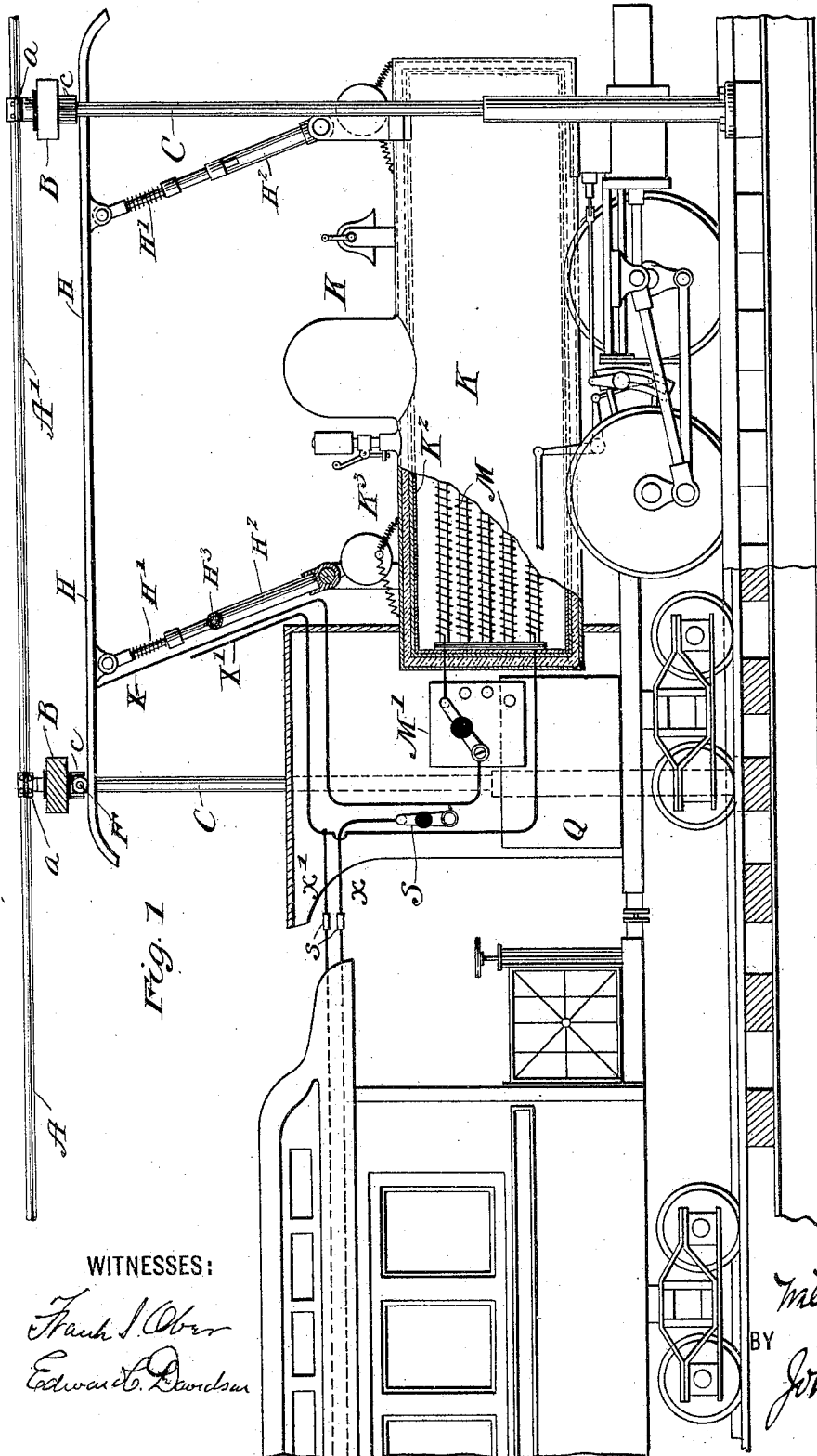


W. A. BUTLER.
ELECTRIC PROPULSION OF VEHICLES.

No. 574,388.

Patented Jan. 5, 1897.



