(No Model.)

S. C. CRANE.

TROLLEY SUPPORT.

No. 476,367. Patented June 7, 1892.

Fig. 1.

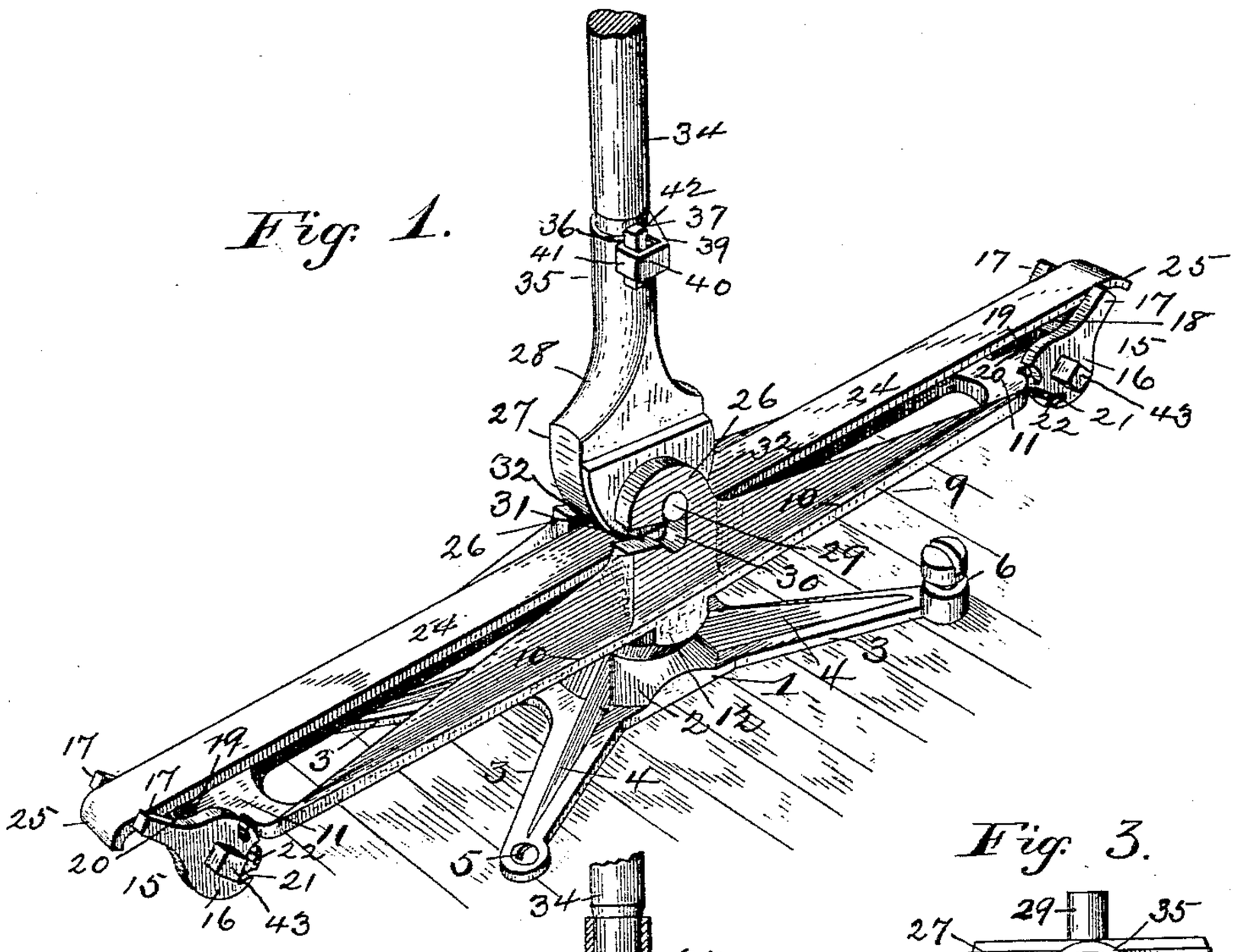


Fig. 2.

