(No Model.) 2 Sheets—Sheet 1.

F. BARRELL.

CONDUIT ELECTRIC RAILWAY SYSTEM.

No. 539,786. Patented May 28, 1895.

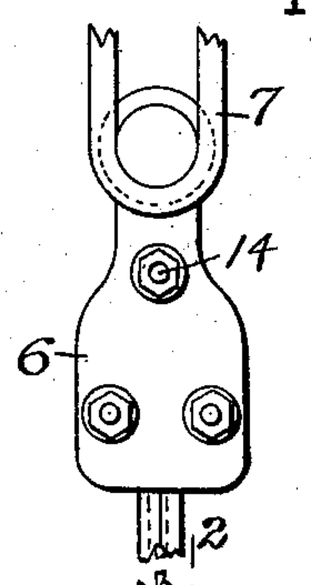
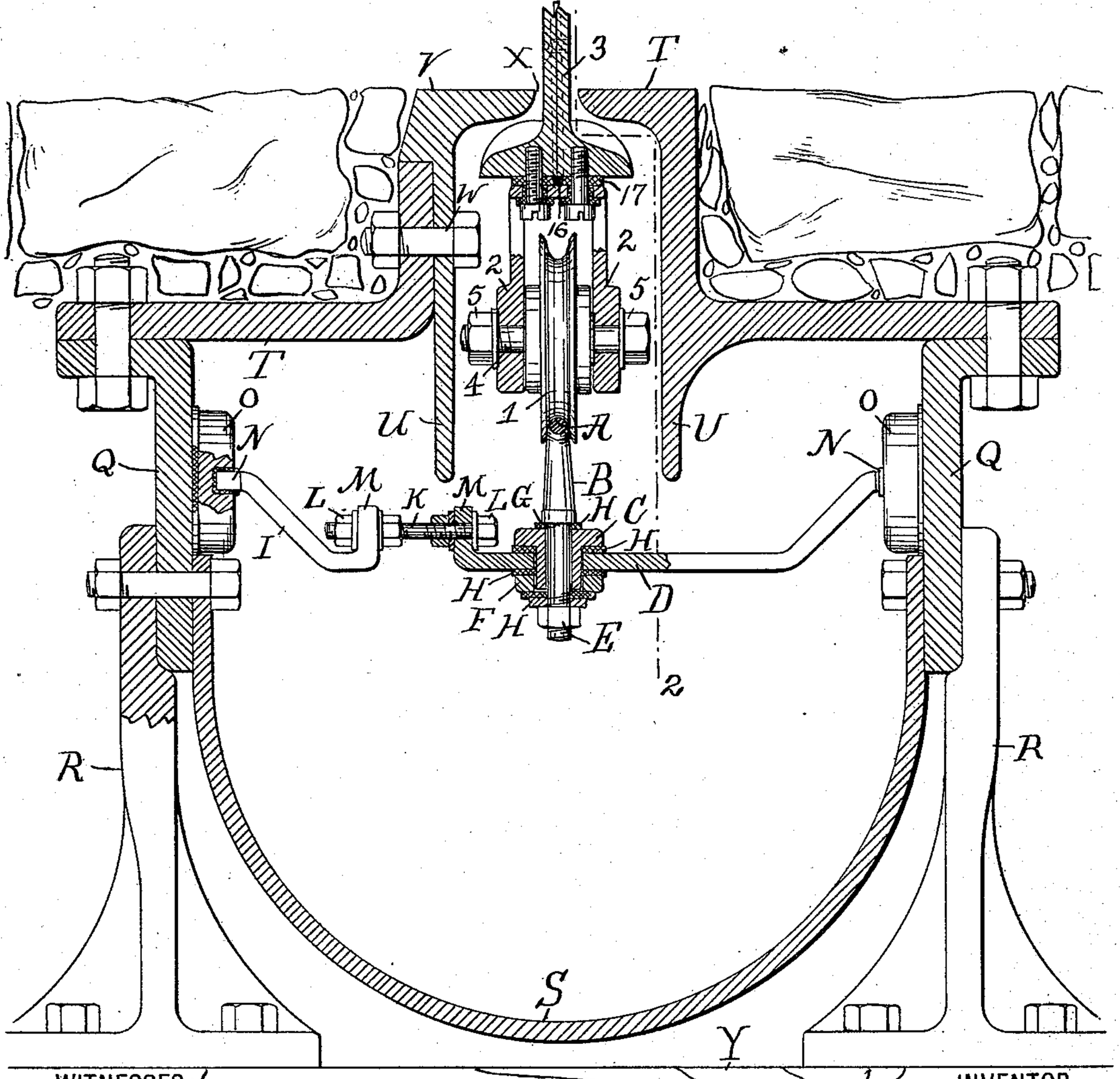


Fig. 1.



