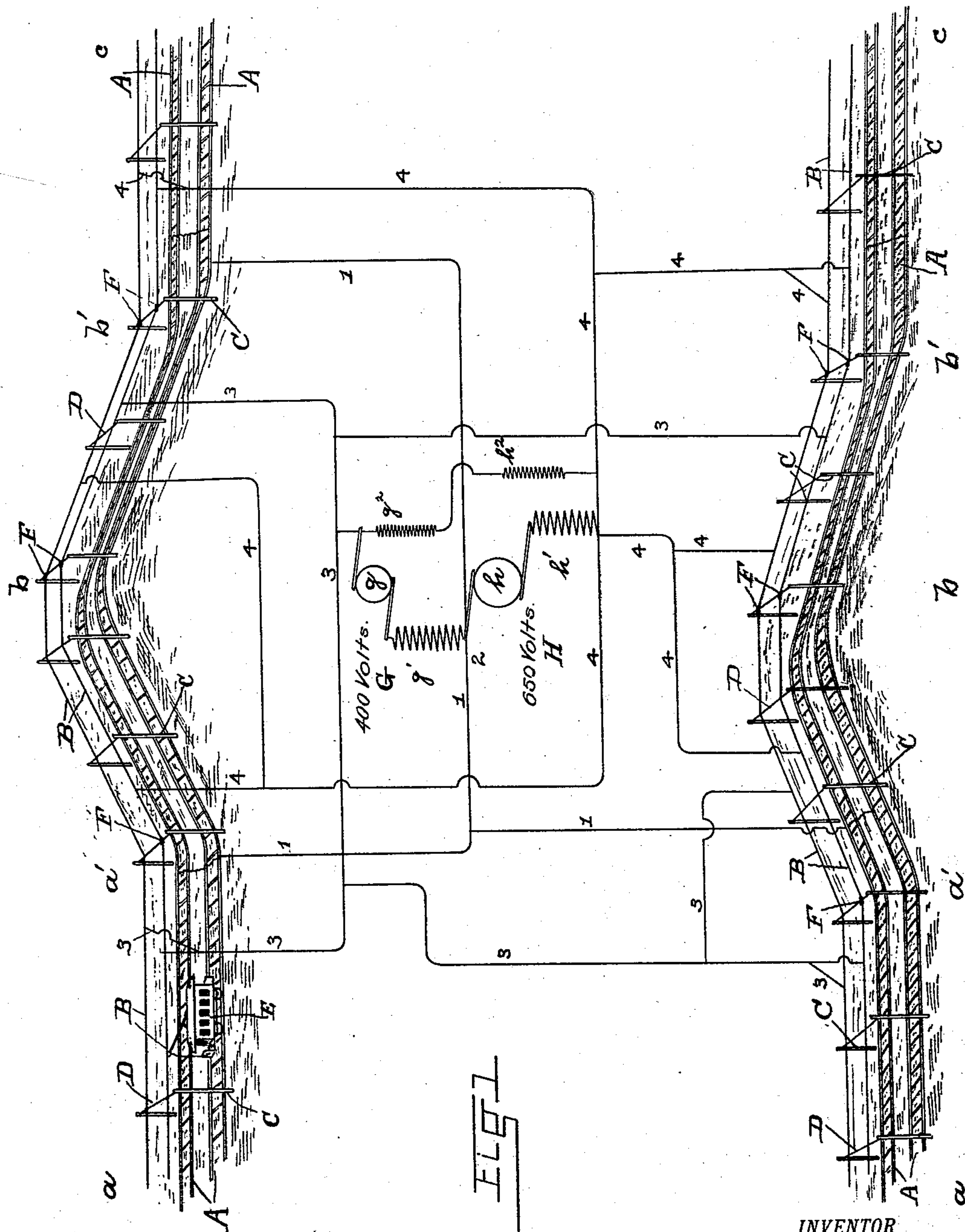


(No Model.)

J. C. HENRY.
ELECTRIC RAILWAY SYSTEM.

No. 543,382.

Patented July 23, 1895.



