No. 801,225. PATENTED OCT. 10, 1905.

H. P. DAVIS & C. AALBORG.

TROLLEY AND TROLLEY SUPPORT.

APPLICATION FILED JAN. 3, 1905.

2 SHEETS—SHEET 1.

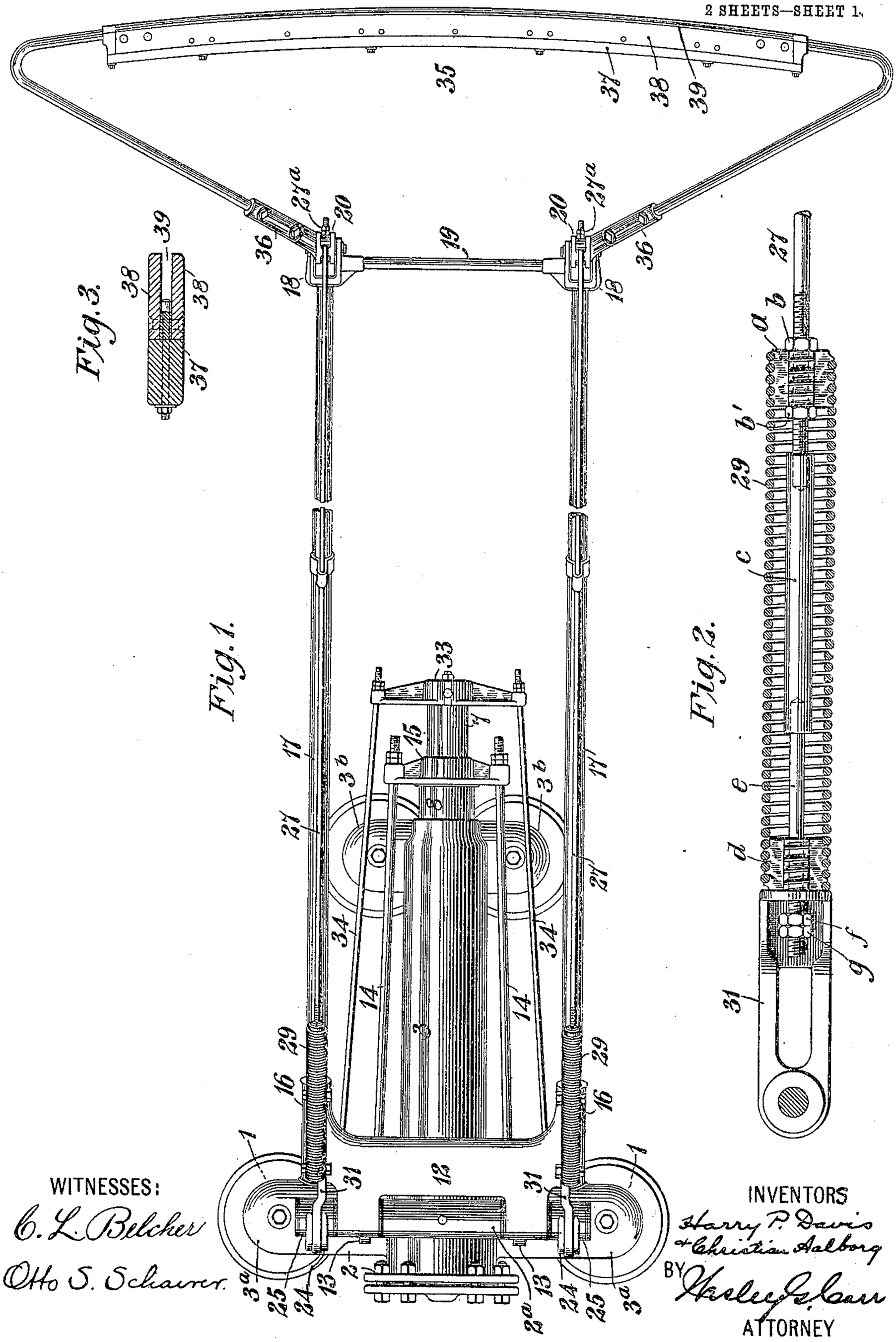

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Fig. 4.