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(No Model.) 2 Sheets—Sheet 2.

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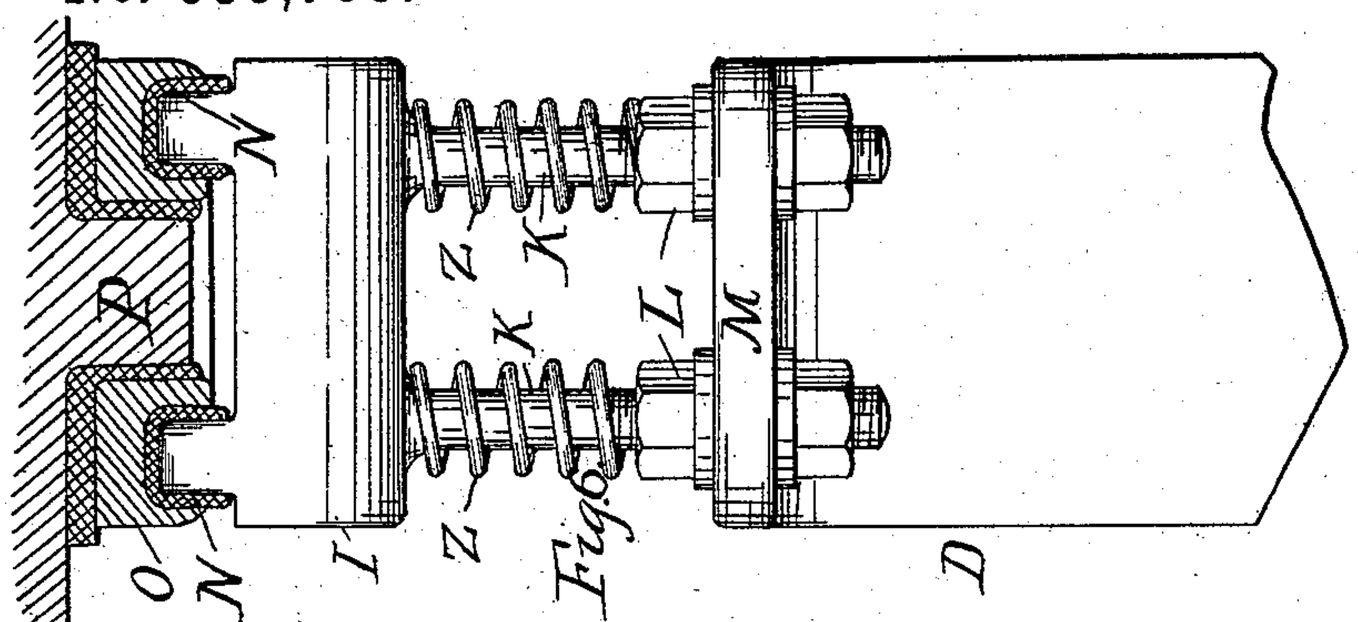

Fig. 4.

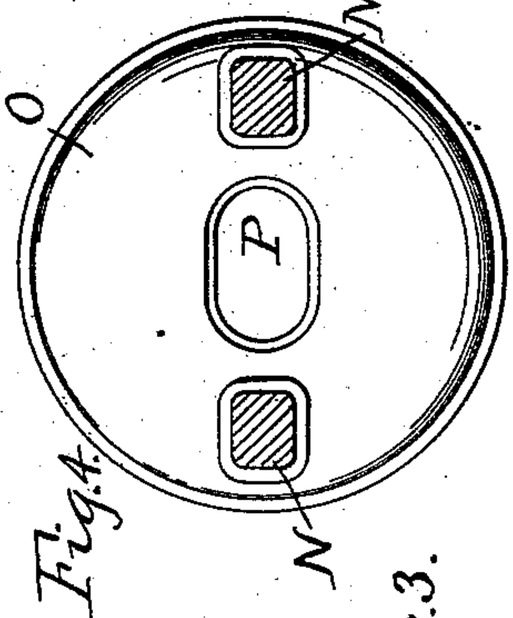

Fig. 3.