WITNESSES:

Frank J. Ober
Edward C. Davidson

INVENTOR

William A. Butler

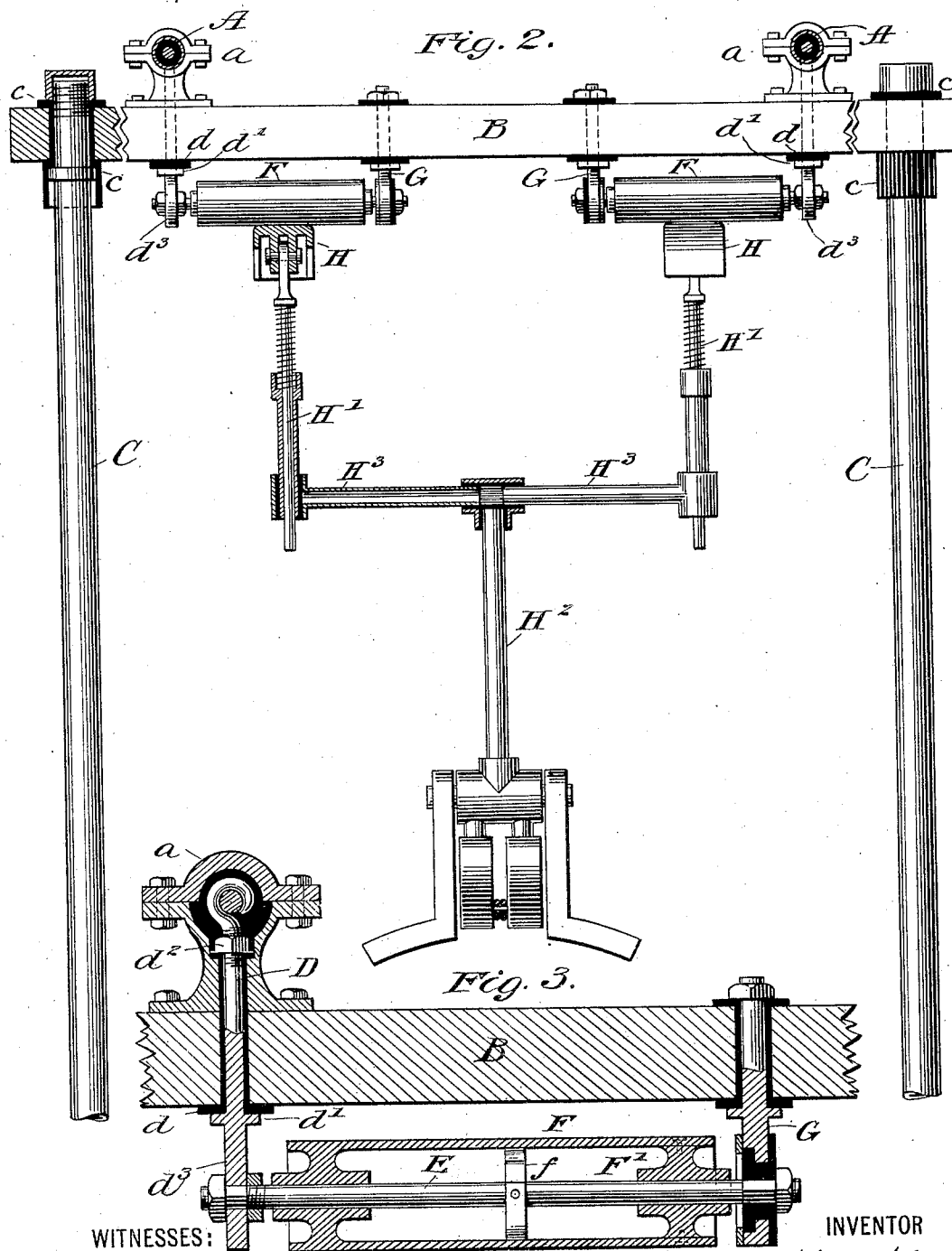
BY

John H. Boyd
ATTORNEY

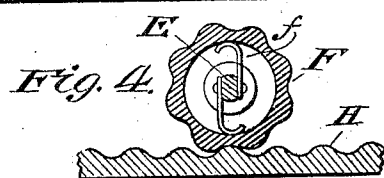
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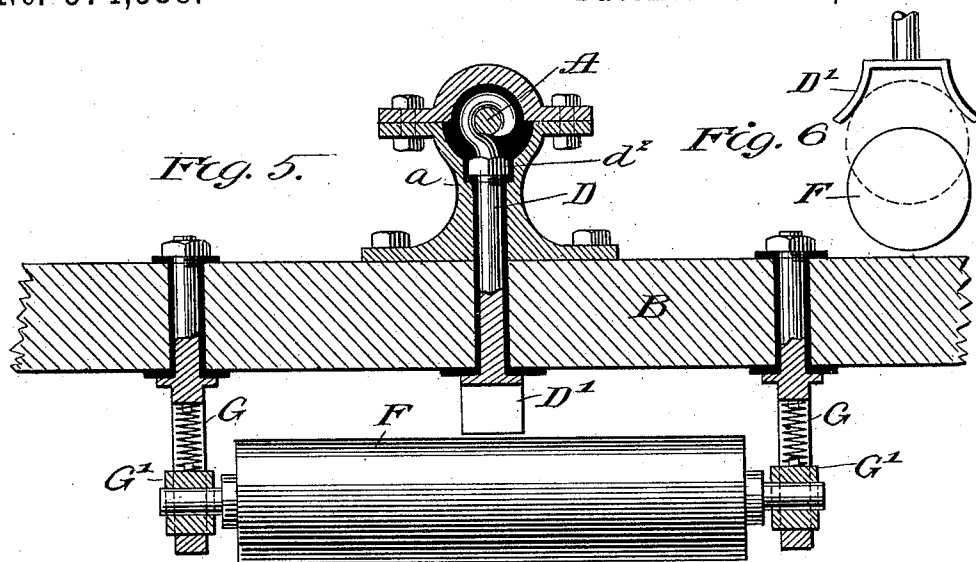
(No Model.)

3 Sheets—Sheet 3.

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UNITED STATES PATENT OFFICE.

WILLIAM A. BUTLER, OF NEW YORK, N. Y., ASSIGNOR TO JOHN GILMORE BOYD, OF SAME PLACE.

ELECTRIC PROPULSION OF VEHICLES.

SPECIFICATION forming part of Letters Patent No. 574,388, dated January 5, 1897.

Application filed March 19, 1895. Serial No. 542,373. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM A. BUTLER, a citizen of the United States, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Electrical Propulsion of Vehicles, of which the following is a specification.

My invention comprises certain details of organization hereinafter set forth and claimed.

In the accompanying drawings, Figure 1 is a side view, partly in elevation and partly in section, indicating a locomotive and the forward end of the adjacent car and the collector, circuits, and connections by which my improved system may be carried into operation. Fig. 2 is a detail view showing, partly in section and partly in elevation transverse to the track, an arrangement of conductors, collectors, and the structure by which the conductor is suitably supported above the track. Fig. 3 is a detail sectional view illustrating the distributing-conductor, the means by which it is supported and insulated, and the roller contact connected therewith and from which the current is taken by the collector carried by the car. Fig. 4 is a detail sectional view indicating that the face of the contact-roller connected with the distributing-roller and the face of the shoe or collector carried by the car may be corrugated or toothed to secure a rotation of the contact-roller as the shoe or collector moves in contact with it. Fig. 5 is a detail sectional view illustrating a modification in which the aforesaid contact-roller is normally out of contact with the distributing-conductor but is pressed into contact therewith by the shoe or collector carried by the car. Fig. 6 is a detail view illustrating the aforesaid conductor in full lines in its normal position and in dotted lines in the position it assumes when in contact with the shoe or collector carried by the car.

