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PATENTED AUG. 18, 1908.

P. PFORR & P. E. HERKNER.
CURRENT COLLECTOR FOR ELECTRIC RAILWAYS.

APPLICATION FILED JAN. 23, 1907.

Fig. 1

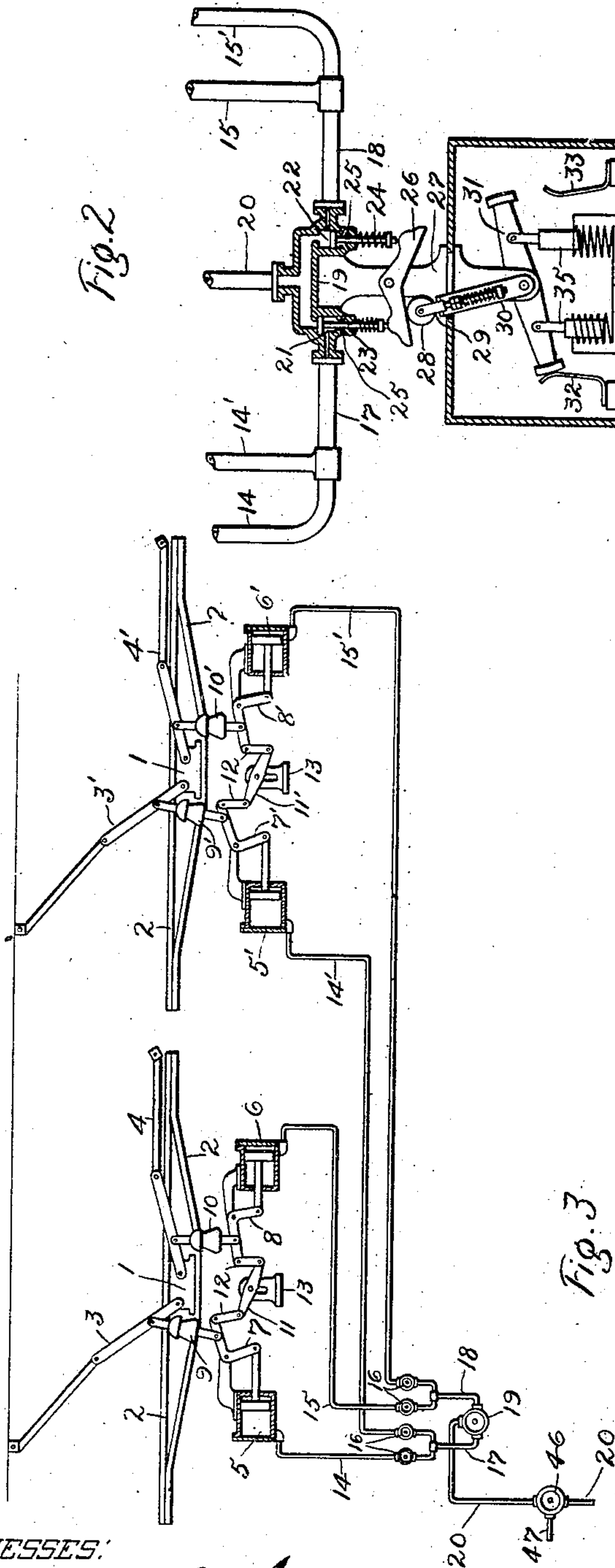


Fig. 2