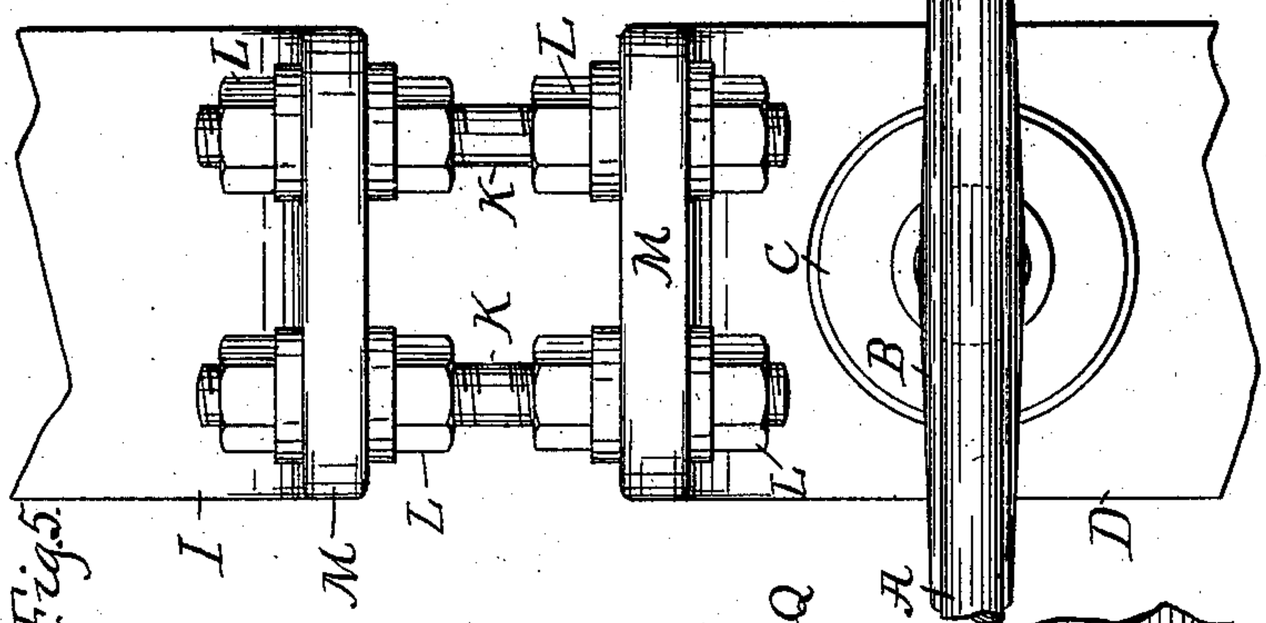

Fig. 5.

