(No Model.) 2 Sheets—Sheet 1.

J. KUEHNLE.

TROLLEY FOR ELECTRIC RAILWAYS.

No. 466,981. Patented Jan. 12, 1892.

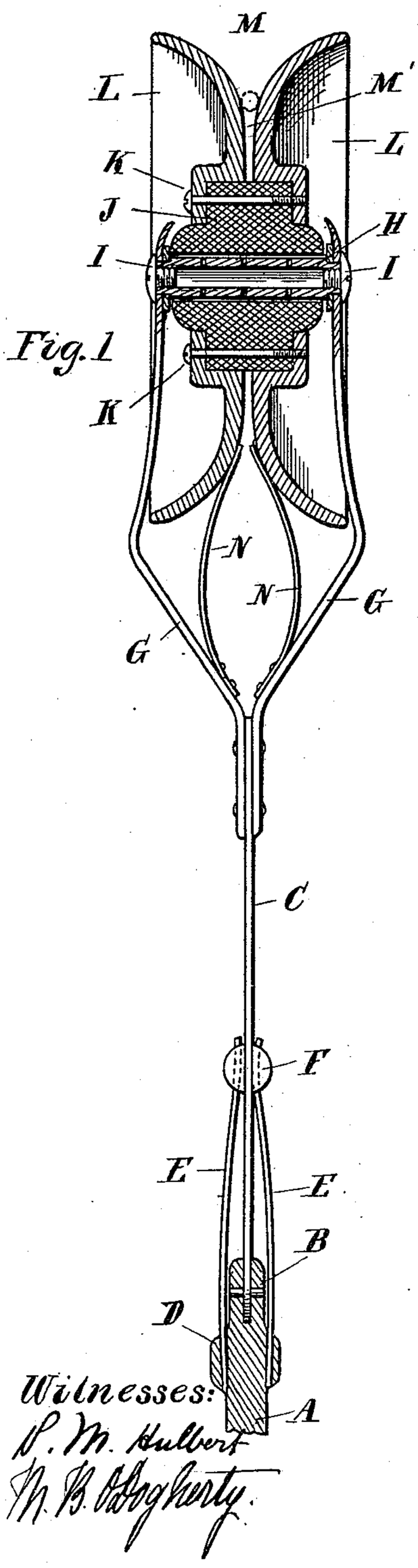

Fig. 1

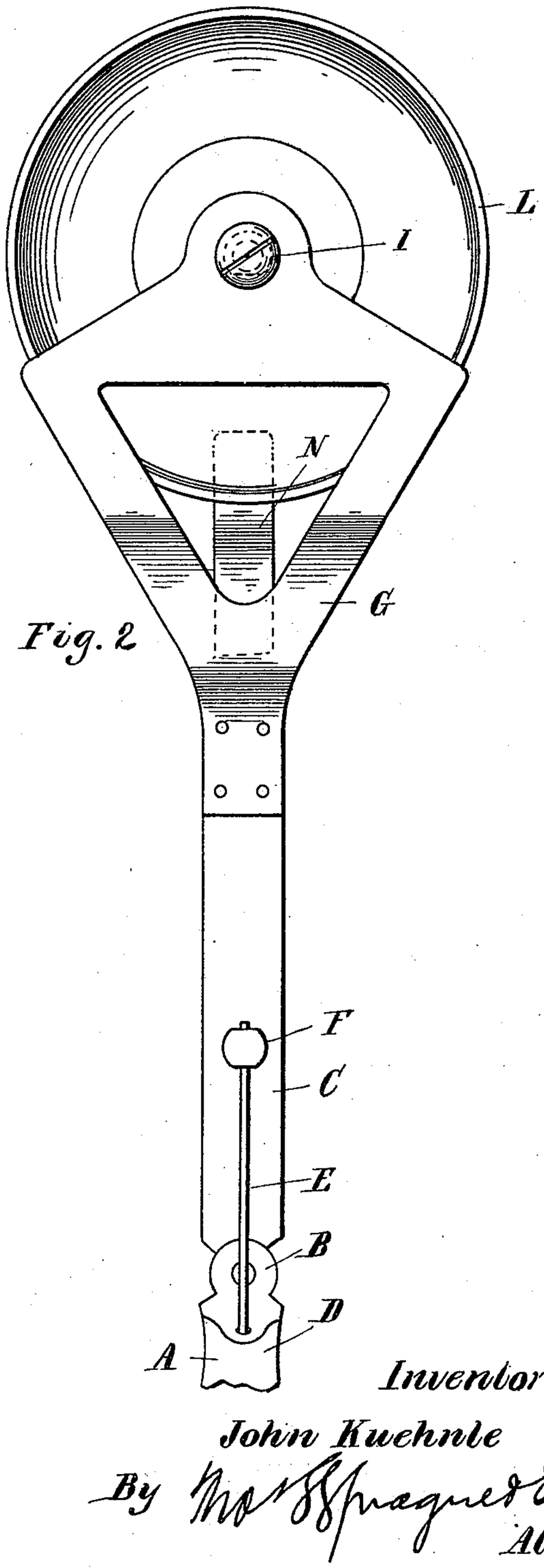

Fig. 2

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(No Model.) 2 Sheets—Sheet. 2.