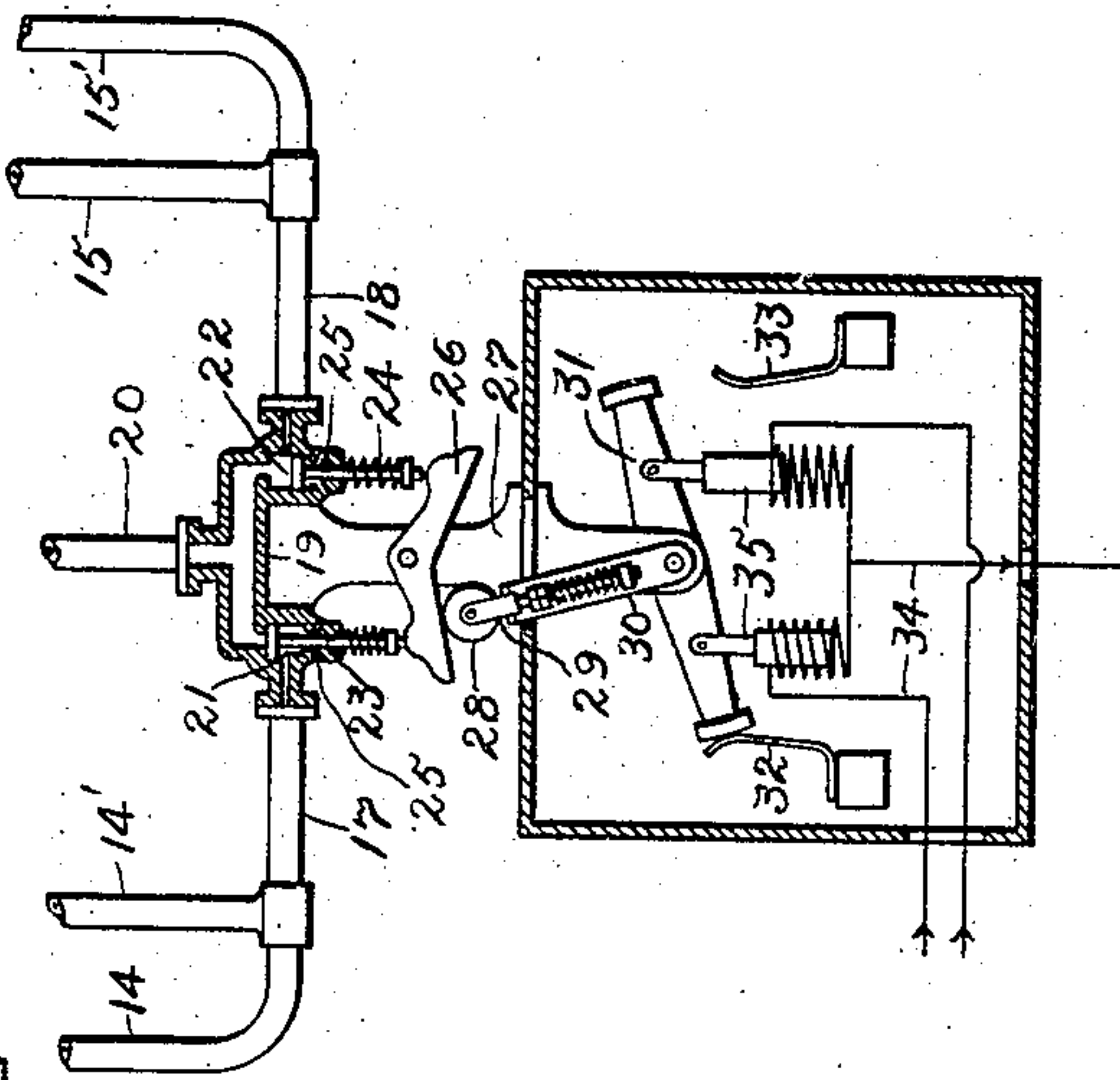
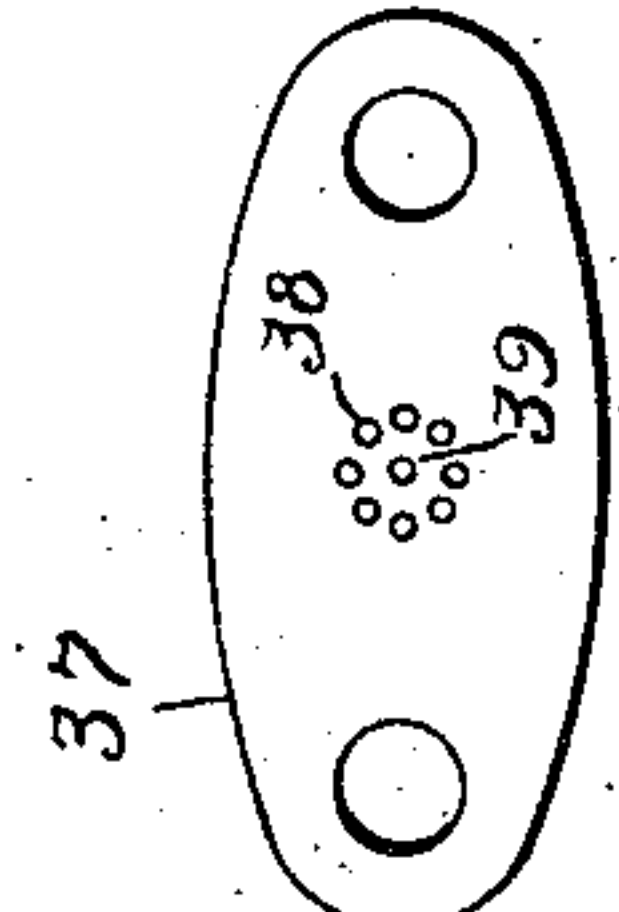
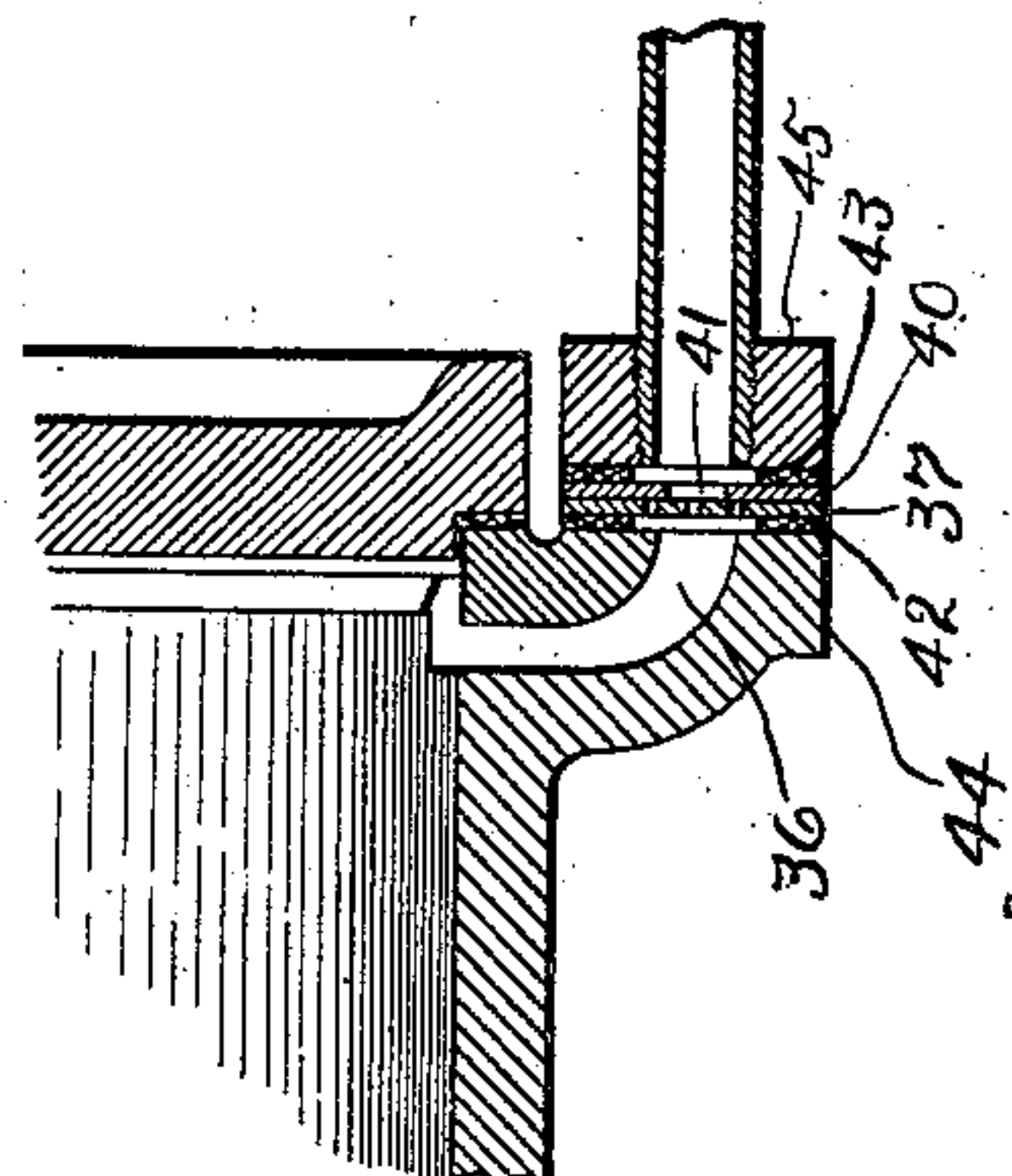


