(No Model.) 2 Sheets—Sheet 1.

C. E. DAVIS.

TROLLEY SYSTEM FOR ELECTRIC RAILWAYS.

No. 568,523. Patented Sept. 29, 1896.

Fig. 1.

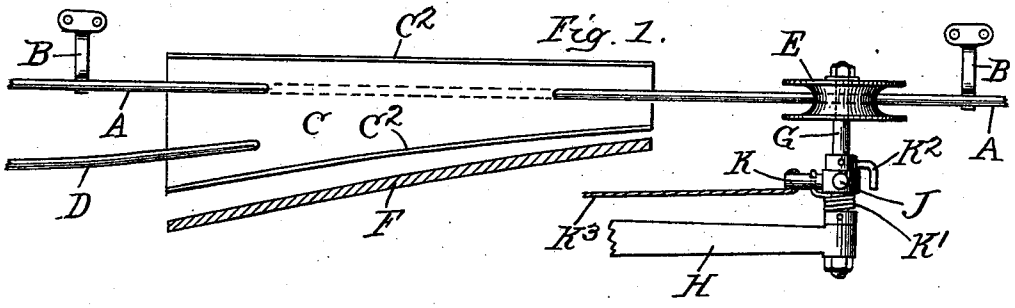
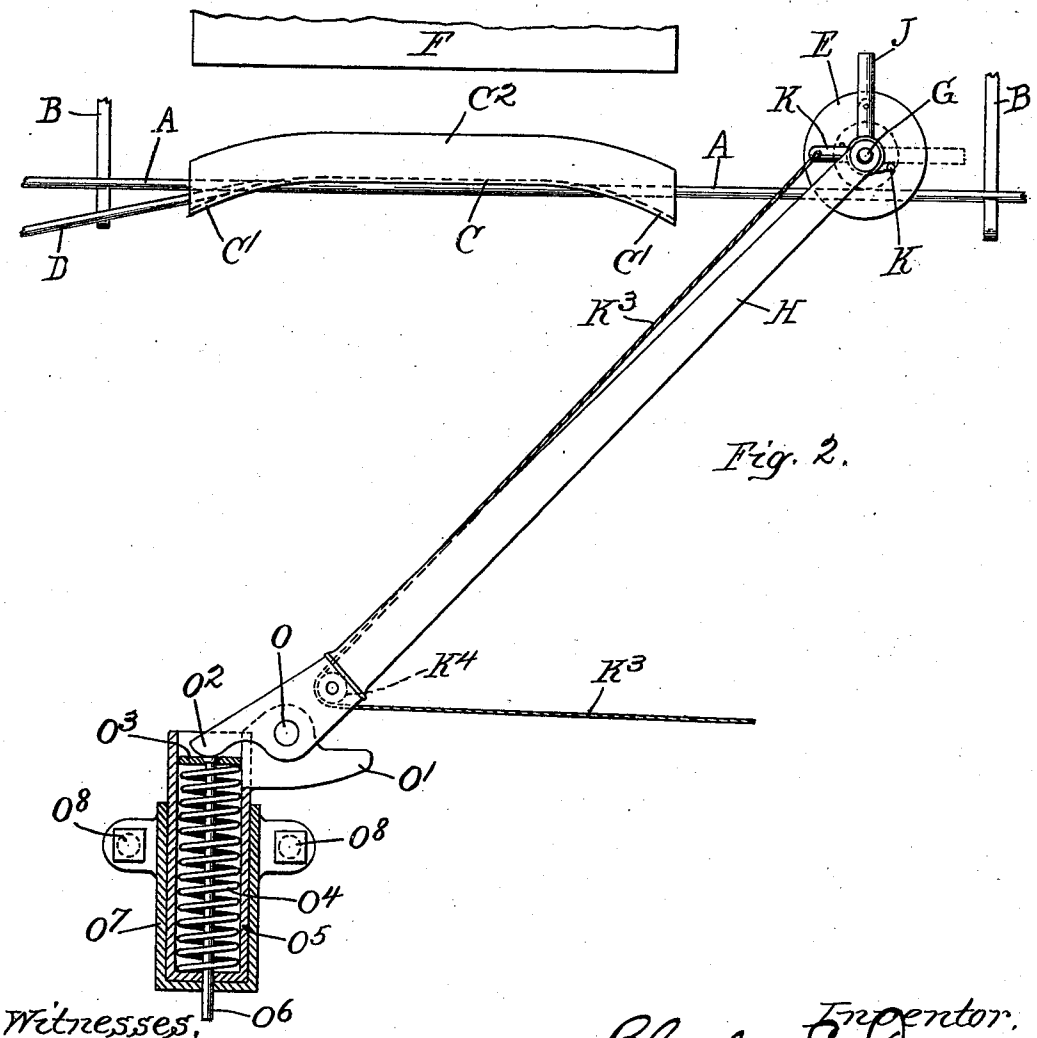