J. KUEHNLE.

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Fig. 3

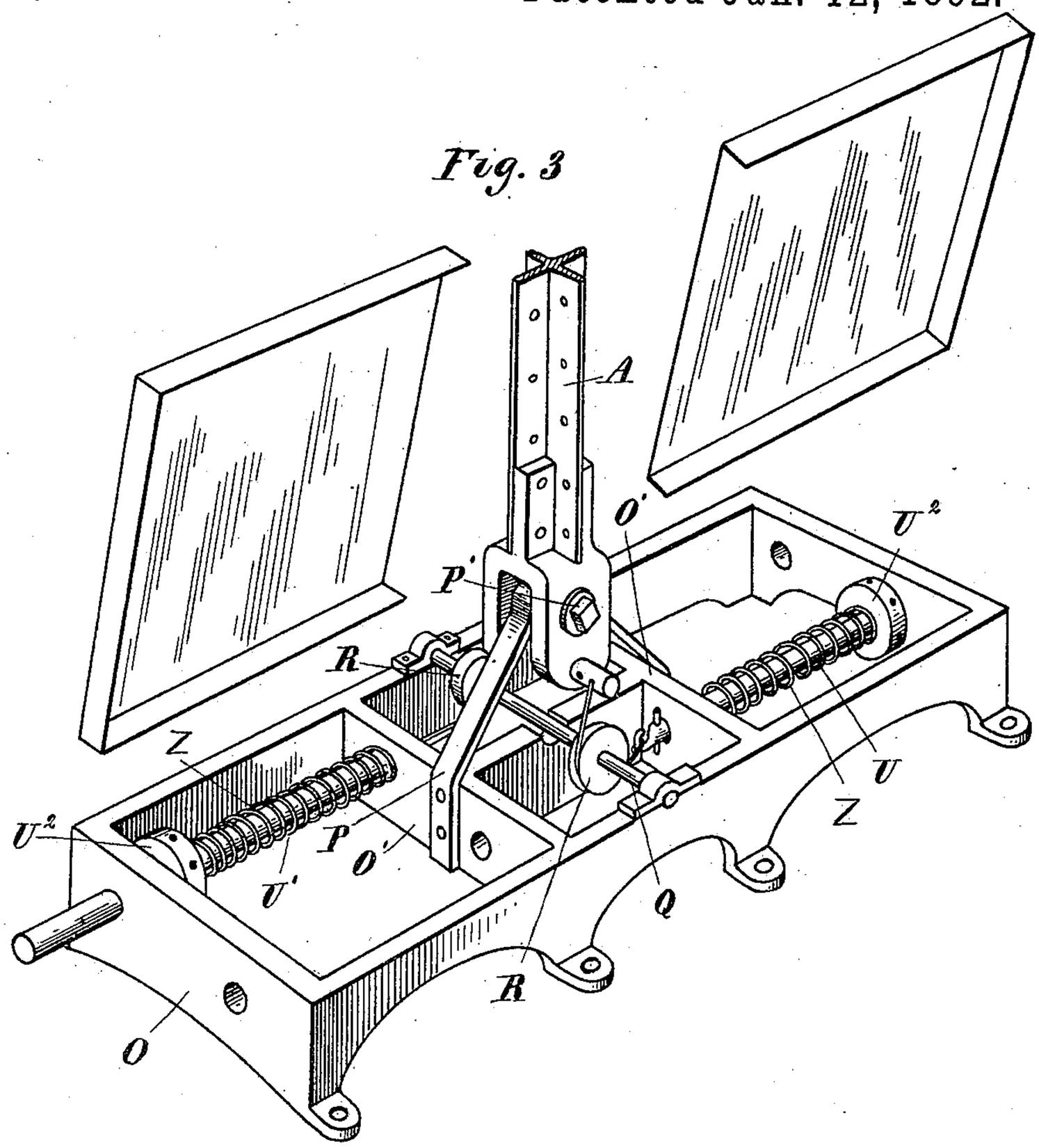
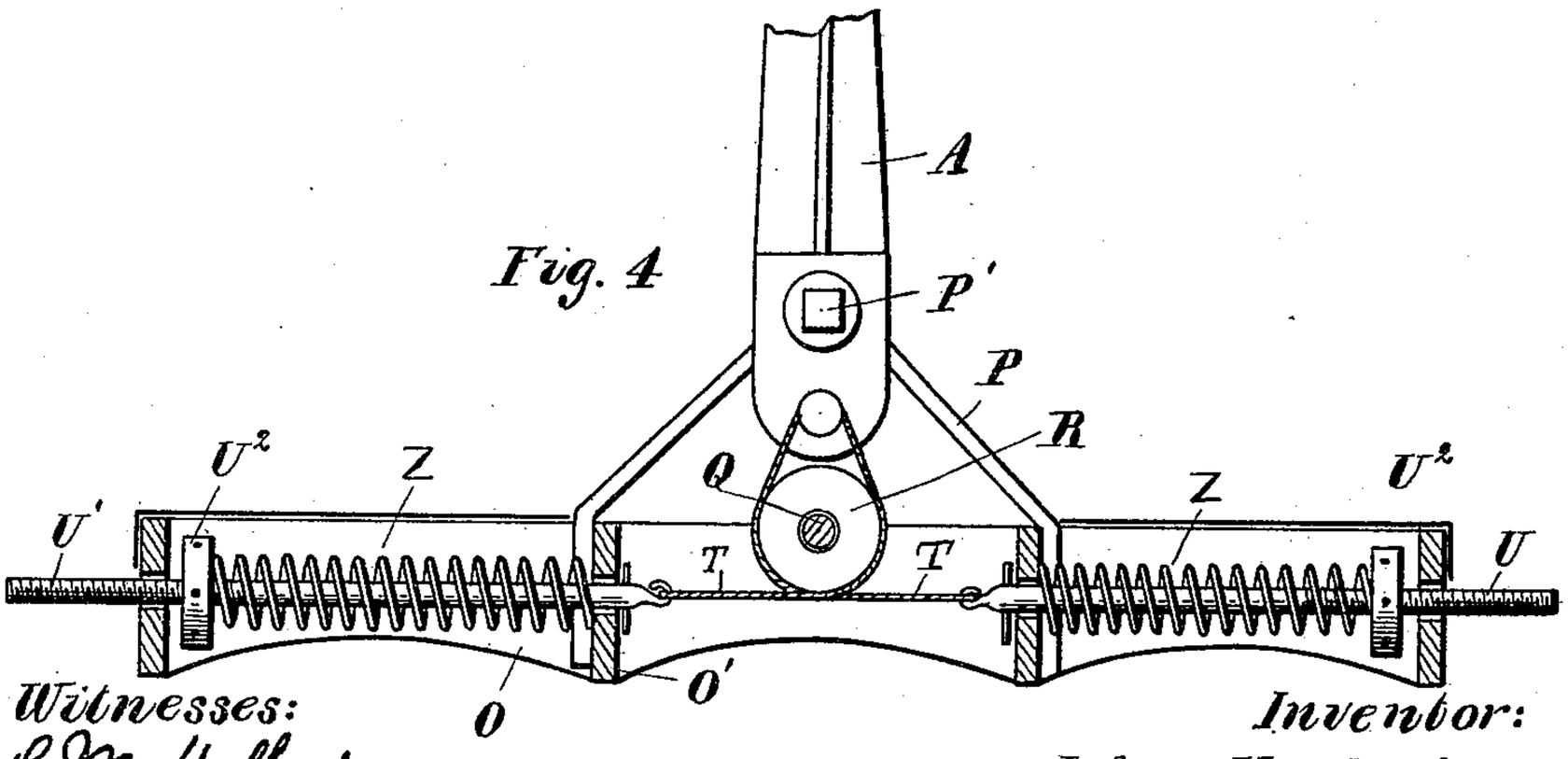