Fig. 3



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UNITED STATES PATENT OFFICE.

PHILIPP PFORR, OF LANKWITZ, NEAR BERLIN, AND PAUL E. HERKNER, OF BERLIN, GERMANY, ASSIGNORS TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

CURRENT-COLLECTOR FOR ELECTRIC RAILWAYS.

No. 896,319.

Specification of Letters Patent.

Patented Aug. 18, 1908.

Application filed January 23, 1907. Serial No. 353,649.

To all whom it may concern:

Be it known that we, PHILIPP PFORR and PAUL E. HERKNER, subjects of the Emperor of Germany, residing, respectively, at Lankwitz, near Berlin, Germany, and at Berlin, Germany, have invented certain new and useful Improvements in Current-Collectors for Electric Railways, of which the following is a specification.

10 The present invention relates to electric railways, and more particularly to under-running trolleys or devices carried by the vehicle and making contact with a conductor suspended along the roadway for the purpose of collecting current therefrom and transmitting it to the motors of the vehicle.

Most of the forms of trolleys heretofore in use have comprised an arm pivoted at one end to the vehicle and spring-pressed rearwardly and upwardly against the underside of the suspended conductor and making more or less of an acute angle therewith. When the direction of motion of the vehicle was to be reversed, the latter had to be brought to a stop and the trolley shifted by the operator while standing on the roadway. Another form of trolley which has been used to a limited extent consisted of an inverted U-shaped bow made sufficiently short to stand at nearly right angles to the suspended conductor when in working position, so that upon reversal of motion of the vehicle it would swing past the normal and in doing so slightly raise the conductor. This steep position of the current collector had the disadvantage that it was obliged to make large angular movements in slight changes of height in the working conductor, which at high speeds caused interruption of contact and consequent sparking. Moreover the steep current collector often failed to shift upon change in direction of travel, and remained in the wrong direction until it encountered a rough spot in the conductor and after the vehicle had attained considerable speed so that the sudden shifting of the bow caused damage either to itself or to the conductor.

The object of our invention is to provide an arrangement of trolley and means for operating it whereby it will be automatically and positively shifted upon reversal of direction of travel of the vehicle upon which it is mounted.

55 In the accompanying drawing forming a

part of this specification is shown one embodiment of our invention.

Figure 1 is a diagrammatic representation of a double set of trolleys and their operating means adapted for use on a single car or two cars coupled together; Fig. 2 is a part section and part side elevation of the controlling valve and its operating means; Fig. 3 is a sectional elevation of the port to the pneumatic cylinders; and Fig. 4 is a side elevation of a fluid pressure throttling diaphragm.

Hinge blocks 1 with oppositely-disposed rest-arms 2 are secured to the railway vehicle (not shown), and to each block is pivoted a pair of collector bows 3 4 and 3' 4'. Bows 3 3' are intended to be elevated into operation when the vehicle moves to the right and bows 4 4' are intended to be elevated when the vehicle moves to the left. When the bows are in retracted position, they are carried by the oppositely-disposed rest-arms 2.

The means for raising the bows against gravity comprises cylinders 5 6 and 5' 6' whose pistons are connected to bell-crank levers 7 8 and 7' 8' pivoted on some stationary part and connected through insulated links 9 10 and 9' 10' to the bows near their pivoted ends. Each pair of bell-cranks 7 8 and 7' 8' and therefore each pair of bows 3 4 and 3' 4' are interconnected so that when bows 3 3' are forced up bows 4 4' are forced down and vice versa. To effect this interconnection between bell-crank levers 7 8 and 7' 8', auxiliary levers 11 11' are connected through short links 12 to the adjacent ends of the bell-crank levers and the fulcrums of the auxiliary levers are carried in slots formed vertically in stationary blocks 13 on the vehicle. The slot is made sufficiently long to enable both trolleys of each pair to be depressed at the same time while only one may be elevated at a time.