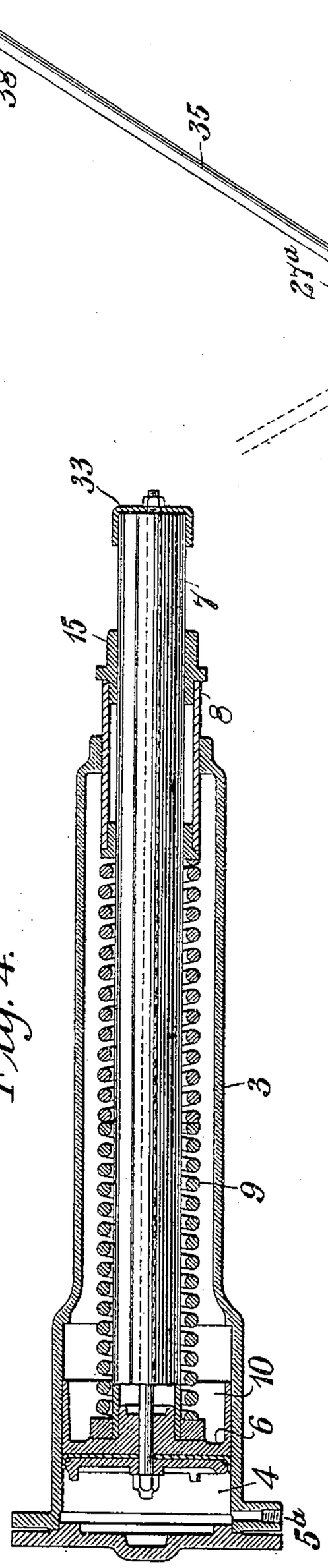
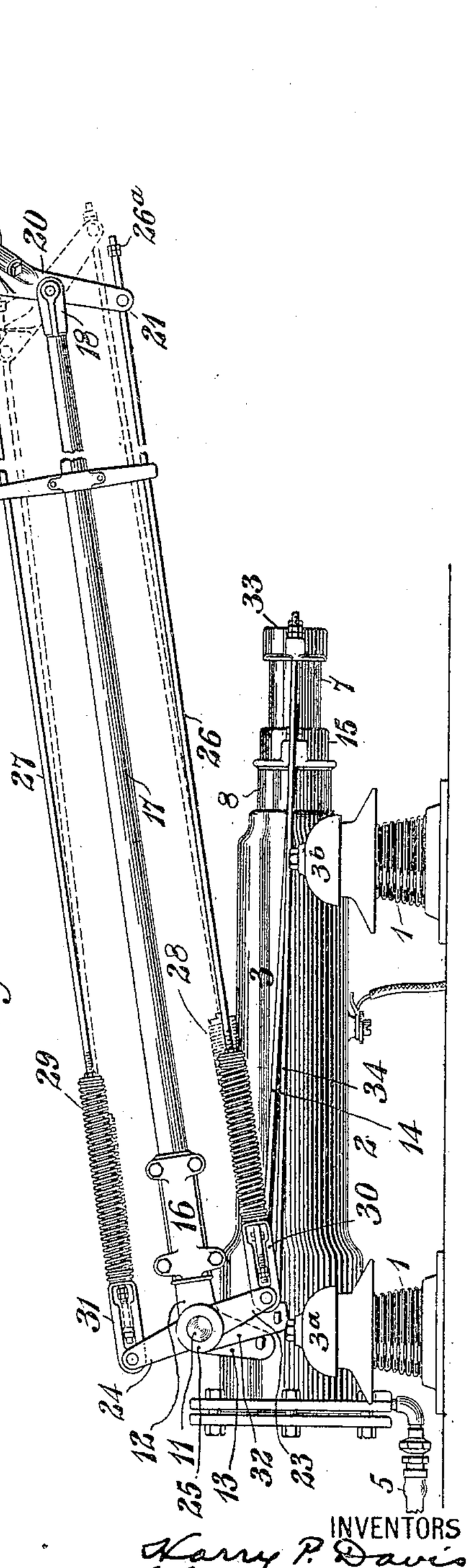


Fig. 5.