Fig. 4



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UNITED STATES PATENT OFFICE.

JOHN KUEHNLE, OF DETROIT, MICHIGAN, ASSIGNOR OF THREE-TENTHS TO EDWARD MARTYN, OF SAME PLACE.

TROLLEY FOR ELECTRIC RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 466,981, dated January 12, 1892.

Application filed September 5, 1891. Serial No. 404,815. (No model.)

To all whom it may concern:

Be it known that I, JOHN KUEHNLE, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Trolleys for Overhead Electric Conductors, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to new and useful improvements in "trolleys for overhead electric wires," by which name I designate the contact device for electric railways of the class in which the current is supplied to the motor upon the traveling vehicle from the conductors suspended above the line of travel through a contact device engaging the under side of said conductor and held up into operative position by means of a spring-actuated arm mounted upon the deck of the car.

My improvements consist in the novel construction of the trolley-wheel itself and of the spring-actuated arm, having for their principal objects to provide for better electrical contact from the wire to the motor and to reduce the amount of pressure required for such contact.

In the drawings, Figure 1 is a vertical central section through my improved trolley. Fig. 2 is a side elevation thereof. Fig. 3 is a perspective view of the tension device. Fig. 4 is a vertical central section through the same.

A is the arm which carries the traveling contact on the wire. It is made of steel, either integral in one piece or composed of several bars or plates, to be strong, rigid, and yet comparatively light.

To the upper end of the arm A is secured, by a hinge or knuckle joint B, an extension C, made of spring metal, preferably a single flat steel bar, which possesses considerable flexibility in a lateral direction, but is rigid in the direction of its width.

Near the upper end of the arm A are sockets D, in which are secured the lower ends of side bearing-springs E, which extend along the sides of the extension C, and near the upper end engage in guides F, secured or formed on the flat sides of the extension C, all so arranged as to flexibly hold the extension C in line with the arm A and permit the extension C to be laterally deflected as well as turned upon its hinge in a direction forward or aft through the arc of a circle within the limit of the hinge B, which is suitably constructed for that purpose, as shown.

To the upper end of the spring-extension C are secured the side brackets or standards G, in the upper ends of which the traveling contact or pulley is supported. The brackets G are of metal and present a suitable outline to avoid corners liable to become entangled or catch cross-wires, or become otherwise entangled with the contacting wires on which it travels in the ordinary manipulation of the trolley in taking it off or changing it on the wire. In the upper ends of these brackets are secured non-rotatorily the ends of a hollow pin or shaft H, on which the contact or trolley revolves, as shown in the drawings. I preferably form this shaft H of a piece of tubing with the ends slightly reduced and made of somewhat irregular outline to fit into a corresponding aperture in the ends of the brackets G, whereby said shaft is prevented from revolving, and to unite it firmly with the brackets I secure screw-bushings I in the open ends of the tubing, forming thereby at the same time a closed chamber in the interior of the tube, which I preferably fill with dope or similar lubricant, and which is intended to pass through perforations in the axle to lubricate the bearing-surfaces of the contacting trolley. The latter is sleeved upon the shaft H, and consists of a bushing J, preferably made of lignum-vitæ, and to the sides of these are secured by suitable bolts or rivets K metallic circular disks L, one on each side. These disks are dish-shaped, as shown, so as to produce a peripheral flaring mouth or opening M, which contracts down to a throat M′, which separates the two disks entirely from each other, and which is of less dimensions than the thickness of the wire on which the contact is designed to travel, so as to prevent the entrance of the wire into it.

