No. 725,719. PATENTED APR. 21, 1903.

G. F. JOHNSON.

TROLLEY STAND.

APPLICATION FILED JUNE 26, 1902.

NO MODEL. 3 SHEETS—SHEET 1.

Fig. 6.

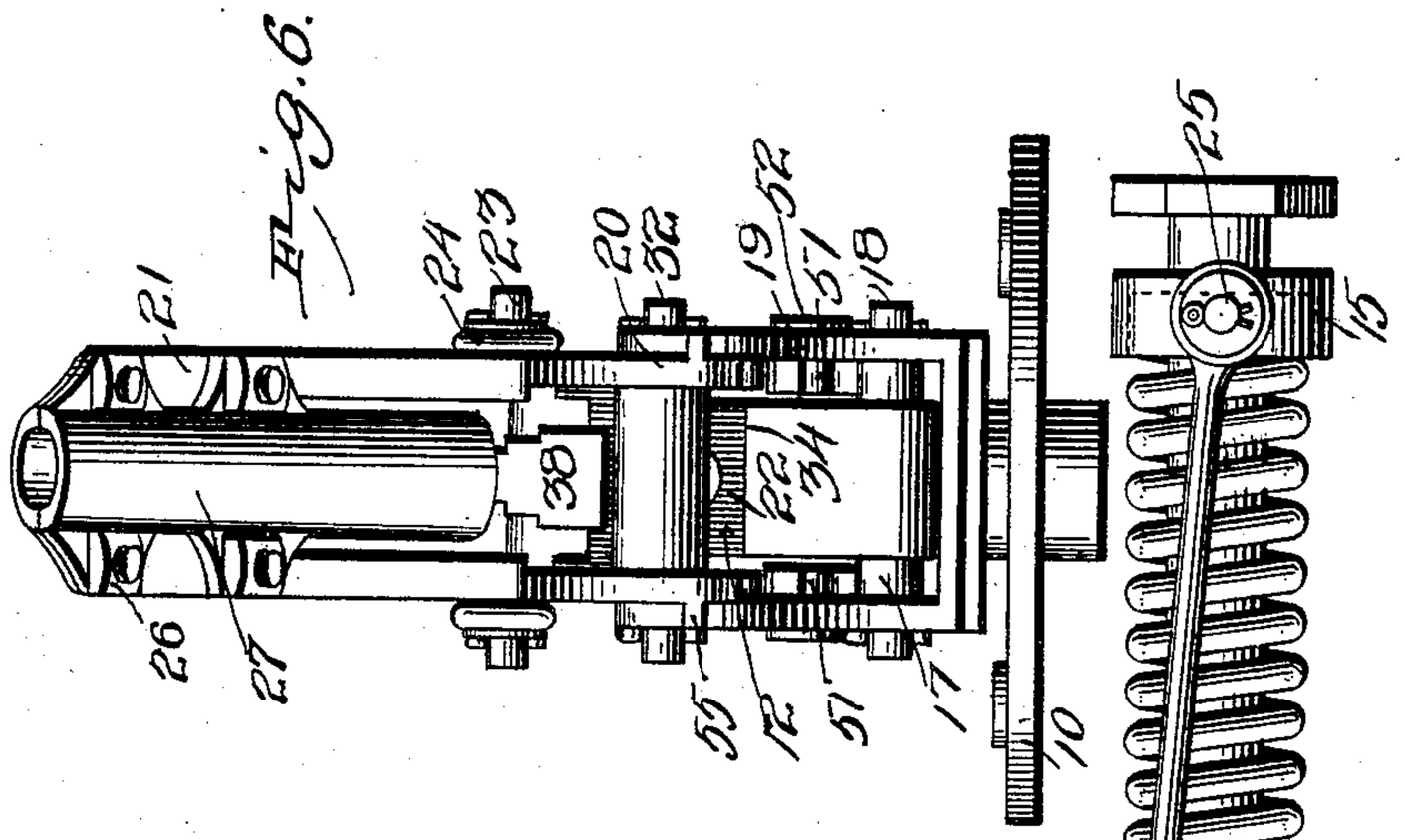


Fig. 7.

