No. 801,226. PATENTED OCT. 10, 1905.

# H. P. DAVIS & C. AALBORG.

## TROLLEY FOR ELECTRIC RAILWAY VEHICLES.

APPLICATION FILED MAR. 6, 1905.

3 SHEETS--SHEET 1.

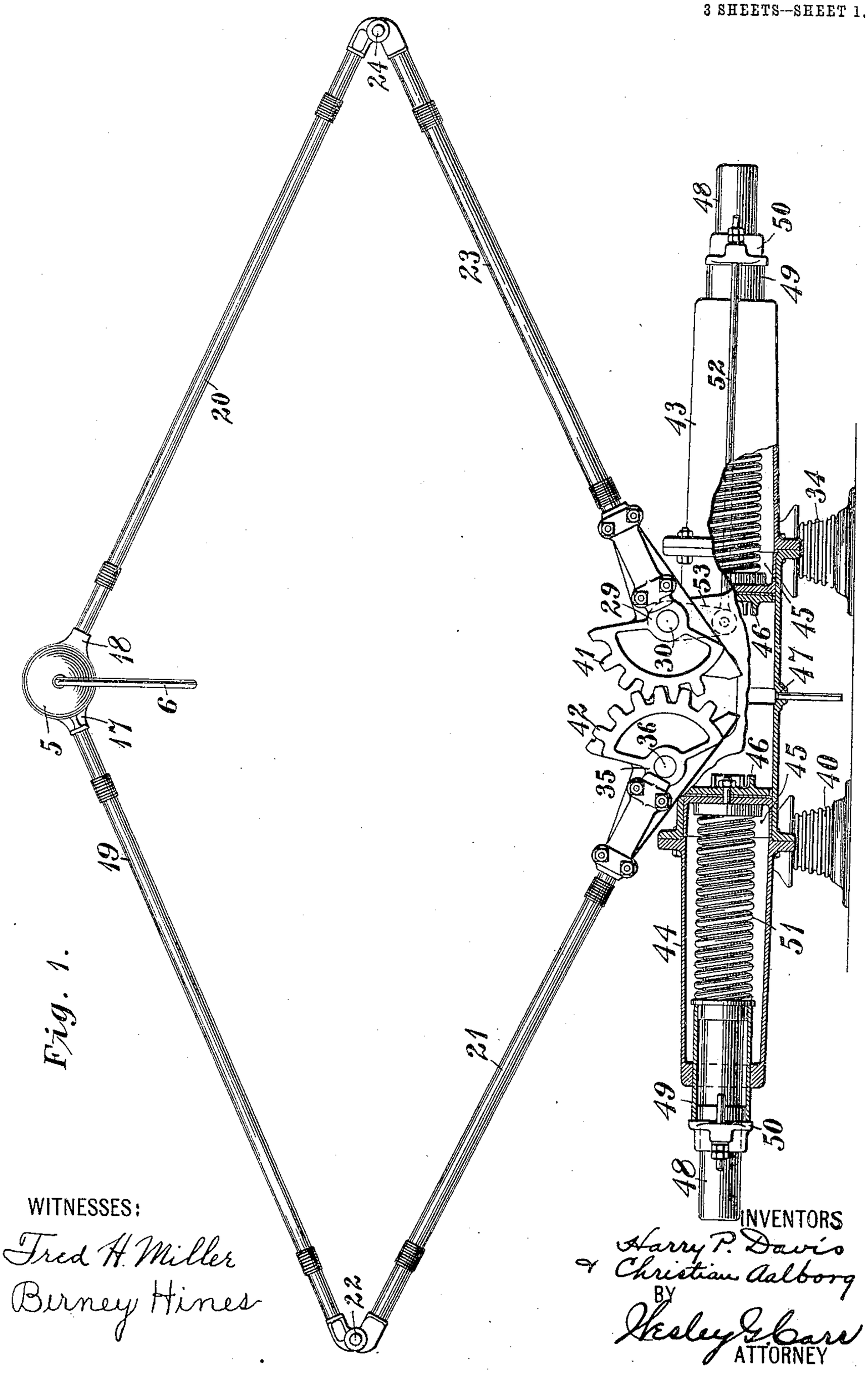


Fig. 1.