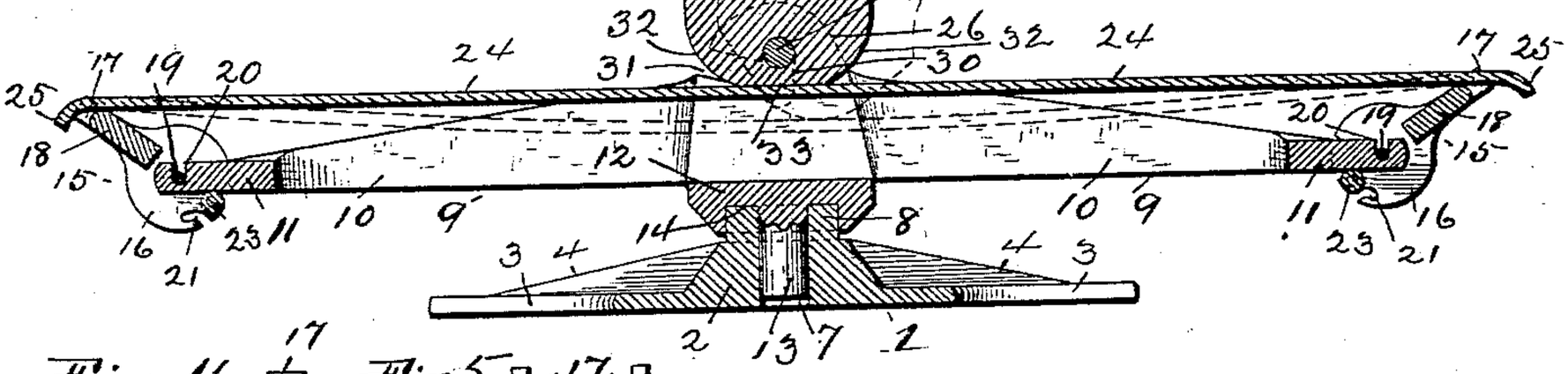


Fig. 3.

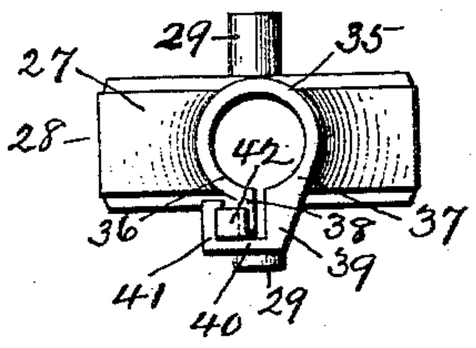


Fig. 4.

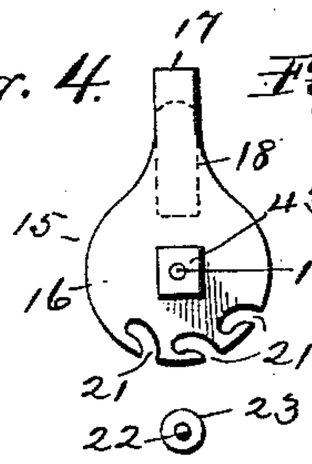


Fig. 5.

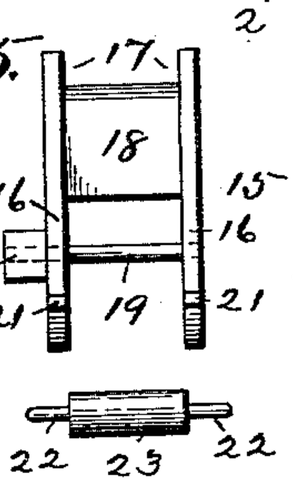
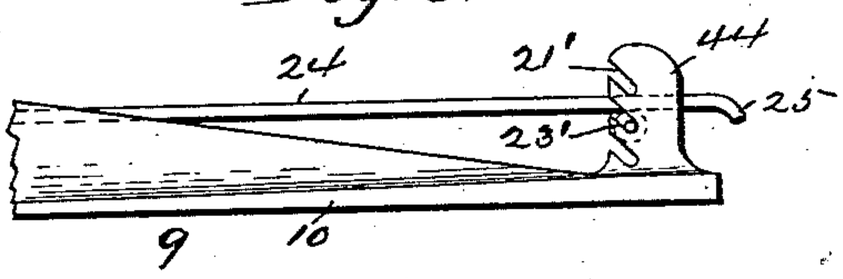


Fig. 6.



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UNITED STATES PATENT OFFICE.

SPENCER C. CRANE, OF PHILADELPHIA, PENNSYLVANIA.

TROLLEY-SUPPORT.

SPECIFICATION forming part of Letters Patent No. 476,367, dated June 7, 1892.

Application filed March 11, 1892. Serial No. 424,600. (No model.)

To all whom it may concern.

Be it known that I, SPENCER C. CRANE, a citizen of the United States, and a resident of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Trolley-Supports, of which the following is a specification.