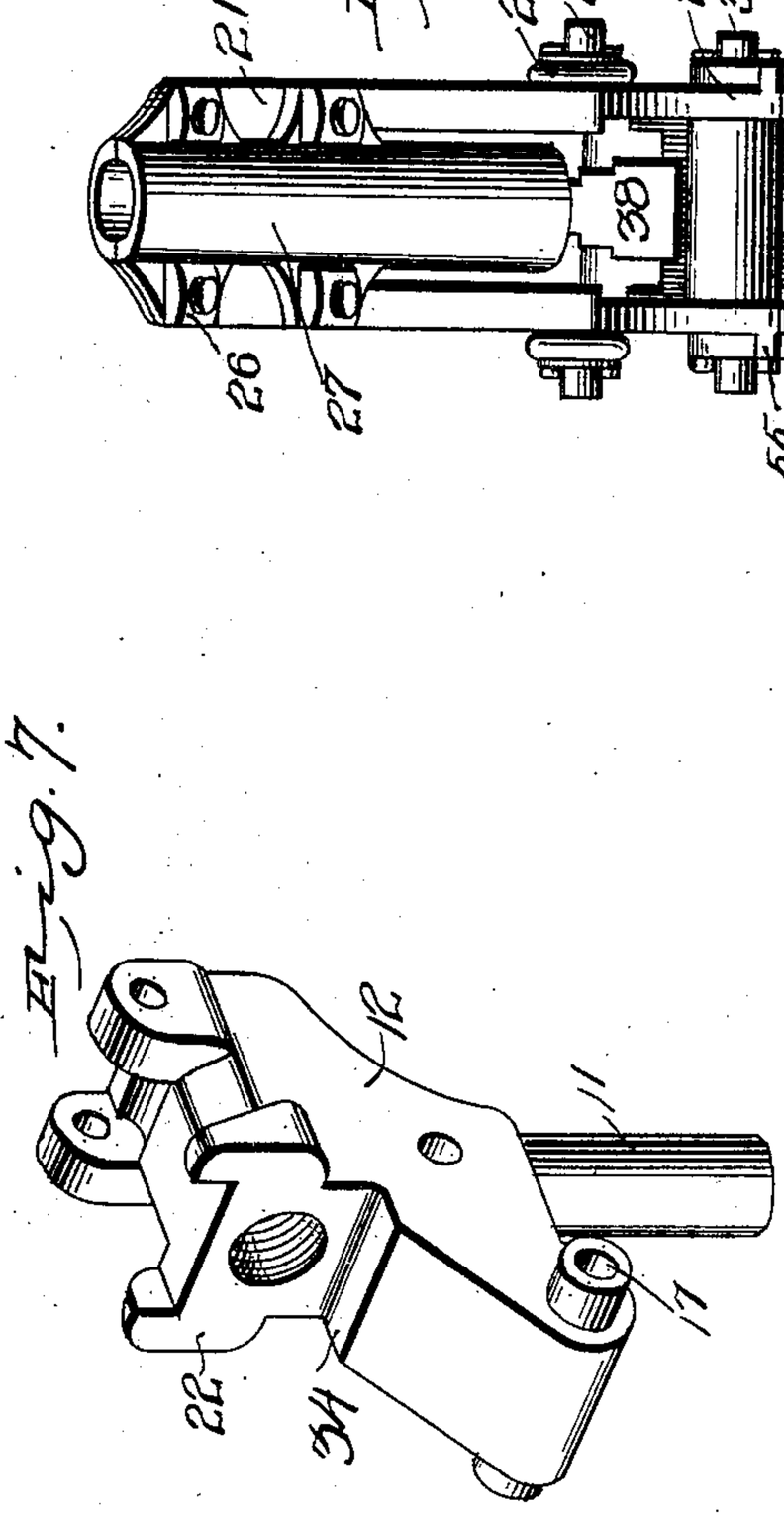