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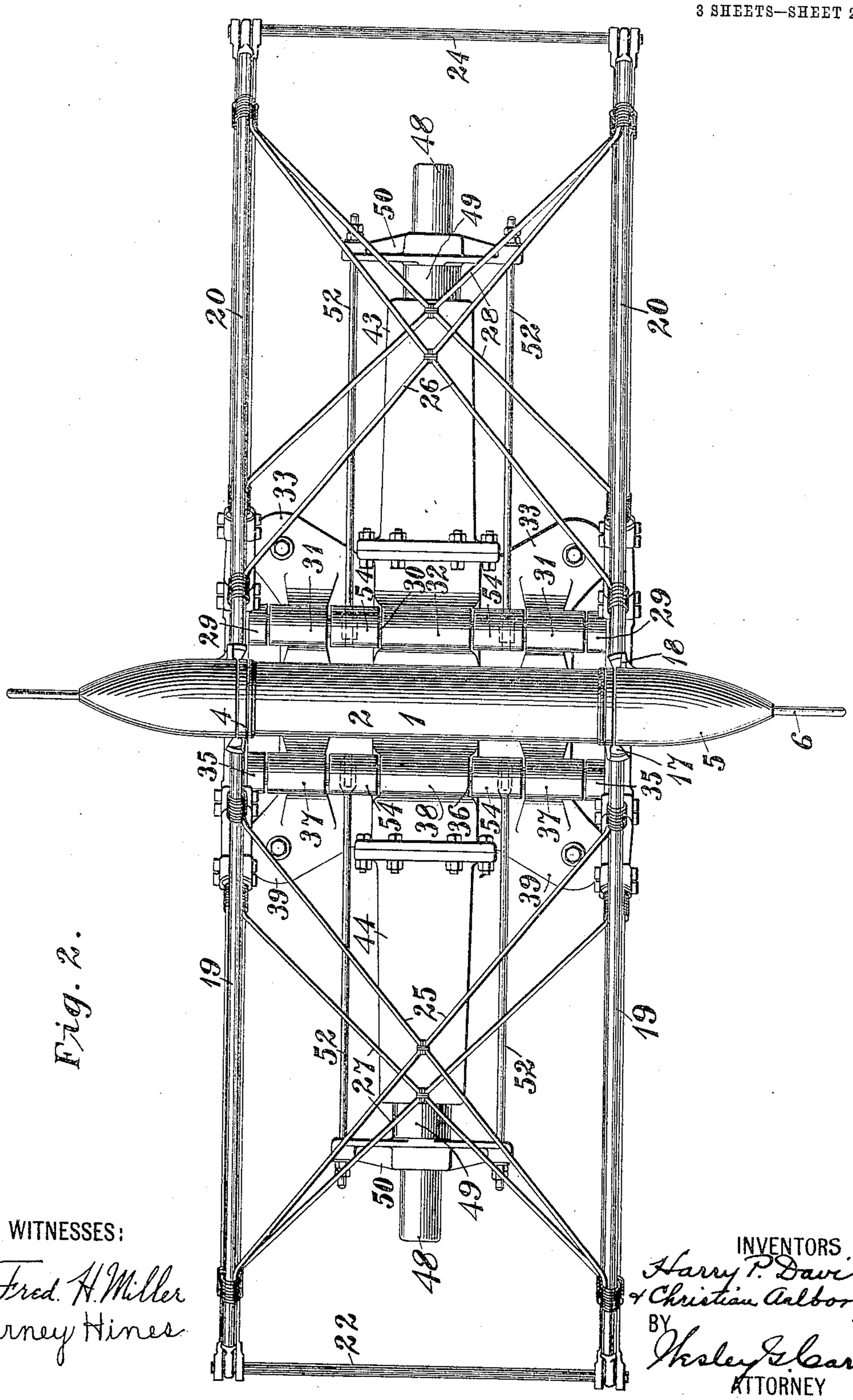


Fig. 2.