Between the lower end of the bracket-arms G are secured the contact-springs N N, one for each disk. Each contact-spring has a

metallic upper end or contact portion bearing on the disks L at or near the bottom of the flaring mouth M of the trolley.

Upon the top or deck of the car is secured a box or housing O, divided by transverse partitions O′ into compartments. In the center of this box is formed or secured a suitable upwardly-projecting standard P, to which the lower end of the contact-arm is pivoted by a suitable transverse shaft or pin P′ in such a manner as to give the contact-arm a free sweep fore and aft. Below the arm is transversely journaled in suitable bearings on the box the shaft Q, upon which are secured two grooved pulleys R R. Around each pulley leads a rope, chain, or cable T, which connects the lower end of the arm A a little distance below its pivot with the tension-rods U U′. The two tension-rods U and U′ are located on opposite sides of the arm A and are supported in suitable guide-bearings in the walls of the box, and each tension-rod has secured upon it a coiled spring Z of suitable resiliency, one end of which is adjustably secured by adjusting-nut U^2 for compressing each spring, all so arranged that the springs, while operating in opposite directions upon the arm A, coact, while at the same time the arm A is free to be bent against the under side of the trolley-wire in the forward or backward direction with equal tension against the wire. A rope for withdrawing the trolley-arm from the wire is provided, as usual, and the operation of the device in practice need not be further explained, as it operates in the usual manner.

I desire to call attention in my construction—

First, to the advantage which my construction of contact-arms has to prevent the trolley from loosing its contact by the constant bumping and jolting of the car. This is due to the construction of the flexible hinge at the upper end, which affords increased flexibility with a lessening of the strain upon the rest of the arm.

Second, to the arrangement of the housing, in which the whole tension device is securely inclosed and may be protected by a suitable cover from climatic influences, dust, &c., which are liable to interfere with the smooth work.

Third, to the reduction of the wear of the trolley, as the lignum-vitæ will stand a very severe and prolonged operation of the trolley without producing any perceptible wear of the bearing.

Fourth, in the scouring or polishing effect which the construction and arrangement of the trolley produces upon the wire, as by deepening the grooves between the disks L the wire becomes slightly wedged between the disks L L upon its sides and a slight rubbing effect is obtained against the sides of the wire, which keeps it always bright and polished and preserves a good contact at all times, while at the same time much less pressure is required to keep the wheel in perfect contact with the wire. By having the contact-springs N bear directly against the disks the electric connection from the wire to the motor is most direct, and, besides, the segmental extensions of these springs against the disks always furnish a good contact.

It will further be seen that in my construction the ends of the standards G are retracted within the planes of the outer rims of the disks L. This prevents any wire from accidently catching at the ends of the standards, which in the ordinary construction is very liable to happen. It will also, further, be seen that the same precaution is taken in the construction of the contact-arm, which presents rounding or inclined surfaces to any wire it may encounter.

Either one of the two springs U U′ alone tends to draw and hold the contact-arm in an upright position, and will press the contact-wheel against the wire whether the arm is forwardly or rearwardly inclined. It is therefore obvious that one tension device alone would be sufficient. I make intentionally, however, provision for using a large number if circumstances should require a greater pressure on the wire, and the box is preferably arranged to hold four such springs, which may be detached from or connected to the arm and used singly or in combination, as circumstances may require.

The construction of the contact-wheel makes it light, and the lignum-vitæ hub, revolving on a fixed shaft, reduces the friction and wear to a minimum. The wheel is also very readily lubricated by removing one of the bushings or detached from the brackets by removing both.

What I claim as my invention is—

1. In an electric railway, the combination, with a contact-arm carrying a contact device at one end and pivoted to the car at the other end, of a tension device for said arm, comprising a compression spring-rod and a connection between the rod and the contact-arm, substantially as described.

2. In an electric railway, the combination, with the contact-arm, of a tension device consisting of a spring, a movable rod with which said spring engages, and a flexible connection between the contact-arm and the rod, substantially as described.

3. In a contact device for electrical railways, a contact-arm consisting of a rigid lower section and a flexible upper section connected thereto by a spring-hinge, substantially as described.