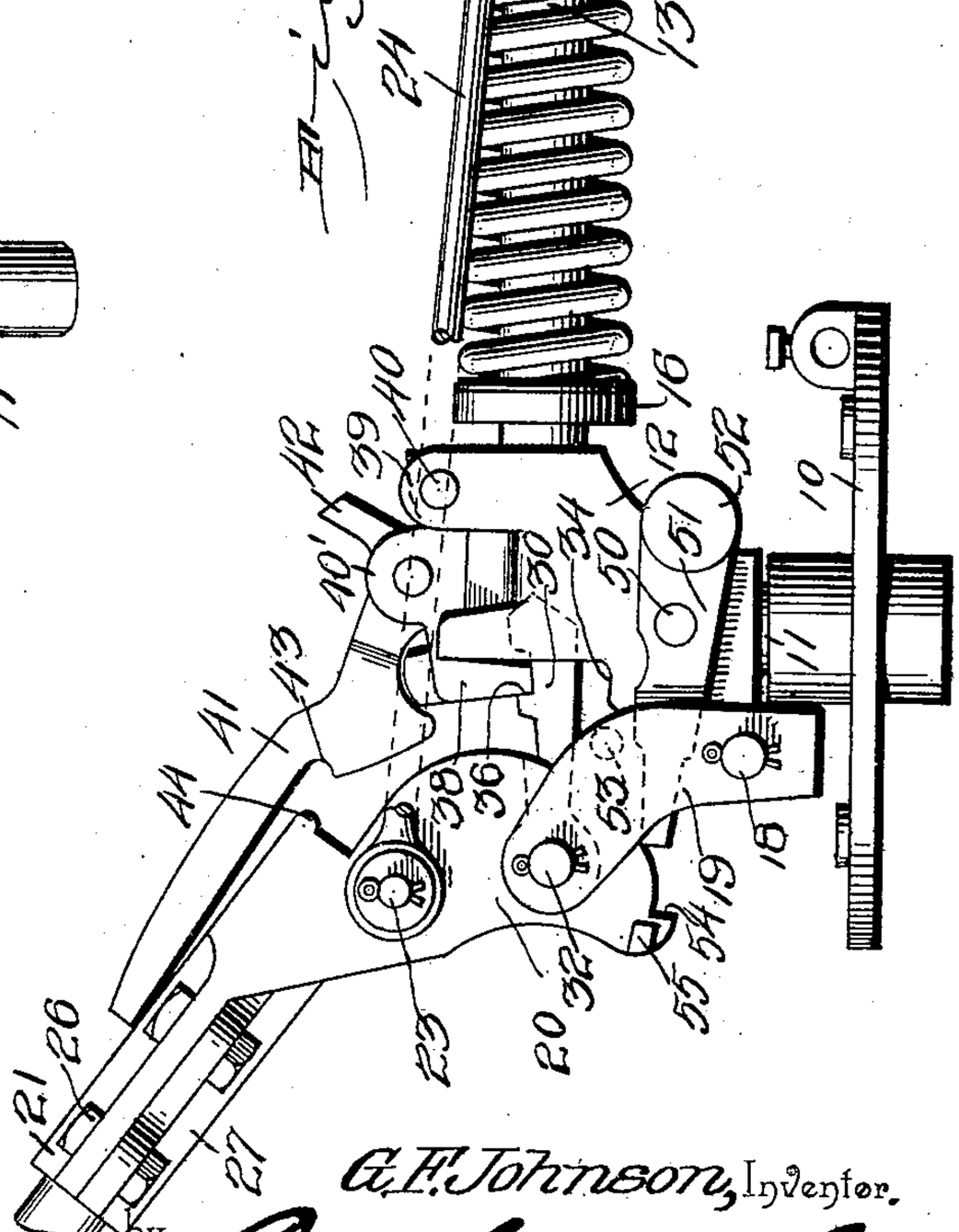