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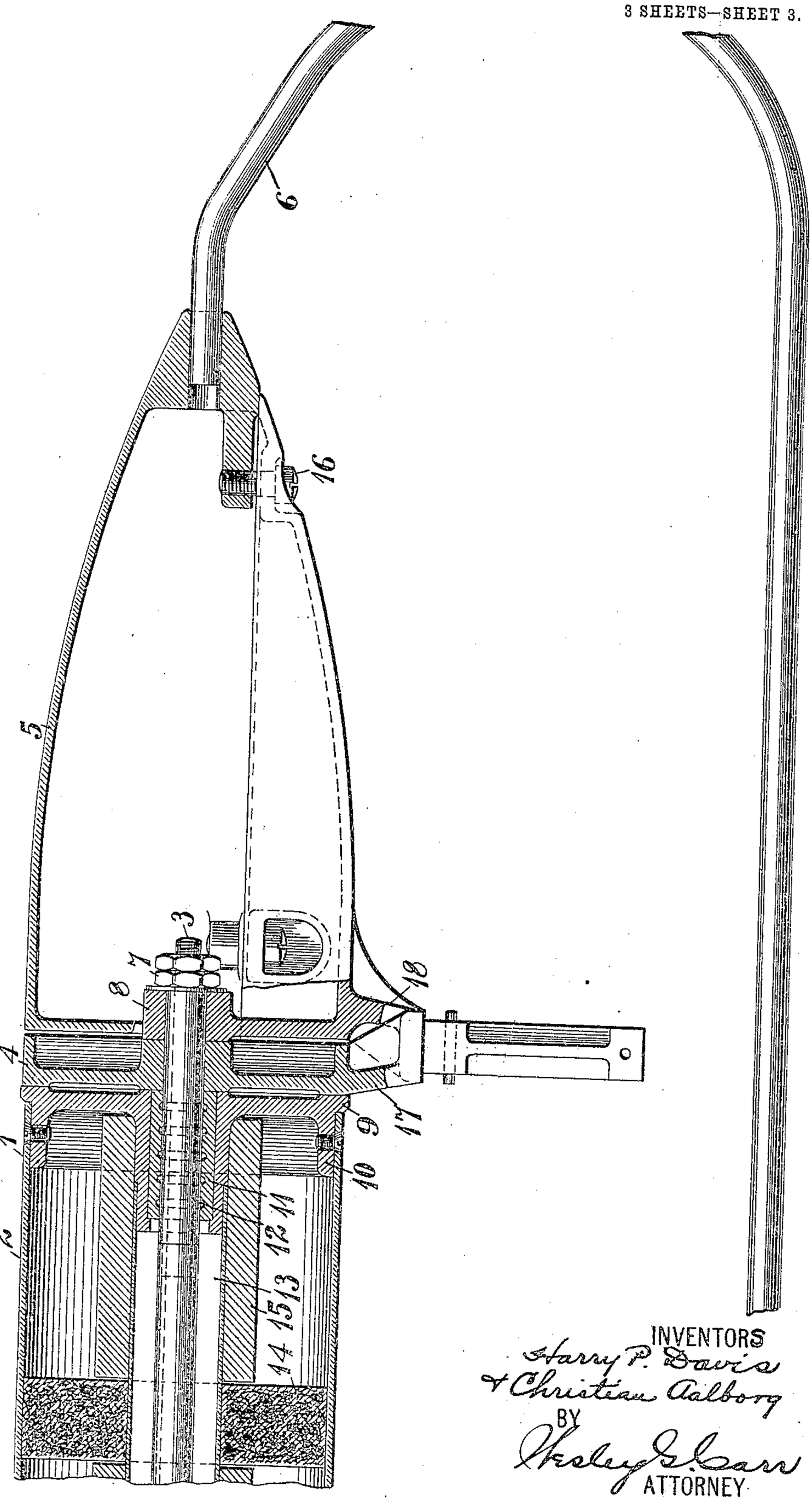
Fig. 3.

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# UNITED STATES PATENT OFFICE.

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## TROLLEY FOR ELECTRIC-RAILWAY VEHICLES.

No. 801,226. Specification of Letters Patent. Patented Oct. 10, 1905.

Application filed March 6, 1905. Serial No. 248,736.

*To all whom it may concern:*

Be it known that we, HARRY P. DAVIS, residing at Pittsburg, and CHRISTIAN AALBORG, residing at Wilkinsburg, in the county of Allegheny and State of Pennsylvania, citizens of the United States, have invented a new and useful Improvement in Trolleys for Electric-Railway Vehicles, of which the following is a specification.

Our invention relates to trolleys for electric-railway vehicles; and it has for its object to provide a device of this character which shall be specially adapted to high-speed operation and one which may be effectively raised into and held in contact with the trolley-conductor by means of pneumatic pressure under the control of the motorman or engineer.

In the operation of railway-vehicles at high speeds by means of either direct or alternating currents it is desirable that the device employed for making contact with the trolley-conductor shall be so designed and constructed as to avoid the possibility of jumping from the conductor in case it presents irregularities with reference to the track and also in case of curves and crossings. Devices which make sliding contact with the trolley-conductor have sometimes been employed in connection with high-speed work, and the contact portions of such devices have generally been mounted upon an arm or frame that has been pivotally supported at one end upon the vehicle-roof. In such cases the weight of the structure as a whole, and particularly of the contact portion, has necessitated the expenditure of considerable power in order to raise the contact device and hold it in contact with the trolley-conductor.