Compressed air is supplied to the trolley-actuating cylinders 5 6 and 5' 6' through pipes 14 15 and 14' 15', each provided with an emergency valve 16. The pipes 14 14' and 15 15' are joined below the emergency valves 16 to pipes 17 18 leading to opposite sides of a four-way controlling valve 19 having a pipe connection 20 by which it is connected to the source of compressed air (not shown).

The controlling valve 19, as shown in Fig. 2, has seats 21 22, opposite pipes 17 and 18, and spring-pressed pistons 23 24 normally

depressed to close exhaust ports 25 formed in the valve 19 below the pistons. The lower ends of the pistons 23, 24 engage a rocker-arm 26 pivoted between them on a bracket 27 depending from the controlling valve 19, and the rocker-arm is actuated by a roller 28 carried on a spring-pressed plunger 29 supported in guide-boxes 30 on arm rigidly connected to the current reversing switch 31 of the car motor circuit. The arrangement is such that the roller 28 tends to move into extreme positions relative to the rocker when moved past the neutral point, so that the reversing switch 31 is positively thrown and held in engagement with one or the other of its contacts 32 33, and at the same time the corresponding exhaust port 25 is positively opened to permit the forward current collectors to be lowered while the trailing collectors are raised into contact with the suspended conductor.

The switch 31 may be actuated to move the roller 28 past the neutral position by hand, as usual, or it may be controlled by a branch circuit 34 acting on electromagnets 35 connected to the reversing switch lever 31.

In order to cushion the upward movement of the current collectors, a throttling device is arranged in the air ports 36 of the actuating cylinders 5 6 and 5' 6', as shown in detail in Figs. 3 and 4. The throttling device consists of a metal disk 37 with a series of small apertures 38 grouped in a circle about a central aperture 39 and a leather disk 40 placed in front of the metal disk 37 and having a single central aperture 41, whose area is equal to the sum of the areas of all the holes in the metal disk, but so arranged that the leather outside the aperture will effectually close the circular series of holes 38 when the compressed air seeks to enter the cylinder. When the air is to be exhausted from the cylinder, the flexible disk 40 moves sufficiently away from the metal disk 37 to uncover the holes 38 and thereby permit the air to escape through holes 38 and 39. Packing disks 42 and 43 are interposed between the cylinder flange 44 and pipe flange 45 on opposite sides of disks 37 and 40.

In order to effect a quick lowering of all

the current collectors 3 4 and 3' 4', the supply pipe 20 is provided with a three-way valve 46 having an exhaust port leading to an open-ended pipe 47.

We do not desire to restrict ourselves to the particular form or arrangement of parts herein shown and described, since it is apparent that they may be changed and modified without departing from our invention.

What we claim as new and desire to secure by Letters Patent of the United States, is,—

1. The combination with two current collectors, of fluid-pressure means for raising and lowering said current collectors, a current reversing switch in the car motor circuit, and means connected therewith for controlling said fluid-pressure means according to the direction of travel.

2. The combination with two current collectors, of a fluid-pressure device connected to each of said collectors, a current reversing switch in the car motor circuit, and a valve connected to said fluid-pressure devices and actuated by said reversing switch for alternately raising and lowering said current collectors according to the direction of travel.

3. The combination with two oppositely-pivoted current collectors, of a fluid-pressure device connected to each of said current collectors, a controlling valve connected to said fluid-pressure devices, a rocker arm for actuating said valve, a current reversing switch in the car motor circuit, and an arm connected to said switch and engaging said rocker arm.

4. The combination with a current collector, of fluid-pressure means for raising and lowering said collector, and means for automatically throttling the flow of pressure fluid during the raising of the collector and permitting a free flow thereof during the lowering of the collector.

In witness whereof, we have hereunto set our hands this fifth day of January, 1907.

PHILIPP PFORR.
PAUL E. HERKNER.

Witnesses:

JULIUS RUMLAND,
KARL MECKELSEN.