Fig. 2.



Witnesses.
E. T. Wray.
Donald M. Carter.

Inventor.
Charles E. Davis
by Frank W. Parker,
his Att'y.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

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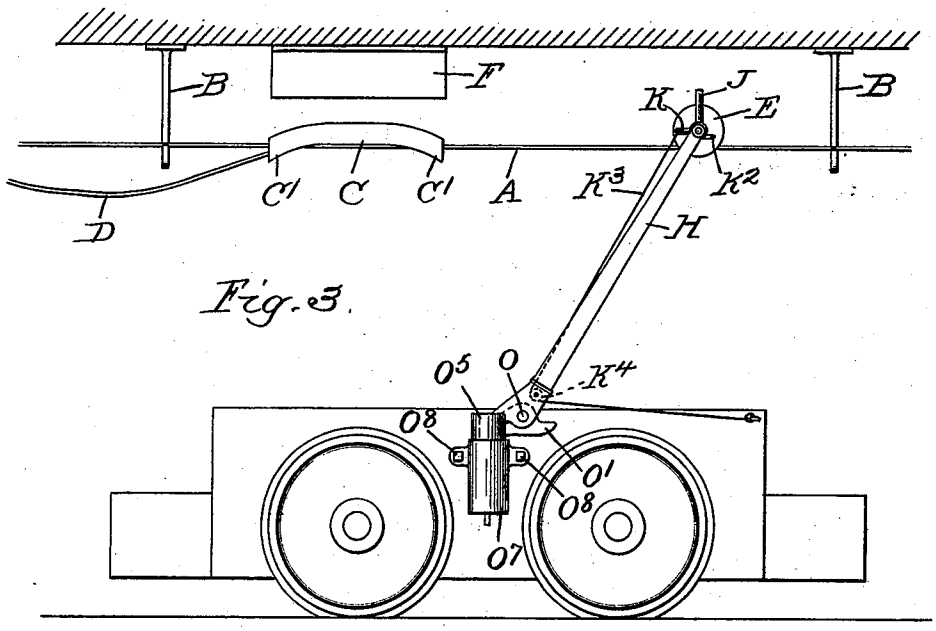


Fig. 3.

Fig. 4.

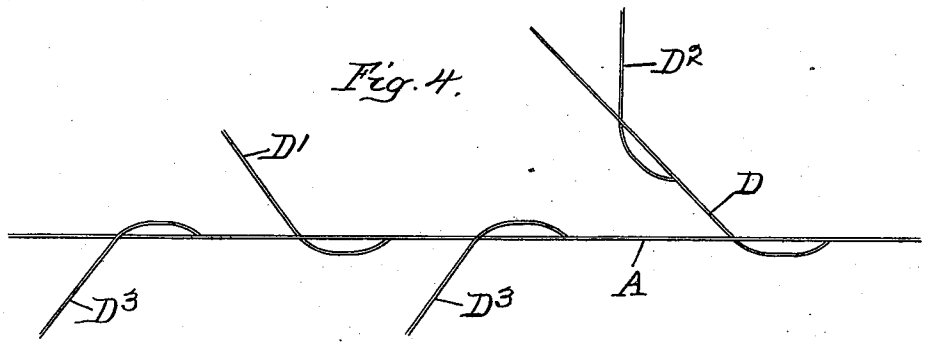
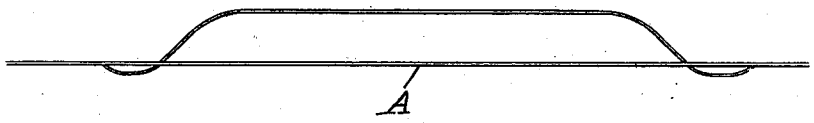


Fig. 5.



