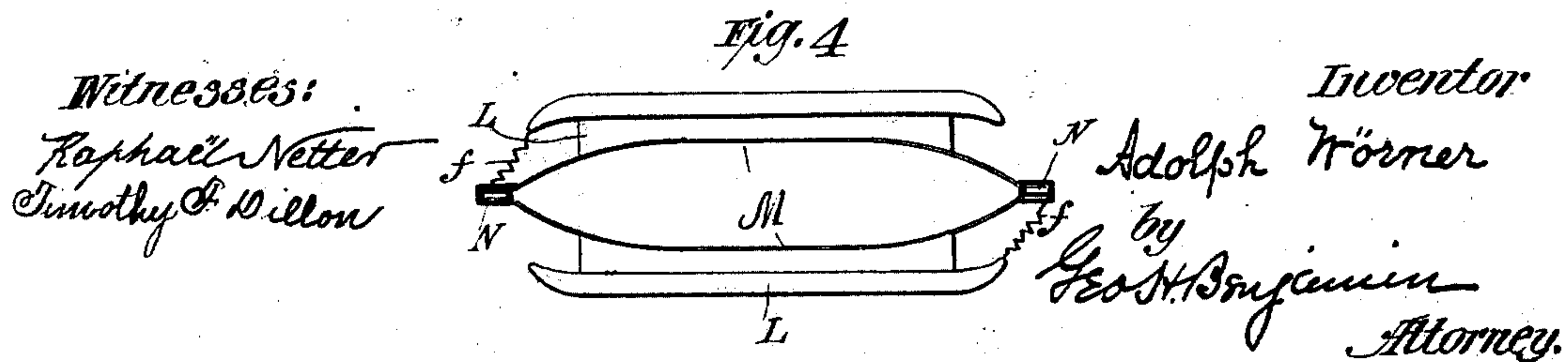
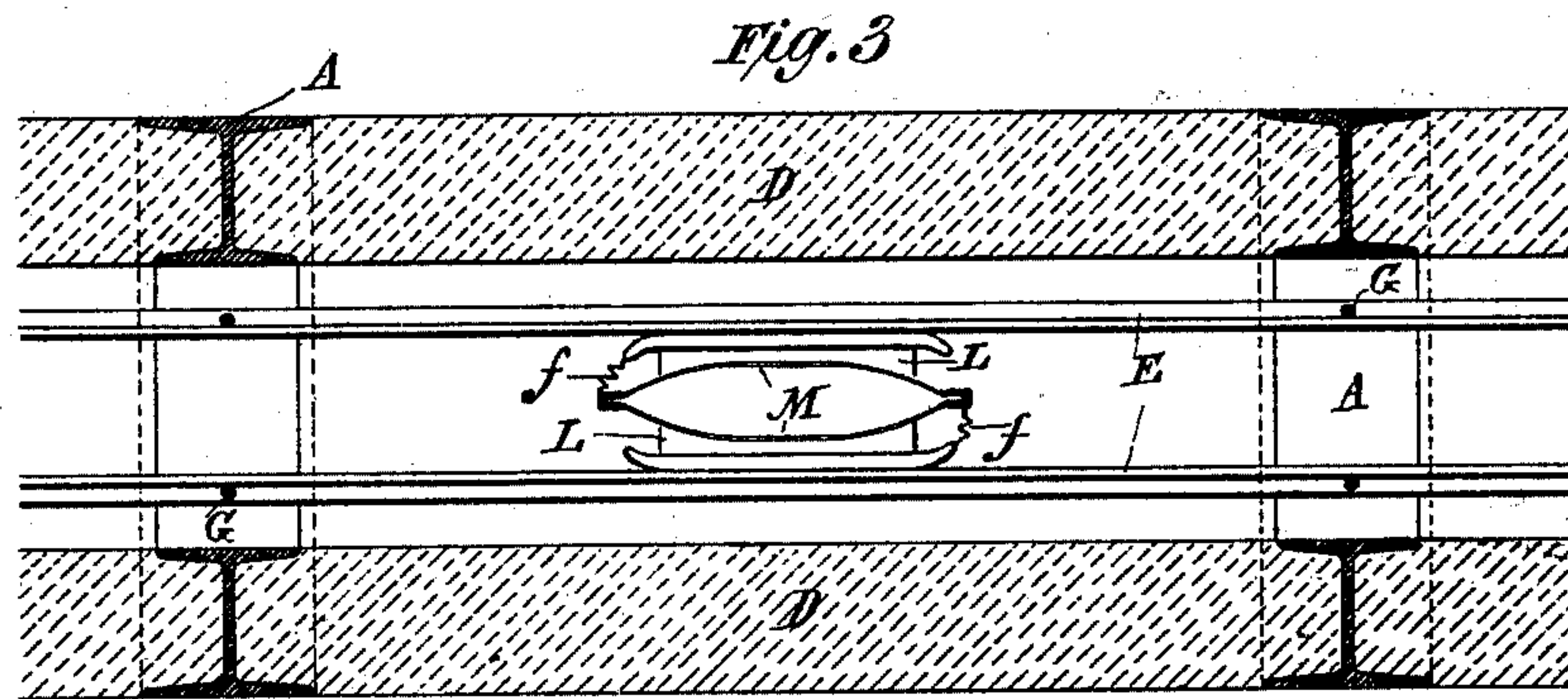