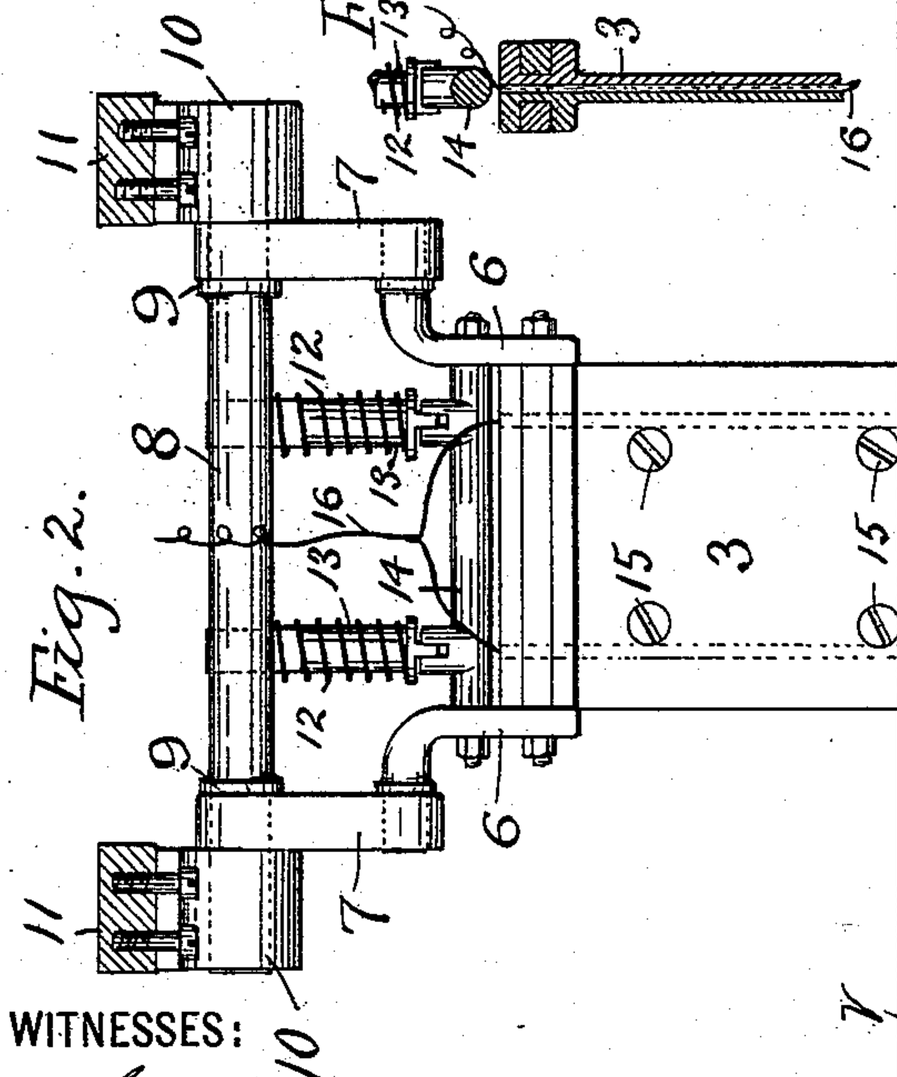

Fig. 2.

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UNITED STATES PATENT OFFICE.

FERDINAND BARRELL, OF NEW YORK, N. Y.

CONDUIT ELECTRIC-RAILWAY SYSTEM.

SPECIFICATION forming part of Letters Patent No. 539,786, dated May 28, 1895.

Application filed July 19, 1894. Serial No. 517,976. (No model.)

To all whom it may concern:

Be it known that I, FERDINAND BARRELL, a citizen of the United States of America, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Electric-Railway Systems, of which the following is a specification.

My invention relates to railways whose motive power is obtained from a continuous live conductor of electricity which is insulated in an underground conduit, and is particularly applied, first, to that kind of conduit system in which the feeding wire is bare to the periphery of the trolley wheel that passes along it to conduct the current to the motor in the car above and also to that kind in which the said naked wire is continuous throughout the length of the railroad, although, as will afterward appear in the detailed description of my invention, that the construction and principle of insulation and support of the feeding wire and trolley wheel may be applied in those systems where the naked wire is formed in sections each of which is connected with the main feed wire either permanently or automatically when a current is required; second, my invention relates to a trolley wheel, more especially to its proper connections with the car and its insulation, together with the necessary conducting wire, from the surrounding attachments.

The object of my invention is to provide an efficient yet simple means for supporting the bare conduit wire or rod in a position for contact with the trolley wheel and at the same time to suitably and serviceably insulate the wire from its supports and other surrounding parts of the conduit and to provide in necessary addition a trolley swung from the car frame in such a manner as to insure the contact of the wheel with the conduit wire by means of an automatically adjustable shank which constantly conforms to the varying distance between the conduit wire and the car frame, and to also insure complete insulation of the current to the car motor. To attain these ends I first support the wire in the center of the conduit on bridges of iron or other suitable material which extend across the conduit and which in turn are supported by sockets preferably made of insulating material attached to the inside of the conduit. The wire is also insulated at its points of support on the bridges or cross pieces; second, I attach the trolley bearing to the bottom of the shank, but still insulate it therefrom and suspend the shank by means of short extending arms from links, one for each arm, which allow the shank, and therefore, its attached trolley, to freely swing for the purpose of conforming with the position of the conducting wire and conduit slot, and which also allow the shank to rise by means of its suspension arms through the center of the links which serve as slots for the guidance of the arms; third, I provide other means and constructions for carrying into practical effect the above objects, which consist in efficient novelties and which will be hereinafter described in detail.