Fig. 1.



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No. 725,719. PATENTED APR. 21, 1903.

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APPLICATION FILED JUNE 26, 1902.

NO MODEL. 3 SHEETS—SHEET 2.

Fig. 1.

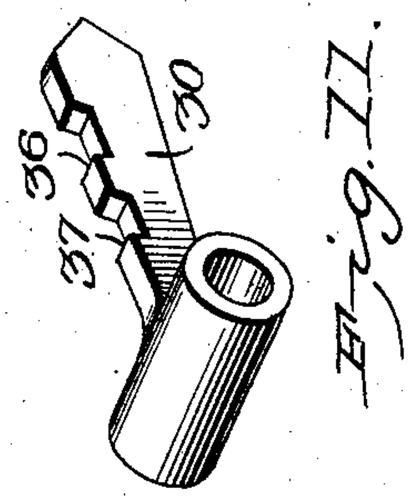


Fig. 2.

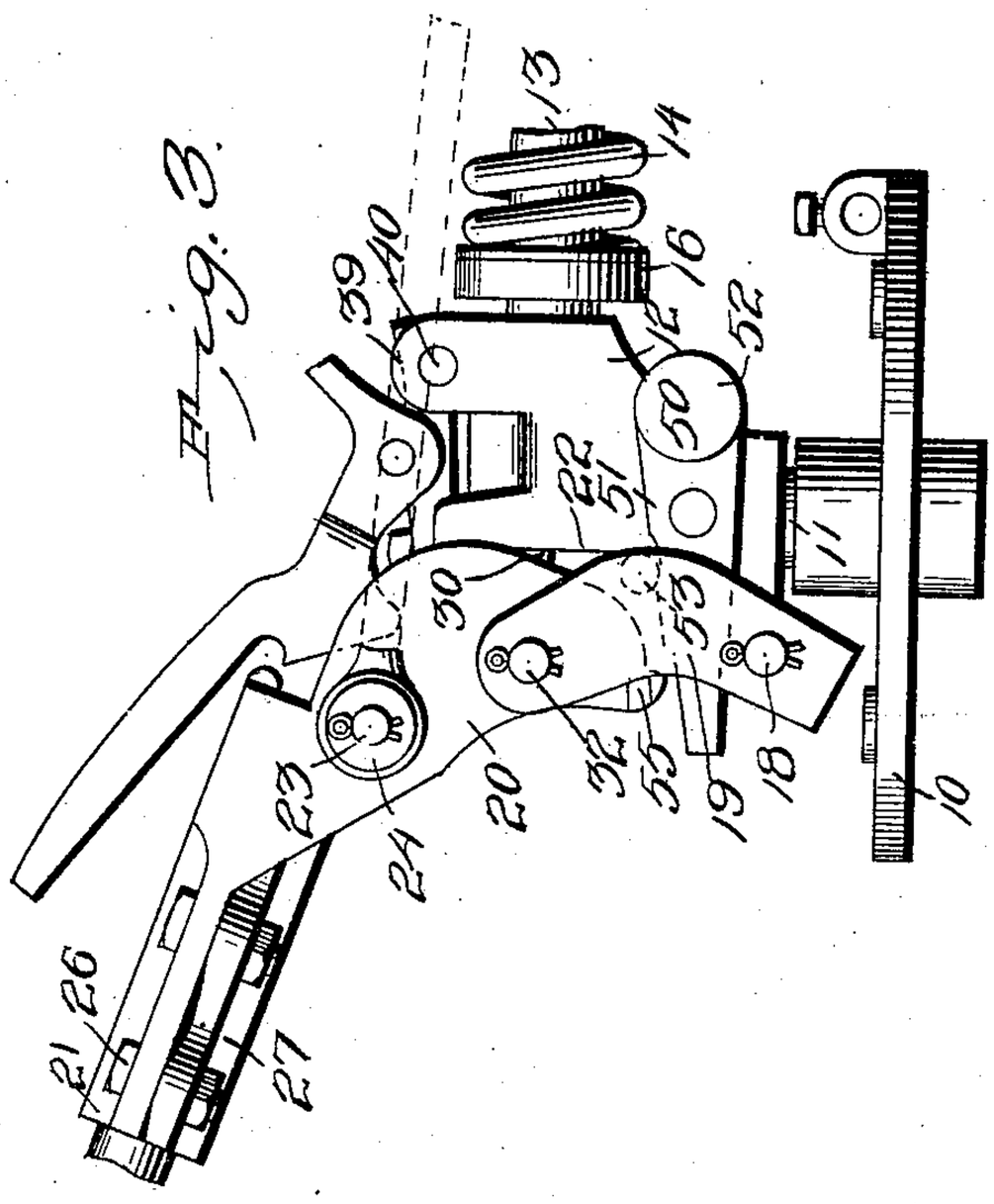
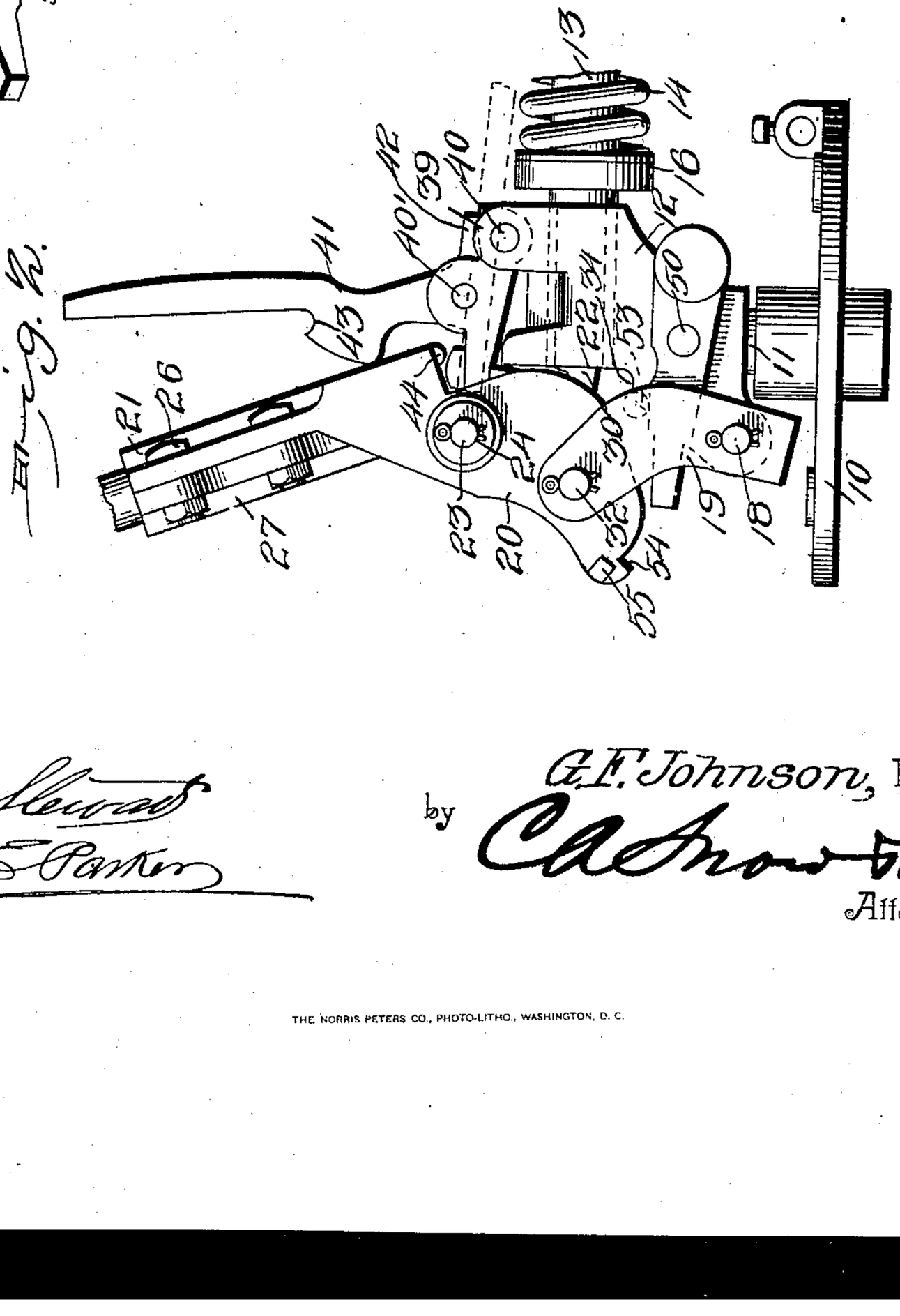


Fig. 3.

Fig. 4.



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No. 725,719. PATENTED APR. 21, 1903.