In the organization illustrated in the drawings I have shown two distributing-conductors A A', insulated and mounted in brackets *a*, supported upon a cross-beam B, carried by uprights C C, arranged at the sides of the track, which track may be that of an elevated railroad. The uprights C C may be of wood or they may be of metal and may be metal

pipe, in which event it is desirable that suitable insulation, as *c*, be interposed between the upright and the cross-beam B, which latter, however, is preferably made of wood. The conductors A A' are insulated and preferably armored throughout their length, except at the points within the brackets *a*. At these points a bar or rod D is attached to the conductor A A', being preferably turned around it and soldered thereto.

The brackets *a* are made in two parts, as shown, and the interior space therein surrounding the electrical conductor and the conducting-rod connected therewith is filled with insulation, as indicated. The two parts of the bracket are bolted together. The conducting-rod extends through the base of the bracket and cross-beam B, suitable insulation *d* surrounding it, and is formed with a flange *d'* below the beam and provided with a nut *d''* within the bracket, by means of which it may be firmly clamped in position. The lower end *d''* of the rod is flattened and has therein a bearing for a fixed shaft E, upon which the contact-roller F turns. The opposite end of this shaft is mounted in an insulated bracket G, pendent from the cross-beam. The elongated hubs F' of the contact-roller F insure a good electrical contact between the shaft E and roller; but to provide against possible imperfection of contact spring-brushes *f* are secured to the shaft and bear against the interior wall of the hollow contact-roller. Of course but one conductor A or A' may be employed and the rails used under proper conditions as the return-conductor. With this organization the distributing conductor or conductors is insulated at all points except where the rods D extend down to the contact-rollers F, that are beneath the beams B, which may be made of any suitable width to protect the rollers from contact with other conductors, such as telephone, signaling, and telegraph wires, that might by accident fall across the beams B.