Witnesses,
E. T. Wray.
Donald McCarter.

Inventor,
Charles E. Davis,
by Frances N. Parker,
his Atty.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

CHARLES E. DAVIS, OF CHICAGO, ILLINOIS, ASSIGNOR TO ARTHUR D. DANA, TRUSTEE, OF SAME PLACE.

TROLLEY SYSTEM FOR ELECTRIC RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 568,523, dated September 29, 1896.

Application filed April 27, 1896. Serial No. 589,248. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. DAVIS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain Improvements in Trolley Systems for Electric Railways, of which the following is a specification.

My invention relates to trolley devices and trolley systems for operating electrical railways, and particularly to the track arrangement, so to speak, on which the trolley runs, and the particular forms shown are such as are designed for use in mines and similar places.

It is illustrated in the accompanying drawings, wherein—

Figure 1 is a plan view looking down from the roof of the mine, a portion being shown in cross-section. Fig. 2 is a side elevation of the same, certain parts being shown in cross-section. Fig. 3 is a side view of a car with my device attached thereto. Fig. 4 is a diagrammatic view of a trolley-line system. Fig. 5 is a diagrammatic view of a siding-line or conductor system.

Like parts are indicated by the same letters throughout the figures.

I do not, of course, wish to give the impression that I have shown all the devices or constructions or arrangements in connection with which my invention might be used or wherein it might be realized, but I have shown enough to explain its peculiarities and bring forth its characteristics.

A represents a primary conductor, which may be continuous, and is suitably supported on arms B B, which depend from the ceiling or other like part. At the junction of the primary lines with the secondary lines the main conductor A may be interrupted and be attached at its ends to a plate C, or it may make electrical contact with such plate and pass under it at the middle. D is the first secondary line, D′ a second secondary line, and D^2 a secondary line departing from the line D. D^3 D′ are oppositely-running secondary lines. The characteristic or peculiarity of these several lines is that the secondary lines or the lines taking their departure from other lines emanate from such primary or first line and pass to one side and then down and under or up and over the first or primary line to the opposite side. This is a characteristic of the entire system. It is evident now that if the contact device, such as a wheel, traveling on top of the main conductor, for example, A, be diverted to the side conductor D it may travel thereon and then pass down underneath the conductor A and out along the conductor D as a main conductor. On this conductor it may travel to the end of the line, and when the return is made it is evident that such wheel will travel back along the conductor D until it reaches the junction with the conductor A and will then travel on the main conductor. If, at the point of engagement of the conductor D^2 with the conductor D, the wheel be diverted to the conductor D^2, it will pass along that conductor and under the conductor D, and thence out on the line D^2. Returning it will pass on conductor D^2 to conductor D, thence to conductor A and back to the point of beginning. In like manner the system operates with reference to lines D^3 D^3, except that here the wheel passes over the primary line.

It is understood, of course, that the departing or side conductor in each case travels, say, to one side of the conductor A far enough to permit this operation, but not far enough to interfere with the wheel-supporting arm or device if the wheel is to continue on the conductor A. This the wheel may do to the end of the line A, or it may be diverted to any secondary line at the junction therewith.