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TROLLEY AND TROLLEY-SUPPORT.

No. 801,225. Specification of Letters Patent. Patented Oct. 10, 1905.

Application filed January 3, 1905. Serial No. 239,517.

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 certain new and useful Improvements in Trolleys and Trolley-Supports, of which the following is a specification.

Our invention relates to trolleys and trolley-supports; and it has for its object to provide a trolley which will successfully collect the current from a trolley-conductor when the car to which it is attached is propelled at a high speed and which will automatically adjust itself to variations in the height of the trolley-conductor without liability of disengagement therefrom

A further object is to provide means for raising and lowering the trolley and its support and for insuring good contact between the trolley and the trolley-conductor, which may be controlled from the motorman's cab.

In the accompanying drawings, Figure 1 is a plan view of a trolley and its supporting and operating means constructed in accordance with our invention. Fig. 2 is a detail sectional view of a portion of one of the members shown in Fig. 1. Fig. 3 is an enlarged transverse sectional view of the trolley-bow. Fig. 4 is an enlarged longitudinal sectional view of a cylinder and piston which are elements of our invention, and Fig. 5 is a view in side elevation of the trolley and its supporting and operating means.

Supported upon suitable insulators 1 is a base 2, comprising a cylinder 3, a cylindrical bearing portion 2^a, and feet 3^a and 3^b, one end of the cylinder 3 being provided with a piston-chamber 4, to which fluid under suitable pressure may be admitted through a pipe 5 and a port 5^a under control of the motorman from a suitable reservoir or pump. (Not shown.) A piston 6, which operates in the piston-chamber 4, is provided with a rigid piston-rod 7, the outer end of which projects beyond the end of the cylinder 3. A sleeve 8 is mounted in the outer end of the cylinder 3 and constitutes a guide for the piston-rod 7. Surrounding the piston-rod 7 and interposed between the inner end of the sleeve 8 and the piston 6 is a helical spring 9. The sleeve 8 and the spring 9 constitute a resiliently-compressible rod for the piston 6, which by reason of its compressibility begins to transmit the motion of the piston at a later period than that at which the piston 6 begins to transmit such motion.

Pivoted to the base 2 by means of a shaft 11 with which the bearing portion 2^a is provided, is a casting 12, having two arms 13, that are respectively connected to the outer end of the sleeve 8 by means of rods 14 and a cross-head 15. The casting 12 has also two arms 16, to which are clamped the inner ends of rods or poles 17. The outer ends of the rods or poles 17 are provided with castings 18, which are joined by means of a bar 19, so as to provide a rectangular rigid supporting-frame or boom for the trolley-bow.

Pivotally mounted in the castings 18 are levers 20, having oppositely-projecting arms 21 and 22, that are respectively connected to corresponding arms 23 and 24 of levers 25, with which the shaft 11 is provided, by means of rods 26 and 27, helical springs 28 and 29, and bars 30 and 31. The rods 26 and 27 make loose sliding engagement with the arms 21 and 22 and are provided, respectively, with stop-nuts 26^a and 27^a for engagement with the outer sides of said arms. The inner or lower end of each of the rods 26 and 27 is fastened to the outer end of the corresponding helical spring by means of a helically-grooved cruciform block *a* and nuts *b* and *b'*, the end of the rod that projects through a central hole in the block being provided with a screw-thread for the nuts and also to engage an internal screw-thread in one end of a splice-rod *c* of larger diameter. The outer end of each of the bars 30 and 31 is provided with a helically-grooved cruciform extension *d*, to which the inner end of the corresponding helical spring is fastened by the engagement of its end convolutions with the grooves. A short rod *e* projects through a central hole in the block *d*, in which it is longitudinally movable, and it has a screw-thread engagement with the extension-rod *c* at one end, its other end being provided with an adjusting-nut *f* and a lock-nut *g*. It will be observed that the inner end of the rod *c* will serve as a stop when the spring is sufficiently compressed and that the nut *f* serves as a stop when the spring is subjected to suf-

ficient tensile strain. Each of the levers 25 is provided with a downwardly-projecting arm 32, that is connected to the corresponding end of a cross-head 33, with which the outer end of the piston-rod 7 is provided, by means of a rod 34.