My invention has reference to improvements in trolley-supports for underrunning trolleys for carrying an electric current from an overhead conductor to a traveling vehicle, and more especially to electric-motor cars. In this system of electric locomotion, which is now universally used, it is essential that the trolley, which is ordinarily mounted upon the roof of the car, be constantly kept against the under side of the line-conductor and accommodate itself to the various inclinations and changes in direction of the line-conductor. For this purpose the trolley-supports are usually swiveled upon the roof of the car and are acted upon by springs which have a tendency to constantly elevate the trolley-support, and thereby the trolley, so as to press the latter against the line-conductor to make good electrical contact with the same. In the trolley-supports heretofore used these results were obtained by means of mechanism which frequently became out of order and which for inspection and repair could not be dismantled on the road, since the various and complicated parts were so fixed to each other that it required a skilled operator and the use of shop-tools to dismantle and to reassemble the parts.

In my improved construction the trolley-support consists of a limited number of exchangeable parts, which may be assembled and taken apart without the use of any tool and without tightening or loosening bolts or screws, since the several parts are arranged to interlock when assembled and are held in place and prevented from accidental displacement, and this interlocking action is effected by the same spring which tends to constantly elevate the trolley and to hold it in a vertical position. All this will more fully appear from the following detailed description with reference to the accompanying drawings, which form a part of this specification, and in which—

Figure 1 is a perspective view of the improved trolley-support mounted on a car-roof, the trolley-pole being broken away. Fig. 2 is a longitudinal vertical section of the same. Fig. 3 is a top view of the trolley-pole butt on a slightly larger scale than Fig. 1. Fig. 4 is an end view, on a large scale, of one of the tension-regulators for the spring with the interlocking pin removed from its notches. Fig. 5 is a side view of the same, and Fig. 6 is a view illustrating a modification of the tension-regulating device.

Referring to the drawings, the base 1 is a casting of any suitable shape, being shown in the drawings as consisting of a central enlarged portion or boss 2, from which radiate arms 3, stiffened by webs 4. Through the outer ends of these arms screws or bolts 5 pass and enter the car-roof and serve to secure the base firmly thereto. On one of the arms 3 may be formed a binding-post 6 for attaching a conductor leading to the motor. The boss 2 is provided with a central perforation 7, and its upper end is formed into an annular seat 8, serving as a pivotal support for a cradle 9. This cradle consists of a casting composed of two side arms 10 10, connected at the ends by cross-pieces 11 and at the middle by a cross-piece 12, the latter having a stout pin 13 formed integral with the cradle and projecting centrally downward therefrom. Surrounding the pin there is an annular groove 14, formed in the cross-piece 12, so that when the cradle is placed on the base-piece, with the pin 13 entering the perforation 7, the annular seat 8 will enter the annular groove 14. The construction is such that the cradle is supported entirely by the seat 8, the pin 13 serving merely as a guide. The cradle is thus swiveled on the base, and the contact between the seat 8 and the walls of the groove 14, and also between the pin 13 and the walls of the perforation 7, is ample for any current that may pass through the trolley-support.

The ends 11 of the cradle are reduced in width and are straddled by the tension-regulators 15—one at each end of the cradle. These tension-regulators consist of two side plates 16 16, approximately circular in outline and each provided at one side with a projecting finger 17. These plates are connected by a cross piece or web 18, which may be cast in-

tegral with the side plates and extends nearly to the ends of the fingers 17. Extending through the center of the side plates and fixed to same is a pivotal pin 19, which, when the tension-regulator is placed on the end of the cradle, fits into a groove 20, extending laterally across the same. In the circular edges of the side plates is a series of inclined or curved notches 21, the notches on one plate matching those on the other. These notches receive the reduced ends 22 of a pin 23, their construction being such that when the tension-regulator is placed on the cradle, with the pin 19 in the groove 20, and the pin 23 with its reduced end in one set of the notches 21, and the tension-regulator is swung in a direction away from the center of the cradle, the pin 23 will ultimately engage the under side of the extended portion of the cradle end 11 and the tension-regulator will thereby be supported against further movement in the same direction. By providing a series of notches 21 in the tension-regulator it will be observed that the latter may be held on the end of the cradle at different degrees of inclination thereto.

Extending from one tension-regulator to the other is an extended narrow leaf-spring 24, its ends resting on the upper edges of the cross-pieces 18 of the tension-regulator, which edges are rounded for the purpose, and beyond these edges the spring 24 has its ends turned downward, as shown at 25, so that if moved longitudinally in either direction it will be stopped by the engagement of the downturned end 25 with the cross-piece 18. Lateral movement of the spring-strip 24 is prevented by the fingers 17, the ends of which project beyond the cross-piece 18 of the tension-regulator.

Cast integral with the side arms 10, midway of their length, are two pedestals 26, at a suitable distance apart, to receive the flattened cam-shaped end 27 of the pole-butt 28, the latter having trunnions 29 formed thereon by casting or by the passage of a pin of suitable dimensions laterally therethrough.