Our present invention provides a long contact-surface transverse to the trolley-conductor, the central and principal contact portion of which may be cylindrical in form and be so mounted upon suitable bearings as to rotate in service, or a sliding contact device may be utilized in connection with a lifting and supporting frame which is of the "lazy-tongs" type and is preferably expanded for the purpose of raising the contact portion of the device into engagement with the trolley-conductor by means of pneumatic pressure and suitable devices intermediate the pneumatic-pressure-actuated piston and the supporting-frame.

In the accompanying drawings, Figure 1 is a view mainly in end elevation, but partially in section, of a structure embodying our invention; and Fig. 2 is a plan view of the same. Fig. 3 is a longitudinal section of one end of the contact member of the trolley on an enlarged scale.

The contact portion of the trolley here shown comprises a rotatable cylinder 2, which is mounted upon a non-rotatable shaft or rod 3, a short cylindrical supporting member 4 at each end of the cylinder 2, an outwardly-tapering hollow extension 5 at each end, and a guard-wire 6 in the form of a bow, the ends of which are seated in the ends of the extensions 5 and the body portion of which extends in a substantially vertical plane below the contact portion 1 of the trolley. The end pieces 5 of the part 1 are fastened rigidly to the supports 4 by means of nuts 7 on the ends of the shaft 3, that project through the hubs or collars 8, with which each of the parts 5 is provided. Each of the ends of the cylinder 2 is provided with a head 9, having an inwardly-projecting boss 10, within which is located a bearing-sleeve 11, provided with grooves 12, adapted to contain a suitable lubricant. The two cylindrical bosses 10 are connected together by means of a cylinder 13, between which and the cylinder 2 are located a plurality of cork rings 14, that are held between wooden cylinders 15.

As indicated in Fig. 3, each of the extensions 5 is formed in two parts, which are fastened together by means of bolts 16 or other suitable fastening device, this construction being provided in order that access may be had to the nuts 7 for the purpose of assembling and disassembling the structure.

The parts 4 and the bottom portions of the parts 5 are provided, respectively, with arms 17 and 18 at opposite sides of the contact device 1, and the former are rigidly connected to laterally-projecting rods or bars 19, and the latter are connected in the same manner to the ends of rods or bars 20, that project in the opposite direction. The outer ends of the bars 19 are pivotally connected to the outer ends of 2 rods or bars 21 by means of a horizontal rod 22, and the rods or bars 20 are similarly connected to the outer ends of rods or bars 23 by means of a horizontal rod 24. The bars 19 are suitably braced by diagonal rods

25, that are suitably fastened at their ends to the said bars and are also rigidly fastened together at the point where they cross each other. The bars 20 are similarly braced by means of rods 26, the bars 21 by rods 27, and the bars 23 by rods 28. This structural arrangement is such that there is little or no possibility of a breakdown or disarrangement by reason of any strains to which the apparatus may be subjected either in raising and lowering the trolley or during the operation of the vehicle upon which it is mounted.

The lower ends of the bars 23 are provided with collars 29, that are rigidly fastened to the ends of a rock-shaft 30, which is mounted in suitable bearings 31 and 32, the bearings 31 being formed in standards 33, which are in turn supported by suitable insulators 34. The insulators 34 are mounted upon the roof of a car or locomotive (not shown) and may be attached thereto in any suitable manner. The lower or inner ends of the bars 21 are also provided with collars 35, which are rigidly fastened to the ends of a rock-shaft 36, that is mounted in bearings 37 and 38, the former of which pertain to standards 39, which are in turn supported by insulators 40, these collars or shafts and the supporting-bearings being in all respects like those just described in connection with the bars 23. The collars 29 are provided with gear-segments 41, and the collars 35 are provided with similar gear-segments 42, which mesh with the segments 41, so that simultaneous and uniform movement of the two rock-shafts 30 and 36 and the parts connected thereto is assured.

Supported by the standards 33 and 39 and the insulators 34 and 40 are two cylinders 43 and 44, which project in opposite directions and communicate with each other at their inner ends. Each is provided with a piston 45, and each of the pistons is provided with projections 46, which prevent such close contact between the pistons when they approach each other as to interfere with the introduction of the necessary pneumatic pressure, such pressure being admitted from a suitable source through a port 47. Each piston 45 is provided with a rod 48, with projections through the outer end of the cylinder, and is provided with a sleeve 49, having a head 50, this sleeve and its head being so mounted upon the piston-rod as to be movable independently thereof. Surrounding each rod 48 and interposed between piston 45 and the inner end of the sleeve 49 is a coil-spring 51.