A trolley-bow 35 is secured to inclined arms 36, with which the levers 20 are provided, the upper portion of the bow having the cross-sectional form shown in Fig. 3. It comprises a stiff backing-piece 37, to which wearing-pieces 38 are attached, a groove 39, that is adapted to contain suitable lubricating material, being provided between the two wearing-pieces 38.

When fluid-pressure is admitted to the piston-chamber 4, the piston-rod 7 is moved outward and the trolley-bow 35 is raised to an upright position by means of the rods 34, levers 25, bars 31, springs 29, and rods 27.

The outward movement of the piston 6 compresses the spring 9 until its resistance to compression overcomes the weight of the trolley-bow and its pivoted supporting-frame, and then the frame or boom is raised until the bow engages the trolley-conductor. (Not shown.) A further limited movement of the boom or frame is effected by the fluid-pressure, so that the bow may be tilted automatically into either the full-line position or the broken-line position indicated in Fig. 5 when the car starts. The supply of fluid-pressure to the piston-chamber 4 may be then cut off and the trolley boom and bow will be maintained in their raised positions by the fluid already in the chamber.

If the car is propelled in the forward direction, the frictional engagement of the bow with the trolley-conductors will serve to tilt it into the position shown in full lines, this movement being permitted by the springs 29. If the direction of motion of the car is reversed, the bow will be automatically tilted into the position indicated by broken lines, and the springs 28 will be placed under tension, and thus serve to exert a yielding upward pressure upon the bow to compensate for minor variations in the height of the trolley-conductor. It will be seen, therefore, that the bow is elevated on its boom or frame by fluid-pressure, that the boom or frame is then elevated to any desired position by an increase in the fluid-pressure, that the springs 28 and 29 permit the bow to automatically adjust itself to the one or the other of two inclined positions according to the direction of motion of the car, and that the springs also insure automatic adjustment of the bow in accordance with small variations in the height of the trolley-conductor.

The details of construction may of course be varied from what is shown without departing from our invention.

We claim as our invention—

1. In a trolley and trolley-support, a boom, a bow pivoted to the outer end thereof, means for raising the bow and means actuated thereby for raising the boom.

2. In a trolley and trolley-support, a boom, a bow pivoted to the outer end thereof, means for raising the bow, means for raising the boom and resilient connections between said means.

3. In a trolley and trolley-support, a cylinder, a piston, a piston-rod, a sleeve surrounding said piston-rod, a resilient connection between said piston-rod and said sleeve, a boom, a bow pivoted to the outer end thereof, means for actuating said bow by the movement of said piston-rod, and means for actuating said boom by the movement of said sleeve.

4. In a trolley and trolley-support, a cylinder, a piston, a piston-rod, a sleeve upon said piston-rod, a resilient connection between said rod and said sleeve, a pivoted boom or frame, connections between said sleeve and one end of said boom or frame, a bow pivoted to the outer end of said boom or frame, and resilient connections between said bow and said piston-rod.

5. In a trolley and trolley-support, a cylinder, a piston, a piston-rod, a sleeve surrounding said piston-rod, a spring interposed between said piston-rod and said sleeve, a boom or frame the extended portions of which comprise parallel arms, connections between the boom and said sleeve, a bow fulcrumed to the outer ends of the parallel arms of the boom, and resilient connections between the bow and the piston-rod.

6. The combination with a base embodying a cylinder, a pneumatically-actuated piston, a relatively movable member and a spring interposed between the same and said piston, of a pivoted frame, a contact-bow pivoted to said frame, resilient connections between the piston and the bow and a connection between the movable member and the pivoted frame.

7. A trolley device for electrically-propelled vehicles, in combination with a pneumatically-actuated means for raising the device to a substantially upright position, and resilient connections that permit the device to tilt in either direction automatically according to the direction of movement of the vehicle.