The plate C, if used, may be the means by which the side line may be attached to the main line, and in that case the junction of the three portions of conductor, that is, the two parts of the conductor A and the conductor D, will be made on a flat smooth surface. There is at the extremities of this plate C preferably a downward dip at each end, as indicated at C′ C′, so as to enable the trolley-wheel E to easily rise onto and then travel across the plate C, and in like manner to enable it to easily glide onto the other portion of the conductor A or the conductor D. The trolley-pole can be manipulated by the hand of the operator, and of course any desired mechanism could be employed so as to divert the wheel E onto the conductor D or permit

it to continue on the conductor A, as occasion may require. It is convenient, however, for the operator to be assisted in this by mechanism which, after he has set it, will automatically cause the wheel thus to be diverted. The plate C is preferably provided with the sides C^2 C^2 to keep the wheel in position thereon. Over and associated with the plate C or the conductors A and D, on top of which the wheel E travels, is placed, when desired, the rib or fin F, which sustains the proper relation to the plate C, so that when it acts as a guide for the wheel E the latter will be moved across the plate C and be made to travel upon the conductor D, whereas, if the fin F has no such action and the trolley-wheel is not so diverted the wheel will pass over the plate and engage the other end of the conductor A.

The wheel E is supported on the axle G in the end of the pole H, and on the axle G is mounted an elbow crank-lever having the long arm J and the short arm K. A spiral spring K′ encircles the axle and is secured thereto, and one end of it is carried over one arm of the elbow crank-lever, so as to tend to force it always in the direction opposite to that in which the wheel is traveling (see Fig. 2) and into the position shown in dotted lines in that figure. Here it rests against the stop K^2, and this is the normal position of the device. In such case the short arm K of the elbow crank-lever is in the position indicated in dotted lines in Fig. 2 and is so short as not to engage the fin F and not to engage the conductor A when the wheel passes under the same on the conductor D. The rope or cord K^3 is fastened to the arm K and travels over the pulley K^4 in the end of the trolley-pole and thence goes to a position where it is under the control of the operator. The long arm J, however, when it is in the position indicated in Figs. 1 and 2 in full lines, into which position it is brought against the action of the spring K′ by pulling the cord K^3, engages the fin, and this draws the wheel toward that fin and afterward releases it after it is in engagement with the conductor D.

If for any reason the long arm of the elbow crank-lever remains elevated until the wheel starts under the conductor A, it will strike that conductor and be forced down into its normal position, the wheel passing under in safety.

As previously suggested, it will of course be understood that these features, as herein described, are more in the nature of diagrammatic illustrations than any attempt to show accurately or critically precise forms and constructions or proportions. Any mechanic, however, can take what is here suggested and make a working device.

The lower end of the trolley-pole is pivoted at O on a piece which has the stop O′ to prevent the trolley-pole from going too far down when its wheel escapes from the wire.

O^2 is a toe on the back of the trolley-pole which bears upon the plate O^3, which when turned rests upon the spiral spring O^4 in the socket O^5. The plate O^3 is steadied by the pin O^6, which passes through the bottom of the socket. This socket is free to rotate in a fixed cup O^7, secured to the side of the car by the bolts O^8 O^8. Thus the trolley-pole is secured, as it were, by a universal joint, so as to permit it to have the lateral motion above referred to. With reference to these portions of the device I make the same observation as before, that no attempt is made to show anything more than a suggestion of what can be done in the way of utilizing my invention.

I will hereinafter denominate the lines which take their departure from another line as "secondary" lines, and the line from which the departure is taken as the "primary" line. Now, a peculiarity of my system is that the secondary line takes its departure from the primary line on the opposite side of the primary line from that in which the secondary line is directed. Another peculiarity is that this secondary line always goes down and under or up and over or into a different place from the primary line. Another peculiarity is that where a switch device is employed the trolley-wheel travels under the switch and over the conductor, thus being distinguished from the systems in which the trolley is placed under the conductor and switch, and also from those systems in which the trolley is placed over the conductor and switch. In my system the trolley-wheel is placed between the two.

The action of the spring O^4 is to constantly press the trolley-wheel firmly down on its conductor, and this is a matter of considerable importance in mining, where these conductors are placed quite close to the roof of the mine, for if a trolley escapes under an upward pressure it is very likely to cause injury to the parts. Here if it escapes, having a downward pressure, it can do no injury. The stop O′ can be arranged, of course, at any desired height, so as to determine the exact distance which the trolley-pole can travel in its downward course.

I can also use, of course, side lines or sidings, as of course the line which takes its departure from its primary can return thereto at any desired point. Such side lines will pass under or over the main line and to one side, as in the other cases. This is illustrated in Fig. 5. I have also by this construction a continuous system, that is, a system in which there are no breaks as distinguished from switching or trolley systems, in which the wheel rides on top of a track, and where movable track-sections are employed to let the wheel-arm pass.