A better understanding of my invention will be had by a direct and specific description, to aid which I have illustrated a practical construction in the accompanying drawings.

In said drawings, Figure 1 is a cross sectional view of the conduit, showing the conductor and one of its supports and the trolley with its immediate attachments. Fig. 2 is a vertical and longitudinal section on the line 2 2 of Fig. 1, showing particularly the construction for suspending the trolley. Fig. 3 is a cross-section of the upper part of the trolley-shank. Fig. 4 is a view of the insulation sockets attached to the side of the conduit, also showing the adjoining parts of the bridge-support in section. Fig. 5 is a plan view of that part of the lateral conductor-support which embodies an essential part of the same and a portion of the wire with its direct support or standard. Fig. 6 is a slight modification of the lateral support.

Referring now to the drawings: A is the wire which is supported and firmly attached by soldering or other suitable means to a standard B. The lower end of the standard is made in the form of a bolt which passes through a porcelain collar C. The collar rests on the iron cross piece or lateral support D by means of a flange on its upper end. To further supply an insulating medium and a seat for the nut E which is meshed on the bolt, there is provided a porcelain washer F. The nut E binds the whole on a shoulder G of the standard B. Washers H, H, H, H,

made of non-vibrating and insulating material such as rubber or vulcanized fiber, are interposed between each of the superimposed collars or washers and the lateral support D centered on the standard B.

The cross piece or support is made in two parts D, I, the adjoining ends of which are connected by bolts K. (See Figs. 1, 2 and 6.) The said bolts pass through upturned flanges M, M, on the adjoining ends of the pieces D and I, and are kept, together with the pieces D and I, securely in place by the bolts K, K, and the nuts L, L, which seat against each side of the flanges M.

The outer ends of the supports D and I extend upward above the level of the bridge D, I, in the center of the conduit, and terminate in two prongs N, N, which rest in recesses or holes of the same size, one for each prong, cast or otherwise made in porcelain sockets O, O. The said sockets are supported on the side of the conduit by lugs P, P, cast on the outer wall of the conduit, which enter the center of the sockets O, O. Non-vibrating material is fitted between the conduit wall and the sockets, and between the sockets and the cross pieces for the purpose of insuring the porcelain from breakage otherwise liable to occur from the constant jarring and vibration caused by passing overhead vehicles.

I do not limit myself to the use of porcelain for the above mentioned insulators, but I may use any other insulating substance such as rubber, glass or fiber.

It is readily seen that the bridge D, I, is made in two parts to obviate the difficulty of entering the prongs N, N, in their respective sockets or holes in the porcelain block O and to facilitate rapidity of construction and the removal of necessary parts in case of needed repair. The possible varying distance between numerous pairs of sockets can be compensated for by adjusting the length of the cross iron D, I, by the nuts and bolts L, K, respectively.

The modification shown in Fig. 6 has the flange M on the piece I inverted and instead of the bolts K simply lugs, cast on the piece I, which pass through the flange M on the piece D, and screw-threaded on their ends for the nuts L, L. This view also shows the use of springs instead of the nuts on the outside of the flange M, to keep the two parts of the bridge D, I, firmly in position.

I do not limit myself in the practical operation of my invention to that specific construction of a conduit shown in the accompanying drawings, but the one I have illustrated is embodied in this invention as a part thereof and a part of a complete electrical railway system and it exhibits a strong, durable, efficient and cheap construction of the conduit itself.

Q are the walls or sides of the conduit and they rest on chairs R, R, fixed to the bed Y of the road. The chairs are at that distance apart which is needed for the proper construction of the road. The bottom of the conduit is formed by a trough S which is bolted to the walls Q, Q, and the chairs R, R. The said trough may be made half round as shown or may be V-shaped or any other needed shape without confining myself to that scope illustrated. The top of the conduit is made in two longitudinal pieces T, T, which are bolted to the upper end and flange of the walls Q, Q, and are situated on each side of the slot X.