WITNESSES:

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ELECTRIC-RAILWAY SYSTEM.

SPECIFICATION forming part of Letters Patent No. 543,382, dated July 23, 1895.

Application filed May 13, 1895. Serial No. 549,165. (No model.)

To all whom it may concern:

Be it known that I, JOHN C. HENRY, a citizen of the United States, residing at Westfield, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Electric-Railway Systems; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to electric railways, and its object is to provide an improved system of distribution, whereby the advantages of what is called the "three-wire system" may be availed of, and at the same time the potential on different sections of the line may be kept at different voltages, in order to meet different requirements as to speed, grade, and load. It has been proposed to use an auxiliary dynamo to supply certain sections of the line with current at a higher voltage than the rest. I obviate the necessity of an extra generator, but accomplish the same result.

My improved system consists in a three-wire circuit fed by two generators of different constant potential, the line being divided into insulated sections, each of which is connected with that one of the generators which produces the potential suitable for that section. The rails of the track form the neutral conductor.

In the drawings I have shown a diagram of circuits embodying my invention, the working conductors and the track being illustrated in perspective. Two portions of track are shown, but each is the duplicate of the other.

The track A and the overhead working conductors B, supported on poles C and spanwires D, are all of the usual construction. The two portions of road shown are supposed to be divided into sections requiring different voltages. The section from *a* to *a'* is a congested part of the city, where the cars E must run slowly. The section from *a'* to *b* is an up and down grade; that from *b* to *b'*, a down and up grade; that from *b'* to *c*, a suburban district where the cars may run rapidly. On the sections where it is desired to run slowly

the maximum voltage is fixed at, say, four hundred, and this may be the voltage, also, on all downgrades. On the upgrades and also in the suburban portions let the voltage be arranged at six hundred and fifty. The sections of the working conductors on which these different voltages are used are electrically separated by insulating-connectors F.

Current is supplied to this system by two constant potential generators G H, the former giving a voltage of four hundred and the latter of six hundred and fifty. These machines are compound wound, the armatures *g h* and series-coils *g' h'* being connected in series, and the shunt-coils *g² h²* being also connected in series, forming a single shunt for the two machines. The neutral conductor 1 is connected with the series-field-coil circuit between the two machines at 2, and also with the rails of the track A, which are electrically continuous.

The positive brush of the dynamo G is connected by the feeders 3 with those sections of the working conductor on which a potential of four hundred volts is to be maintained, while the negative brush of the dynamo H is connected by the feeders 4 with those sections of the line on which the potential is to be six hundred and fifty.

It will be seen that this system operates substantially in the same manner as a three-wire system of the usual construction, and that it also supplies different portions of the line with different voltages without the use of an auxiliary dynamo. The peculiar connection of the shunt-coils is of especial importance, since I have found it to be essential where constant potential dynamos of different voltages are connected together in series.

In a former application, Serial No. 546,541, I have shown dynamos coupled up in the same manner as in this case, but for a different purpose, to wit: the regulation of the motors where the car is in traveling contact with all three mains, the motors taking current from either or both sides.

Having thus described my invention, what I claim is—

1. In an electric railway, a system of current distribution having sources of supply of different electro-motive force coupled together

in the three wire or compensating system, one or more road conductors divided into electrically separate sections, and conductors leading from said coupled sources of supply to different sections of the road, whereby predetermined sections will be given different voltages, substantially as set forth.

2. In an electric railway, a system of current distribution comprising one or more road conductors divided into sections insulated from each other, two electric generators of different electro-motive force coupled in series, and feed conductors connected with said generators in the three wire or compensating system and supplying current of different voltages to different sections of the road, substantially as set forth.

3. In an electric railway, a system of cur-

rent distribution comprising one or more working conductors divided into electrically separate sections, two dynamo electric generators of different electro-motive force coupled in series, feed conductors connecting the positive and negative sides of said coupled generators with different sections of the road, and a neutral conductor connected with said generators in the three wire or compensating system and common to all the road sections, substantially as set forth.

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

JOHN C. HENRY.

Witnesses:

S. W. TOWNSEND,
J. J. BURNS.