Of course my system is applicable to ordinary trolley-car lines under elevated-road constructions and even with ordinary street-lines. It is applicable to underground work where the trolley or current-collector is be-

low the wire or lead from which the current is taken. It is also applicable, broadly speaking, and so far as the switching or side-track construction is concerned, to any track construction wherein wheels are to travel upon the track and the vehicle associated with such wheels is to be on the opposite side of the track.

Thus my system, broadly speaking, contains a wheel-track, a wheel on one side of the same, a car on the other side, and a connecting part between the two, and specifically referring to trolley constructions it contains a wheel, a track, a car, the car and wheels on opposite sides of the track, and an additional supporting-track for the car itself.

My invention is thus capable of application in different ways, and some of its features could be retained while others were dispensed with.

The use and operation of the invention have been sufficiently shown. When the operator desires to direct his car onto one of the secondary lines, he has only to pull the pole over at the point where the secondary wire takes its departure from the primary, or if the switching device shown is employed he can pull the elbow crank-lever so as to cause its long arm to engage the fin F.

I claim as new and desire to secure by Letters Patent the following:

1. A trolley system consisting of a series of conductors, each successive secondary conductor taking its departure from its primary conductor at one side and then passing to the other side of said primary conductor.

2. A trolley system consisting of a series of conductors, each successive secondary conductor taking its departure from its primary conductor at one side and then passing in a different plane to the other side of such primary conductor.

3. A trolley system consisting of one or more conductors with a series of secondary conductors departing from such main conductor, each secondary conductor departing therefrom toward one side, then passing to the other side of the primary conductor and in a different plane from that of the primary conductor.

4. In a trolley system the combination of a main conductor supported by arms at one side, with a series of secondary conductors some of which depart from the main conductor on the opposite side from these arms, passing downwardly under the conductor and out on the other side while the remaining secondary conductors depart from the main conductor on the side toward the supporting-arms and then upwardly and over the conductor to the other side.

5. In a trolley system the combination of a main conductor with a side conductor which departs from the main conductor on one side thereof, passes into another plane and crosses the main conductor and travels approximately parallel therewith and then crosses the main conductor again and returns to it on the same side from which it departed.

6. In a trolley system the combination of a system of conductors with a trolley traveling on top of said conductors, and a switch device above the trolley and conductor system.

7. In a trolley system the combination of a conductor system with a switching device and a trolley-wheel which travels between the conductor and the switch.

8. A trolley system comprising conductors, a switch and a trolley-wheel which travels between the trolley-wheel and its opposed conductor, a device under the control of the operator for governing the application of the switch.

9. In a trolley system the combination with a continuous main conductor of secondary conductors continuous therewith and departing therefrom on either side thereof, with a car traveling below said conductors and having a trolley-wheel connected therewith, said trolley-wheel traveling on top of said conductors, and means whereby said trolley-wheel may be diverted to either side of said main conductor so as to travel along any of said secondary conductors.

10. A trolley system comprising a continuous main conductor, having secondary conductors continuous therewith and departing from each side thereof, a trolley-wheel traveling on top of said conductors, and a switch device whereby said trolley-wheel may be diverted from said main conductor to any of said secondary conductors.

11. A trolley system comprising a track, a car thereon, a main conductor parallel therewith, a current-collector carried by the car and on the opposite side of the conductor from the car, and secondary conductors which depart from the main at one side and pass thence to the other side thereof.

12. The combination of a continuous track or way with a wheel to travel on one side thereof, an associated vehicle on the opposite side thereof, a connection between the two, a series of secondary ways taking their departure from the primary way each at one side, and then passing to the other side of said primary way.

13. The combination of a continuous track or way with a wheel to travel on one side thereof, an associated vehicle on the other side thereof, a connection between the two, a series of secondary ways taking their departure from the primary way each at one side and then passing in a different plane to the other side of such primary way.

CHARLES E. DAVIS.

Witnesses:
DONALD M. CARTER,
BERTHA C. SIMS.