In the pedestals 26 are formed vertical slots 30, the upper ends of which are rounded to form overhanging or top bearings for the trunnions 29, and other slots 31, each extending from one edge of a pedestal and intersecting the vertical slots. The slots 31 serve the purpose of guiding the trunnions into their vertical slot-bearings and are preferably inclined from their outer ends downwardly toward the vertical slots. This construction permits the pole-butt to be placed on the spring 24 at one side of the pedestals, then pressed downward a short distance against the tension of the spring until the trunnions enter the inclined slots 31, and then the pole-butt may be pushed forward along these guide-slots until the trunnions 29 enter the bearing-slots 30, to the upper ends of which they are immediately forced by the reaction of the spring, the parts being so proportioned that the spring is somewhat bent when the pole-butt has been inserted and its trunnions are at the upper ends of the slots 30. The bearing-face 32 of the pole-butt where it engages the spring is cam-shaped, except at its central portion 33, where it is flattened, so that the tendency of the spring will be to maintain the trolley-pole 34 in an upright position, the flattened face 33 when in engagement with the spring acting as a lock or stop for this purpose. When, however, the trolley-pole is inclined, as when in engagement with the electrical conductor, the cam-surface 32 will depress the spring 24 to an extent corresponding to the inclination of the pole. One position of the trolley-pole thus inclined, and the action of the cam-surface on the spring, is indicated by dotted lines in Fig. 2. The tendency of the spring is constantly to return the pole to an upright position, thus maintaining the trolley in contact with the conductor at all times. The trolley-pole 34 enters a socket 35, formed in the pole-butt and in one piece therewith. This socket is split at its upper end, which is thereby formed into two spring-jaws 36 37. The jaw 36 has a lug 38 projecting laterally from one side and the jaw 37 has a finger 39 projecting therefrom and bent at right angles, as shown at 40, and finally returned on itself, as shown at 41, parallel with the lug 38, so as to embrace the latter, but with its free end 41 at a short distance from the corresponding face of the said lug 38. The jaws 36 37 are normally slightly spread apart, so that the lower end of the trolley-pole may be easily inserted into the socket 35. To clamp the pole in place, a wedge 42 is driven between the end 41 of the finger 39 and the lug 38, thus forcing the jaws 36 37 toward each other and clasping the pole firmly between them.

To assemble the trolley-support, the base is first screwed or bolted on the car-top in the desired position. The cradle is then placed on the base, with the pin 13 in the perforation 7 and the annular bearing 8 entering the groove 14. The tension-regulators are then placed upon the ends 11 of the cradle in the manner before described. The spring is laid upon the cross-pieces 18 of the tension-regulators, and the pole-butt, with the pole secured therein, is inserted in the manner before described into its bearings. When the parts are thus assembled, the spring is under some tension and serves to lock all the parts on the cradle against accidental displacement. In this condition of the device, when the trolley-pole is free—that is to say, when the trolley does not engage the overhead conductor—the spring bears directly upon the flat end of the butt and holds the trolley-pole in a vertical position, and the cam-faces on each side of the flat face resist a moderate force tending to incline the pole to one side or the other. If, however, the pole is forcibly turned about the trunnions 29 one of the cam-faces 32 of the butt impinges upon the spring, depresses the same, and thus increases the tendency of

the pole to return to its vertical position. Thus when the trolley engages the line-conductor it is pressed against the same by the action of the spring upon the cam-faces of the butt and insures good electrical contact. When the pole is turned from its free vertical position to an inclined position for engagement of the trolley with a line conductor, or when in the normal working of the trolley the pole rises and falls, the cam-faces of the butt make powerful frictional contact with the middle portion of the spring, and this friction being greater than the friction of the ends of the spring upon the cross-bars 18 the spring is slid along upon these cross-bars in a contrary direction to that of the movement of the pole. Thus the middle portion of the spring is not perceptibly ground away by the working of the device and the end portions are only slightly affected, since each end is acted upon by one-half only of the force which acts upon the middle. If at any time it be found necessary to increase or diminish the tension of the spring, it may be done without dismantling the trolley-support by applying a wrench to a square lug 43, cast on one of the side plates 16 of each tension-regulator for this purpose, and turning the tension-regulator thereby on its pivot against the action of the spring until the pin 23 can be removed from its seat in the notches 21. The pin is then placed in another set of notches and the tension-regulator is relieved from the pressure of the wrench and is moved on its pivot by the spring until the pin 23 engages the under side of the cradle end 11. Both tension-regulators may thus be readily and quickly adjusted and the tension of the spring thereby regulated.