Each head 50 is connected to the corresponding rock-shaft by means of two rods or links 52 and lever-arms 53, that are rigidly attached to the rock-shaft by means of collars 54, so that when the pistons 45 are forced apart by the pneumatic pressure introduced between them the lazy-tongs structure, which constitutes the supporting-frame for the contact member of the trolley, will be expanded and the contact member will be raised into contact with the trolley-conductor and will be held in such position by the pneumatic pressure existing in the cylinder until the same is exhausted for the purpose of lowering the trolley by the action of gravity.

By reason of the interposition of the springs 51 between the pistons 45 and the sleeves 49 a resilient element is provided which permits the trolley-contact device to accommodate itself readily to variations in the height of the trolley-conductor. Since the springs are always under a greater or less degree of compression when the trolley is in use, they may either expand to raise the contact device slightly or be further compressed to lower it below the height to which it was originally raised by the pneumatic pressure.

Variations may be made in the details of construction from what we have shown and described, and we therefore desire it to be understood that such modifications and variations as do not materially change the mode of operation or result are within the scope of our invention.

We claim as our invention—

1. The combination with a cylinder adapted to receive pneumatic pressure and a piston therefor, of a lazy-tongs structure, resilient connections between the same and said piston and a contact device that is supported and raised and lowered by said lazy-tongs structure.

2. The combination with two cylinders projecting in opposite directions and in open communication with each other at their adjacent ends, and pistons in said cylinders that are movable in opposite directions by pneumatic pressure, of a lazy-tongs structure, resilient connections between said structure and said pistons and a contact device that is supported and raised and lowered by said lazy-tongs structure.

3. In a trolley for railway-vehicles, the combination with two pairs of parallel rods or bars that are pivotally connected together at their outer ends and two pairs of parallel rods or bars that project in the opposite direction and are also pivotally connected at their outer ends, of a contact device to which the inner ends of the upper pairs of rods or bars are connected, and a pneumatic-pressure-actuated device to which the inner ends of the lower rods or bars are connected.

4. The combination with four pairs of rods or bars that are connected together to form a lazy-tongs structure and have diagonal brace-rods between the rods or bars of each pair, a contact member comprising a central roller, tapered extensions and intermediate disks, the inner ends of the upper pairs of parallel bars or rods being respectively fastened to the tapered extensions and to the disks, and means for expanding the lazy-tongs structure.

5. The combination with a lazy-tongs struc-

ture and a contact member supported thereby, of a pneumatic-pressure cylinder, a piston located in said cylinder, a resilient rod therefor, and operating connections between said rod and the lazy-tongs structure.

6. The combination with a supporting frame or structure and pneumatically-actuated means for raising and lowering the same, of a contact member supported by said frame or structure and comprising a rod or shaft, a cylinder rotatably mounted thereon and provided with internal cushioning-rings, supporting-disks at the ends of the cylinder, tapered extensions fastened to the ends of the rod or shaft and a wire bow connecting the ends of the tapered extensions together.

7. The combination with a cylinder adapted to receive pneumatic pressure and a piston therefor, of a lazy-tongs structure, connections between the same and said piston and a contact device that is supported and raised and lowered by said lazy-tongs structure.

8. The combination with two cylinders projecting in opposite directions and in open communication with each other at their adjacent ends, and pistons in said cylinders that are movable in opposite directions by pneumatic pressure, of a lazy-tongs structure, connections between said structure and said pistons and a contact device that is supported and raised and lowered by said lazy-tongs structure.

9. The combination with four pairs of rods or bars that are connected together to form a lazy-tongs structure and have diagonal brace-rods between the rods or bars of each pair, a contact member comprising a central roller, tapered extensions and intermediate disks, the inner ends of the upper pairs of parallel bars or rods being respectively fastened to the tapered extensions and to the disks and pneumatic means for expanding the lazy-tongs structure.

10. The combination with four pairs of rods or bars that are connected together to form a lazy-tongs structure and have diagonal brace-rods between the rods or bars of each pair, of a contact member comprising relatively movable parts to which the inner ends of the upper pairs of rods or bars are attached and pneumatically-actuated means for expanding the lazy-tongs structure.

11. The combination with a lazy-tongs structure and a contact member supported thereby, of a pneumatic-pressure cylinder, a piston in said cylinder and connections between said piston and the lazy-tongs structure that embody a compressible coil-spring and links and levers.

12. The combination with a supporting-frame and pneumatically-actuated means for raising and lowering the same, of a contact member comprising a rotatably-supported cylinder having internal cushioning-rings and a non-rotatable shaft therefor.

In testimony whereof we have hereunto subscribed our names this 28th day of February, 1905.

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CHRISTIAN AALBORG.

Witnesses:
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