8. A trolley-bow for electrically-propelled vehicles, in combination with a fluid-pressure-actuated piston for raising it to an upright position, and means for exerting an auxiliary, yielding pressure and at the same time permitting the bow to tilt in either direction according to the direction of movement of the vehicle.

9. A trolley for electrically-propelled vehicles comprising a boom or frame that is pivotally supported at one end to swing in a vertical plane, a bow pivoted to the free end of the boom or frame, a fluid-pressure-actuated piston, and separate, relatively movable connections between the piston and the boom and between the piston and the bow.

10. A trolley for electrically-propelled vehicles comprising a boom or frame that is pivotally supported at one end to swing in a vertical plane only, a bow pivoted to the free end of the boom or frame, and fluid-pressure-actuated means for successively raising the boom and the bow to their operating positions.

11. The combination with a cylinder adapted to receive fluid-pressure and a piston in said cylinder having two rods one of which is resiliently compressible, of a boom pivotally supported at one end adjacent to said piston, a trolley-bow pivotally supported upon the free end of said boom, resilient connections between the bow and the rigid piston-rod, and unyielding connections between the boom and the resilient piston-rod.

12. The combination with a frame that is pivotally supported at one end, of a trolley-bow that is pivotally attached to the free end of the frame and means for raising the bow and the frame on their respective pivots successively and for yieldingly supporting them to follow irregularities in the elevation of the trolley-wire above the track.

13. The combination with a frame that is pivotally supported at one end, of a trolley-bow that is pivotally supported upon the free end of the frame, a fluid-pressure-actuated piston, connections between the piston and the frame and connections between the piston and the trolley-bow, each of said connections having a resilient element whereby the trolley structure is yieldingly supported to accommodate it to different elevations of the trolley-conductor.

14. In a trolley structure for electrically-propelled vehicles, the combination with a fluid-pressure-actuated piston having two concentric rods one of which is resiliently compressible, of a frame or boom one end of which is pivotally supported, a contact member pivoted to the free end of the boom or frame, link-and-lever mechanism having yielding elements that connect the non-compressible piston-rod with the contact member, and non-yielding link-and-lever mechanism between the compressible piston-rod and the boom or frame.

15. In a trolley structure for electrically-propelled vehicles, the combination with a base and a boom having one end pivoted thereto, of a contact member pivoted to the free end of the boom, a piston that is actuated by fluid-pressure, and separate yielding connections between the piston and the boom and between the piston and the contact member that are so constructed and arranged that the contact member will be moved into upright position before the boom is raised.

16. The combination with a cylinder adapted to receive fluid-pressure and a piston in said cylinder having two rods one of which is resiliently compressible, of an adjustable boom, a trolley-bow pivotally supported upon said boom, connections between the bow and the rigid piston-rod, and connections between the boom and the resilient piston-rod.

17. The combination with a movable frame, of a trolley-bow that is pivotally attached to the frame and means for raising the bow and the frame successively and for yieldingly supporting them to follow irregularities in the elevation of the trolley-wire above the track.

18. The combination with a movable frame, of a trolley-bow that is pivotally supported upon the frame, a fluid-pressure-actuated piston, connections between the piston and the frame and connections between the piston and the trolley-bow, each of said connections having a resilient element whereby the trolley structure is yieldingly supported to accommodate it to different elevations of the trolley-conductor.

19. In an electrically-propelled vehicle, the combination with a movable frame and pneumatic elevating means therefor having a yieldingly-resilient member, of a trolley-bow that is pivotally supported upon the frame and is spring-pressed toward an upright position but is automatically tilted in the one or the other direction, according to the direction of travel of the vehicle.

20. The combination with a movable frame, of a trolley-bow that is pivotally attached to the frame and pneumatically-actuated means for raising the bow and the frame successively and for yieldingly supporting them to follow irregularities in the elevation of the trolley-wire above the track.

In testimony whereof we have hereunto subscribed our names this 30th day of December, 1904.

HARRY P. DAVIS.
CHRISTIAN AALBORG.

Witnesses:
CAROLINE E. S. MYERS,
OTTO S. SCHOIRER,
BIRNEY HINES.