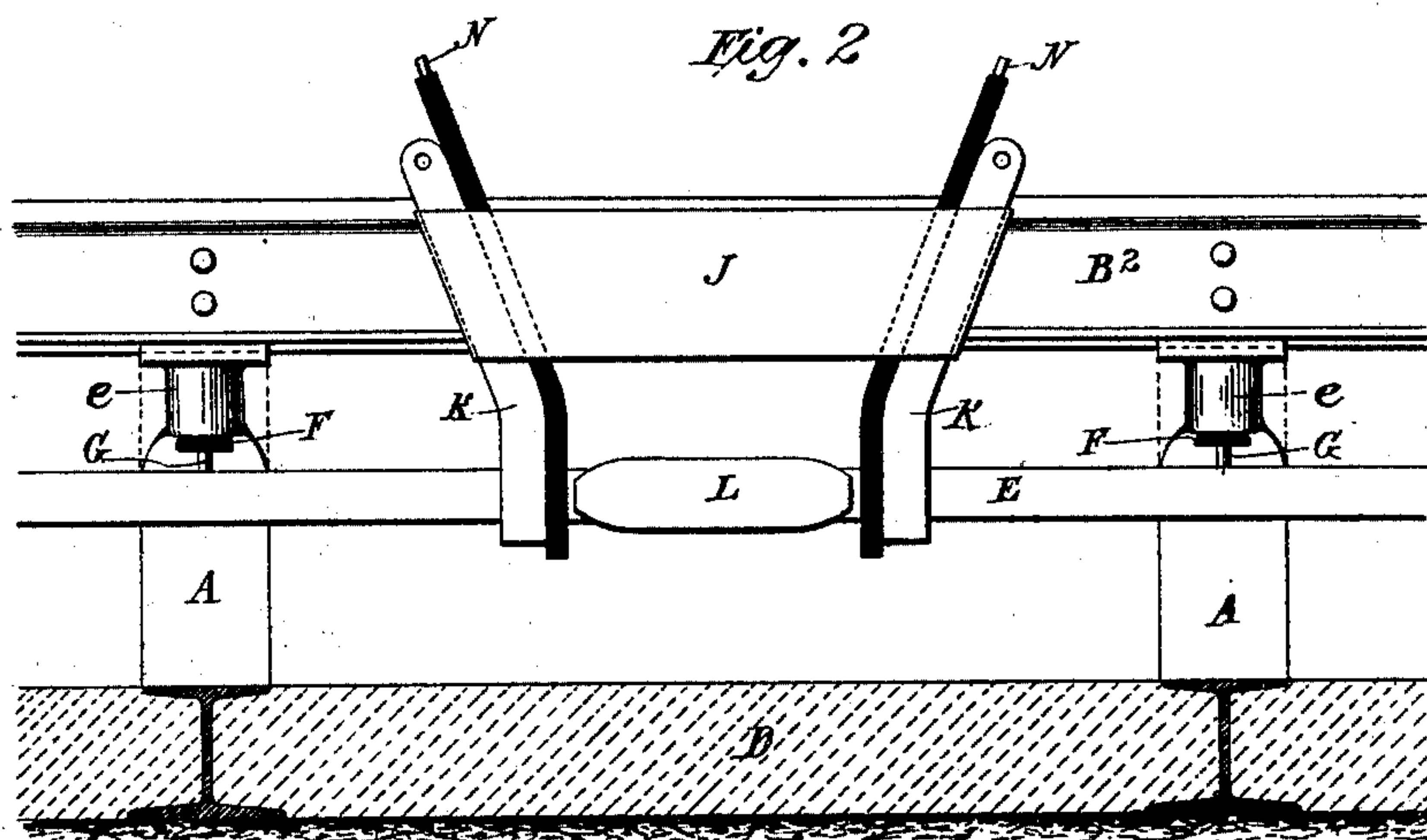
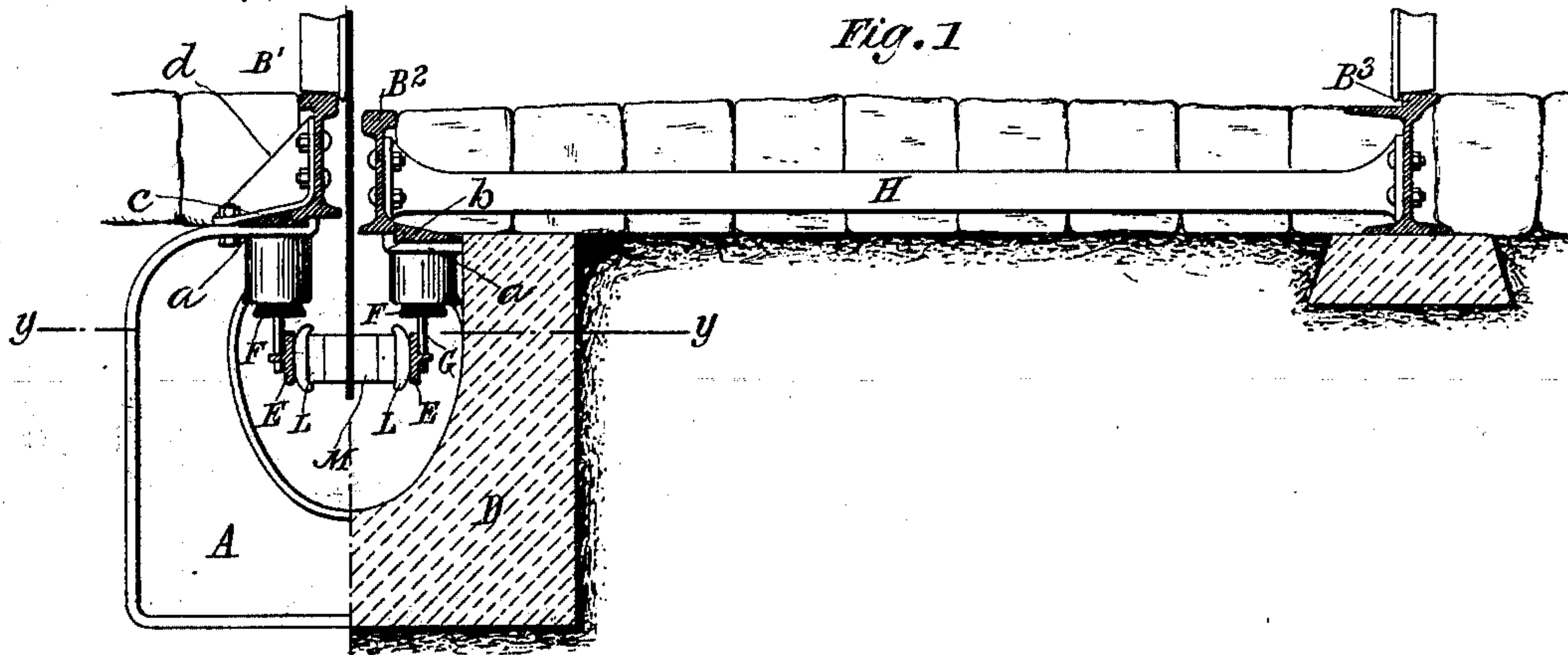