In order to protect the sockets O, O, from wet and other injurious effects the longitudinal slot bars T, T, have on their lower face flanges U, U, projecting downward nearly to the bridge D, I. One of the top slot bars T is made in two sections, one of which constitutes with the flange U a plate which can be removed by loosening the bolts W by taking up a small number of the street paving stones. This establishes an easy method of access to the inside of the conduit without necessitating extensive street excavations.

The trolley wheel 1, mounted in bearings on a standard 2, is securely attached and properly insulated by a piece of non-conducting material 17 to the bottom of the shank 3 by screws, bolts or any suitable method. The wheel 1 consists in part of a grooved periphery for its guidance on the wire A and two hubs which bear lightly against the bearings 2, 2. The shaft 4 of the wheel is fixed laterally by bolts 5.

The bottom of the shank 3 is peculiar in construction in that it forms an efficient seat for the attachment of the standard 2 and at the same time serves as a guard to throw all water, slush, mud, or other injurious substances which may drip down through the slot from the wheel and its immediate connections. To effect this purpose in reality the shank is broadened in the manner shown at its lower end, and its sides at the bottom are made oblique to conform to a gradual slope necessary for the proper flow of the water.

The shank 3 is bolted at its forward and rear end to short arms 6, 6, which are rounded near their horizontal extremities to rest easily in the bottom of the links 7, 7. The links 7, 7, are in turn suspended from a longitudinal shaft 8, having shoulders 9 abutting the inside of each link to securely hold them in place against bearings, 10, 10, which support the ends of the shaft and which are bolted or screwed directly to the car frame 11. Thus it is seen that the shank can easily ride up and down in the links 7, 7, from the possible jolting of the car, but it is at the same time securely held in position and in connection with the car; and that the shank 3 can swing laterally on the pivots at both ends of the links 7, 7, thereby conforming with the probable irregularity in the position of the wire A and the conduit slot X in relation to the car track. For the purpose of normally holding the shank in the bottom of the links 7, 7, and to insure an efficient contact by pressure on the wire A, a pair of springs 12, 12, are inter-

posed between the shank 3 and the stationary shaft 8, on spindles 13, 13, which have their lower ends firmly fastened or held in vertical guides on a horizontal bar 14, secured at its ends to the shank arm 6, 6; and the upper ends projecting through the shaft 8 in such a manner as to be unimpeded by the vertical movement of the shank 3. The shank 3 is made in two parts vertically, which are bolted or screwed together at 15, the inside of each section being grooved in two places for the entrance of the insulated wires 16 which are connected with the trolley at one of their ends and with each other at their other ends, thereby forming one wire which in turn is connected to the car motor. This insures protection for the electrical connection between the wire A and the car.

The advantage of constructing the socket O above the level of the cross piece D, I, is two-fold. First, it places the insulated connection between the bridge D, I, and the conduit wall Q away from the drippings of water or mud which fall through the conduit slot X to the trough S, and, second, it places the said connection above the dampness and water which find a resting place on the pieces D and I, thereby providing in both instances a thorough isolation and insulation of the sockets O, O. The trough S is crossed at intervals of suitable length by branches from the street sewers for the conveyance of the mud and water from the conduit.

It is obvious that I may insulate in a similar manner two or more wires in the same conduit, all on different lateral supports, or one support in common.

What is claimed is—

1. In an electric conduit, the combination with the conduit wall, of a lateral wire support having a depressed middle or central part and raised supported ends, substantially as set forth.

2. In an electric conduit, a rigid electric conductor support formed in sections and extending transversely of the conduit, substantially as described.

3. In an electric conduit, an electric conductor support formed in sections which are adjustable in relation one to the other, the said support extending transversely of the conduit, substantially as described.

4. In an electric conduit, the combination with the conduit walls, of a lateral electric conductor support formed in sections, and cushioning devices interposed between the adjacent sections, whereby jarring or vibration of the parts may be compensated for, substantially as described.

5. In an electric conduit the combination with an electric conductor support extending transverely of the conduit of insulated sockets in which the ends of the support are held, substantially as described.

6. In an electric conduit, the combination with a lateral support, of sockets into which the ends of the said support fit, and non-vibrating and insulating material interposed between the said ends and the sockets, substantially as described.