4. In a contact device for electrical railways, a contact-arm consisting of a rigid lower section hinged to a support mounted upon the top of the car, and a flexible bar secured to the end of said lower section by a spring-hinge extending it in line with the lower section, substantially as described.

5. In a contact device for electrical railways, a contact-arm provided with a laterally-flexi-

ble extension hinged to said contact-arm and carrying the contact-wheel, and two springs secured to the ends of the contact-arm and bearing with their free ends against the opposite sides of said flexible extension to hold it flexibly in line with the contact-arm, substantially as described.

6. In a contact device for electrical railways, the combination of the rigid contact-arm A, pivotally secured to a support mounted upon the car, the flexible extension C, the hinge B, connecting the two, the side bearing-springs E, secured to the contact-arm, and the guides F, into which the free ends of said springs engage, substantially as described.

7. In a contact device for electrical railways, the combination, with the contact-arm, of a contact-wheel revolving on a shaft fixed in the upper end of said contact-arm and having its body portion or hub constructed of lignum-vitæ, substantially as described.

8. In a contact device for electrical railways, the combination, with the contact-arm provided with the bifurcated standards or brackets carrying the contact-wheel, of a hollow shaft non-rotatably secured in the end of said brackets and forming a receptacle for a lubricant, the screw-bushings I, secured into the open ends of the shaft and securing said shaft to the brackets, and a contact-wheel revolving loosely on said shaft, substantially as described.

9. In an electric railway, the combination of a contact-arm, a frame in which the arm is pivoted, a tension device consisting of a spring-actuated rod, a flexible connection between the rod and the contact-arm, and a pulley over which the connection passes, substantially as described.

10. In electric railways, the combination, with an overhead electric conductor, of a contact device having a metallic contact-wheel constructed with rigidly-united flanges and traveling on said wire, said wheel being provided with a groove extending in the body of the wheel and contracting regularly to a less width than the diameter of the wire engaging therein, substantially as described.

11. In electric railways, the combination, with an overhead electric wire, of a contact device consisting of an arm pivotally mounted upon a car and provided with a tension device connected to its lower end, a contact-wheel carried by the upper end of said arm in traveling contact with the electric wire, and consisting of two metallic disks rigidly-united and mounted upon a hub and revolving upon a stationary shaft supported in brackets secured to the ends of the contact-arm, said disks having projecting flanges overhanging the ends of the brackets in which the contact-wheel is supported, and a peripheral groove formed between said disks and contracting regularly to a less width than the diameter of the wire engaging therein, substantially as described.

12. In a contact device for electrical railways, the combination, with the contact-arm, of two brackets or standards G, secured to the upper end of said arm, the stationary hollow shaft H, mounted in said brackets, the screw-bushings I, securing said shaft to the brackets, and the contact-wheel revolving on said shaft and consisting of the hub J and the metallic flanges L, mounted upon said hub and forming a peripheral groove M, provided with the contracted throat M′, substantially as described.

13. In a contact device for electrical railways, a contact-wheel having a grooved metallic periphery and a non-metallic insulating hub, a shaft upon which said hub revolves, a metallic contact-arm provided with brackets to which the ends of said shaft are secured, and metallic contact-springs electrically connecting the wheel with the contact-arm, substantially as described.

14. In an electric railway, the combination of a contact-arm carrying a contact-wheel at its free end and hinged near its lower end, a housing adapted to be supported upon the roof of the car and provided with a central standard or support, to which the contact-arm is hinged, a transverse shaft journaled in said housing below the contact-arm, and one or more tension devices consisting of a tension-rod slidingly secured in said housing, a spring secured upon said rod, a rope or cable connecting said tension-rod with the lower end of the contact-arm, and a grooved pulley on the transverse shaft, around which said rope or cable passes, substantially as described.

15. In an electric-railway car, the combination, with a contact-arm, of a tension device consisting of a movable rod, a yielding body for retaining the rod in a normal position, a connection between the rod and contact-arm, and a pulley over which the connection passes, substantially as described.

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

JOHN KUEHNLE.

Witnesses:
N. L. LINDOP,
M. B. O'DOGHERTY.