(No Model.)

A. WÖRNER.
CONDUIT ELECTRIC RAILWAY.

No. 509,421.

Patented Nov. 28, 1893.



UNITED STATES PATENT OFFICE.

ADOLPH WÖRNER, OF BUDA-PESTH, AUSTRIA-HUNGARY, ASSIGNOR TO
SIEMENS & HALSKE, OF BERLIN, GERMANY.

CONDUIT ELECTRIC RAILWAY.

SPECIFICATION forming part of Letters Patent No. 509,421, dated November 28, 1893.

Application filed November 12, 1891. Serial No. 411,755. (No model.)

To all whom it may concern:

Be it known that I, ADOLPH WÖRNER, a subject of the Grand Duke of Hesse, residing at Buda-Pesth, Austria-Hungary, have invented
5 certain new and useful Improvements in Electric Tramways with Subterranean Current-Supply; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others
10 skilled in the art to which it appertains to make and use the same.

My invention relates to the arrangement of underground conductors for electrical railways and to means for establishing electrical
15 connection between the said conductors and the electro-motor upon the car.

The objects of my invention are to concentrate and simplify the construction, to render the parts accessible, and to provide for drainage
20 in the foundation of the road bed.

My invention consists in a roadway, provided with a compound rail adapted for the passage of the electrical contact-making device connected to the car, and a structure
25 for the continuous conductor or conductors, adapted to form a sub-way so constructed as to support the respective members of the compound rail rigidly in their fixed relation.

In order to enable others skilled in the art
30 to which my invention appertains to understand and use the same, I will proceed to describe its details of construction, explain its operation and subsequently point out in the appended claims its novel characteristics.