Instead of the tension-regulators 15, I may use the tension-regulator illustrated in Fig. 6. In this form there are two upright ears 44, (one only being shown,) cast integral with the cradle at the ends thereof. These ears are sufficiently far apart to admit the passage of the spring between them, and on the inner edges of each of these ears is a series of inclined notches 21′ for the reception and retention of the ends of a pin 23′, on which the corresponding end of the spring 24 rests and is directly sustained. Adjustment is effected by lifting the end of the spring, removing the pin, and replacing it in another set of notches. The spring 24, which in the drawings is shown in solid lines as straight when the flat end of the pole-butt bears upon the same and in dotted lines as curved downwardly when a cam-face of the pole-butt bears upon it, will be understood to be slightly curved upwardly when free, so that when the parts are assembled the spring will always be under tension.

Having thus fully described my invention, I claim and desire to secure by Letters Patent—

1. A trolley-support composed of a pivoted trolley-pole and a spring bearing upwardly against the butt of the pole, tending to maintain the latter in an upright position, substantially as described.

2. A trolley-support consisting of a pivoted trolley-pole and a leaf-spring bearing upwardly against the butt of the pole, tending to maintain the latter in an upright position, substantially as described.

3. A trolley-support consisting of a pivoted trolley-pole, top bearings for the same, and a spring pressing upwardly against the butt of the pole to lift and maintain the latter in its bearings, substantially as described.

4. A trolley-support consisting of a pivoted trolley-pole, top bearings for the same, and a leaf-spring pressing upwardly against the butt of the pole to lift and maintain the latter in its bearings, substantially as described.

5. A knockdown trolley-support composed of a pivoted pole, slot-bearings for the same, and a spring acting upon the butt of the pole and reacted upon by the butt, whereby the parts are interlocked, substantially as described.

6. In a trolley-support, the combination of a swiveled cradle provided with slot-bearings and a trolley-pole provided with a cam-shaped butt pivoted in the same, of a leaf-spring supported upon the cradle under the pole-butt, acting upon the latter to maintain it in its bearings and to interlock the parts, substantially as described.

7. A trolley-support composed of a pivoted trolley-pole, elongated bearings for the same, and a spring maintaining the trolley-pole pivoted at one end of the bearings, substantially as described.

8. A trolley-pole support composed of a pivoted trolley-pole, provided with a butt having cam-surfaces and an intermediate flattened portion, bearings for the pivots of the trolley-pole, and a spring acting in conjunction with the flattened portion of the pole-butt to lock the pole in an upright position and yielding to the action of the cam-surfaces as the pole is inclined, substantially as described.

9. In a trolley-support, the combination of a pivoted trolley-pole provided with a cam-shaped butt, a leaf-spring acting upon the pole-butt and tending to maintain it in an upright position, and supports for the ends of the spring, substantially as described.

10. In a trolley-support, the combination of a pivoted trolley-pole provided with a cam-shaped butt, a leaf-spring acting upon the cam-surfaces of the pole-butt and riding thereunder as the pole is tilted, and supports for the ends of the spring, on which the latter is movable longitudinally, substantially as described.

11. In a trolley-support, the combination of a pivoted trolley-pole provided with a cam-shaped butt, a leaf-spring acting upon and riding under the cam-surfaces of the pole-butt and provided with downturned ends, and supports for the spring, acting in conjunction with the downturned ends thereof to limit

the longitudinal movement of the spring, substantially as described.

12. In a trolley-support, the combination of a pivoted trolley-pole provided with a cam-shaped butt, with a leaf-spring freely supported at its ends and bearing with the middle upwardly against the butt, and means for raising and lowering the spring-supports, substantially as described.

13. In a knockdown trolley-support, the combination of a pivoted trolley-pole, bearings for the same, a leaf-spring acting upon the pole-butt to maintain the pole-pivots in their bearings, adjustable supports for the ends of the spring, and locking-pins for maintaining the end supports in the adjustable positions, substantially as described.

14. A knockdown trolley-support consisting of a swiveled cradle, adjustable supports mounted on the ends of the cradle, a pivoted trolley-pole provided with a cam-shaped butt, slot-bearings for the trolley-pole, formed in the cradle, and a leaf-spring sustained at the ends on the adjustable supports and engaging under the pole-butt, the said spring tending to maintain the trolley-pole upright and serving to lock the parts of the trolley-support together, substantially as described.

15. In a knockdown trolley-support, a pole-butt provided with a socket for the end of the pole split into two jaws, opposing lugs formed on the jaws, and a wedge for separating the lugs to close the jaws, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

SPENCER C. CRANE.

Witnesses:
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JAMES P. BOYD.