7. In an electric conduit, the combination with the conduit walls, of an electric conductor support formed in sections and supported in sockets in the said walls, and cushioning devices interposed between the adjacent sections, substantially as described.

8. In an electric conduit, the combination of a rigid lateral support, a trolley wire standard, and non-vibrating and insulating material interposed between the said standard and support, substantially as described.

9. The combination with a two part lateral support, each part independently connected to the conduit and connected to each other, of an electric conductor supported on one of its parts, substantially as described.

10. In an electric conduit, the combination with the side walls of the conduit, of a removable slot bar having a downwardly projecting portion, and a lateral electric conductor support, the said downwardly projecting portion, and support being so disposed that the former will act as a shield or guard for an end portion of the latter, substantially as described.

11. In an electric conduit, the combination with the side walls of the conduit, of a removable slot bar having a flange which projects downwardly into the interior of the conduit, and a lateral electric conductor support having a depressed middle portion and raised end, the said flange acting as a guard or shield for the raised end, substantially as described.

12. In an electric conduit, the combination with the side walls of the conduit, of slot bars having inwardly projecting portions which define the conduit slot, and downwardly projecting portions, and a lateral electric conductor support having a depressed middle portion and raised ends, all being so disposed and related that a trolley chamber is formed, and the downwardly projecting portions will act as guards for the said raised ends of the lateral support, substantially as described.

13. In an electric conduit, the combination with the conduit walls, of a removable slot bar having an inwardly projecting portion whose edge defines the conduit slot, and a flange projecting into the interior of the conduit, which flange is not in the same plane with the edge of the inwardly projecting portion, whereby a trolley chamber is formed, substantially as described.

14. In an electric conduit, the combination with the conduit walls, of slot bars having inwardly projecting portions whose inner edges define the conduit slot, and flanges which project downwardly into the interior of the conduit, the said downwardly projecting flanges not lying in the same plane with the inner edges of the inwardly projecting portions, whereby a trolley chamber is formed, substantially as described.

15. The combination of a trolley, bearings therefor, and a superimposed shank formed

at its lower end as a seat for the attachment of the trolley bearing and at the same time as a guard for protecting the said trolley, and bearing, substantially as described.

16. The combination with a car frame, a shank, arms for the support of said shank and suspending links attached to said car frame for the guidance of said arms during their vertical movement, substantially as described.

17. The combination of a shank, links for the suspension thereof, horizontal support for said links, and springs interposed between said shank and said support, substantially as described.

18. In an electric railway, a trolley, a shank in which the trolley is supported, arms or hangers for the said shank, links in which the arms are adapted to be hung, a support attached to the car body to which the links are attached, and springs interposed between the said shank and the link support, substantially as described.

19. In an electric railway, a trolley, a shank in which the trolley is supported, a support loosely mounted in bearings attached to the car body, means for suspending the said shank from the said support, spindles attached to the shank and passing loosely through the support on the car body, and springs coiled about the spindles to cushion the movement of the said shank, substantially as described.

20. In an electric railway, the combination of a trolley a superimposed shank formed with an enlargement which acts as a guard for the said trolley, arms or hangers attached to the said shank, a horizontal bar attached to the car body, links suspended from the said bar, and in which the said hangers are adapted to be loosely hung, spindles attached to the superimposed shank, and passing loosely through the said horizontal bar, and springs coiled about the said spindles to cushion the movement of the trolley shank, substantially as described.

21. The combination of a trolley, a shank formed in separable parts and provided with a guard for the said trolley, and an electric conductor incased within the said shank, substantially as described.

22. The combination of a trolley, a superimposed shank made in separable parts and formed at its lower end as a seat for the attachment of the trolley, and an electric conductor incased within the said superimposed shank, substantially as described.

23. In an electric railway system, a conduit comprising chairs on either side of the conduit, a trough supported by the chairs, and slot rails removably secured to the said chairs, the extreme inner edges of the opposing slot rails defining the conduit slot, the said slot rails being provided with flanges which project downwardly into the interior of the conduit, and do not lie in the same plane with the slot defining edges, substantially as described.

In witness whereof I have hereunto signed my name in the presence of two witnesses.

FERDINAND BARRELL.

Witnesses:

GEORGE C. BIEBER,

F. C. BUSCH.