Referring to the accompanying drawings:
35 Figure 1, is a cross sectional elevation of the roadway; Fig. 2, a vertical longitudinal section taken through the conduit between the members of the compound rail; Fig. 3, a horizontal section taken on the line *y, y*, Fig. 1; and Fig. 4, an enlarged detail view of the contact-making device.
40

A represents suitable yokes which are placed in the road bed at intervals, to support the respective members *B' B²* of the compound rail. The openings through the yokes A correspond to the contour of the subway to be formed, and between said yokes the filling D is interposed to complete the side walls of
50 the subway. The subway is graded at its bottom to promote drainage, and its depth

rendered sufficient to obviate the rise of the water to the height of the conductors E of current. The top of each yoke A presents two horizontal bearing portions *a a*,—the adjacent edge portions of which bend upwardly
55 to constitute a pair of short vertical flanges *b b*. The traction rail *B'* and the guard rail *B²* are secured on the horizontal bearing portions *a a* of the yokes,—the base of each rail *B'* being recessed to form a longitudinal shoulder *c* adapted to be engaged by the adjacent flange *b*, to assist in preventing the rails *B'*, *B²* from working toward each other and contracting the intermediate slot in which the
60 contact connection moves. Angle plates or brackets *d*, on the outer side of the bearing rail *B'* are bolted to the web of the same and to the yokes A respectively. The other traction rail *B³* of the road is secured by a suitable-cross tie H to the web of the guard rail *B²*, as indicated in Fig. 1, and the said guard rail *B²*, being thus rigidly connected to the traction rail *B'* by the yoke A, the proper
65 gage of the track is thereby securely maintained.

The continuous underground conductors E are suspended in the subway by means of insulated depending arms G, having insulators F of porcelain, hard rubber, or any suitable well known material, seated in bosses *e e*, located integrally on the under side of the bearing portions *a a* of the yokes A. The arms G, being projected downwardly from the bosses *e e*, avoid any possibility of the
80 water that may collect on the conductors E flowing to the non-insulated parts, and thereby making electrical connection. One of the conductors E serves to convey the electric current from the generating station to the car, the other to return the current, and the travelling contact-making device of the car is provided with two respective shoes L, L insulated from one another bearing on the respective conductors E, E, and connected to the opposite
85 poles of the electro-motor by wires *f f*, *N, N*. The shoes L, L, are compressed against the respective conductors E, E by means of the spring M, shown in Figs. 3 and 4. The shoes L, L and their electrical conductors N, N are supported
90 from the car in a suitable carrying frame J, having depending arms K, K that engage with
100

and support the opposite ends of the contact-making device.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In an electrical railway, in combination with a subway including a series of yokes, each made in a single piece and comprising top horizontal bearing portions having adjacent vertical flanges; of a traction and a guard rail, mounted and secured on the said bearing portions respectively, and provided with under shoulders to engage the said vertical flanges of the yoke; together with current conductors located oppositely in the same horizontal plane in said subway, substantially as set forth.

2. In an electrical railway, in combination with a subway including a series of yokes, provided with top horizontal bearing portions and lower integral bosses *e e*; of a traction and a guard rail, secured on said bearing portions respectively, and forming a slot between them, for the purpose described; together with current conductors located oppositely and suspended in the same horizontal plane, and suitably insulated from said bosses in said subway, substantially as set forth.

3. In an electric railway, the combination with an underground conduit, and continuous electrical conductors suspended therein by insulated supports, of a compound spring, the parts of which are rigidly connected at their ends so as to form in effect a single spring, carried by the moving vehicle, for pressing contact shoes carried thereby against the continuous conductors and means for transmitting the current to said vehicle, substantially as described.

4. In an electric railway, the combination with an underground conduit and continuous

electrical conductors suspended therein by depending, insulated supports, of a compound spring, the parts of which are rigidly connected at their ends so as to form in effect a single spring, attached to a suitable frame carried by the moving vehicle, for pressing contact shoes carried by said spring against the continuous conductors and means for transmitting the current to said vehicle, substantially as described.

5. In an electric railway, the combination with an underground conduit, and continuous electric conductors, *E E*, suspended therein by insulated supports, of the frame *J*, carried by the moving car, the contact shoes *L L* the spring *M*, the parts of which are rigidly connected at their ends so as to form in effect a single spring, whereby said shoes are uninterruptedly forced against said conductors, and means for transmitting the current to said car, substantially as described.

6. In an electric railway, the combination with an underground conduit and continuous electrical conductors suspended therein by insulated supports, of a compound spring, the parts of which are rigidly connected at their ends so as to form in effect a single spring, for pressing contact shoes carried by said spring against the continuous conductors, wires connecting said shoes to the moving vehicle, a carrying frame, and arms *K* securing said shoes to said frame and protecting said connecting wires, substantially as described.

In testimony whereof I have affixed my signature in presence of two witnesses.

ADOLPH WÖRNER.

Witnesses:

B. ROl,
MAX WAGNER.