The collectors, shoes, or brushes H may be each pivoted to a pair of telescoping pivoted counterweighted arms H', carried by the car or locomotive, substantially as shown in my Patent No. 523,104, dated July 17, 1894. In the drawings, however, as I show two distrib-

uting-conductors arranged above the track, I may use a single counterweighted pivoted upright H^2 at each end of the car and provide it with a transverse bar H^3 , in the respective ends of which one arm H' of each pair is mounted. The shoes or collectors are each of sufficient length to make contact with one contact-roll F before breaking contact with the preceding one and are curved or turned downwardly at each end for an obvious purpose.

In Fig. 5 the conducting-rod D terminates in a forked contact-plate D' , below which the contact-roller F is mounted in blocks G' , sliding in the forks of insulated brackets G and normally pressed downwardly to hold the roller away from the contact D' . When the shoe H strikes the roller, the blocks slide in the forks of the brackets and the roller is pressed against the contact D' . The conductors or circuit-wires X X' are carried down from the shoes H in any usual or appropriate manner.

The organization thus far described is an appropriate one for carrying current to a traveling car or locomotive and possesses points of novelty in structure and elements of safety.

In Fig. 1, K indicates a steam-locomotive having a boiler K^1 , preferably well covered with heat-insulating material K^2 to prevent loss of heat by radiation, that may be inclosed in an external shell K^3 of sheet-iron. Steam is to be raised in the boiler by heat developed in heating-conductors M, located in the boiler and submerged in the water therein. Any well-known system of electrical heating for this purpose may be employed. In the drawings the conductors M are wound spirally around rods of insulating material supported longitudinally in the water-space of the boiler. Any appropriate arrangement of heating-conductors, either in series, parallel, or series-parallel, may be employed. M' is an ordinary resistance-box, to the lever of which one of the circuit-wires X runs. The other circuit-wire X' is shown connected directly to the heating-conductor in the boiler.

Lighting-conductors $x x'$, controlled by a switch S, may be run through the train, representing their couplings.

In Fig. 1, Q Q indicate water-tanks arranged one at each side of the cab.

I claim as my invention—

1. The combination of the overhead structure, consisting of uprights C and cross-beams B, positive and negative distributing-conductors A A, supported at intervals by and above the cross-beams B and insulated between such points of support, a series of contact-rollers

for each conductor, each permanently electrically connected with it and located beneath one of such cross-beams, a track or way running parallel with the lines in which such contact-rollers are arranged, vertically-yielding elongated contact-shoes, one for each series of rollers, carried by a vehicle traveling upon such track or way, and circuit connections extending from each shoe to the vehicle, the organization being such that each shoe makes contact with one of the rollers of its series before leaving another, substantially as set forth.

2. The combination of two overhead conductors supported at intervals and insulated between supports, a contact arranged at each support and electrically connected with its conductor, a traveling vehicle, two yielding vertical arms H^2 carried by the vehicle, a cross-bar carried by each arm, vertical telescoping supports arranged at each end of the cross-bar, and two elongated contact-shoes respectively pivotally connected with the telescoping supports, on corresponding ends of the cross-bars, substantially as and for the purpose set forth.

3. The combination of a track or way, a vehicle traveling thereon, a yielding elongated collecting-shoe carried by the car, a distributing-conductor, supports therefor arranged above the track, the conductor being insulated between such supports, a contact-roller mounted to rotate upon a fixed shaft, whose support is electrically connected with the distributing-conductor and contact-brushes attached to the shaft within the roller, and rubbing against the interior face of the roller, substantially as set forth.

4. The combination of the supporting-beams B, the distributing-conductor, the brackets mounted thereupon and within which the conductor is supported, insulation covering the conductor between said brackets, and insulation enveloping the conductor within the brackets, a conducting-rod electrically connected with the conductor within the bracket and extending therefrom through the cross-beam, a shaft having one end mounted in the end of said conducting-rod, and the other end in an insulated bracket or support depending from the under side of the cross-beam, and a contact-roller revolving upon said shaft.

In testimony whereof I have hereunto subscribed my name.

WILLIAM A. BUTLER.

Witnesses:

EDWARD C. DAVIDSON,
JOHN MCCARTHY.