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TROLLEY STAND.

APPLICATION FILED JUNE 26, 1902.

NO MODEL. 3 SHEETS—SHEET 3.

Fig. 3.

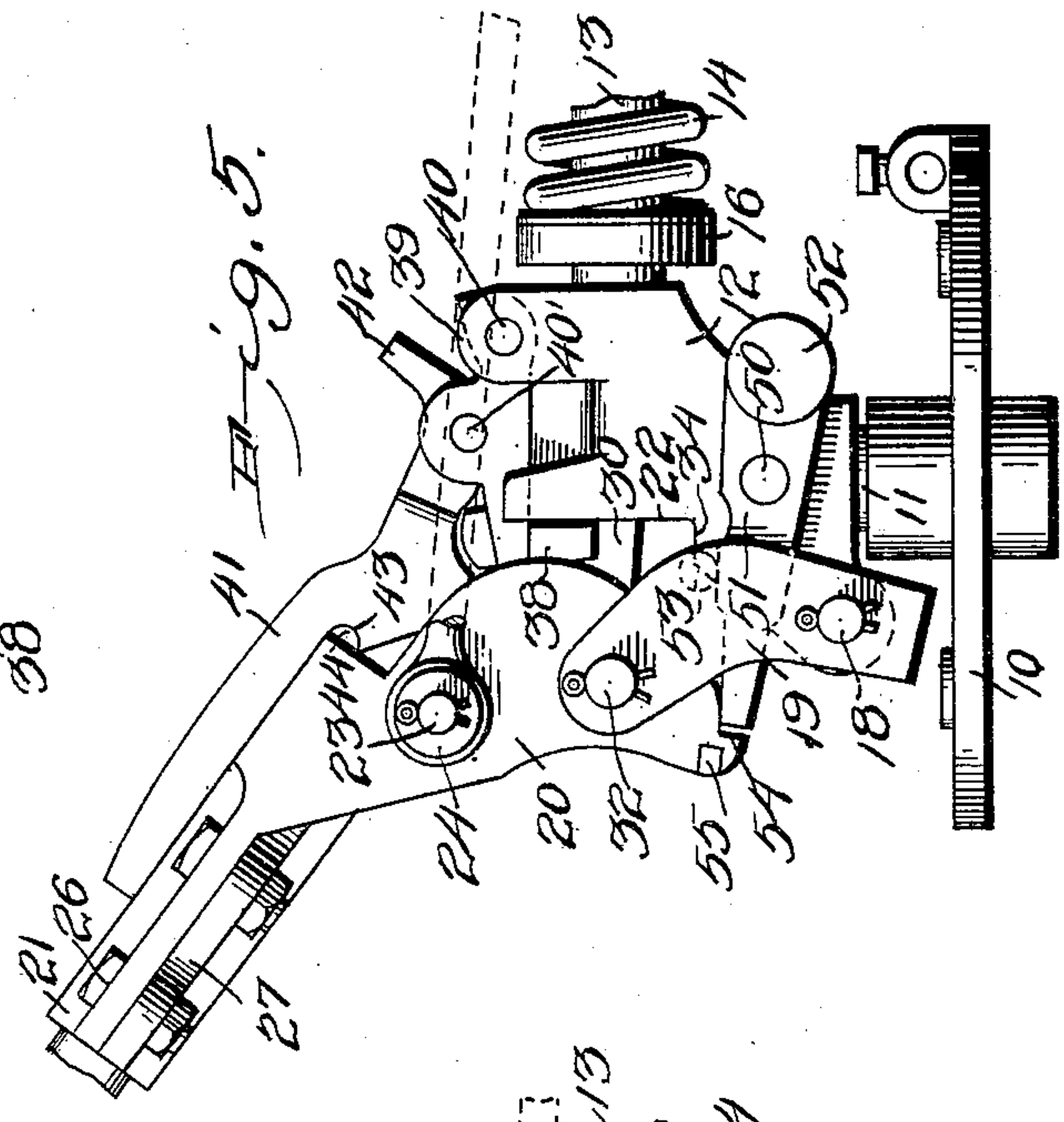


Fig. 4.

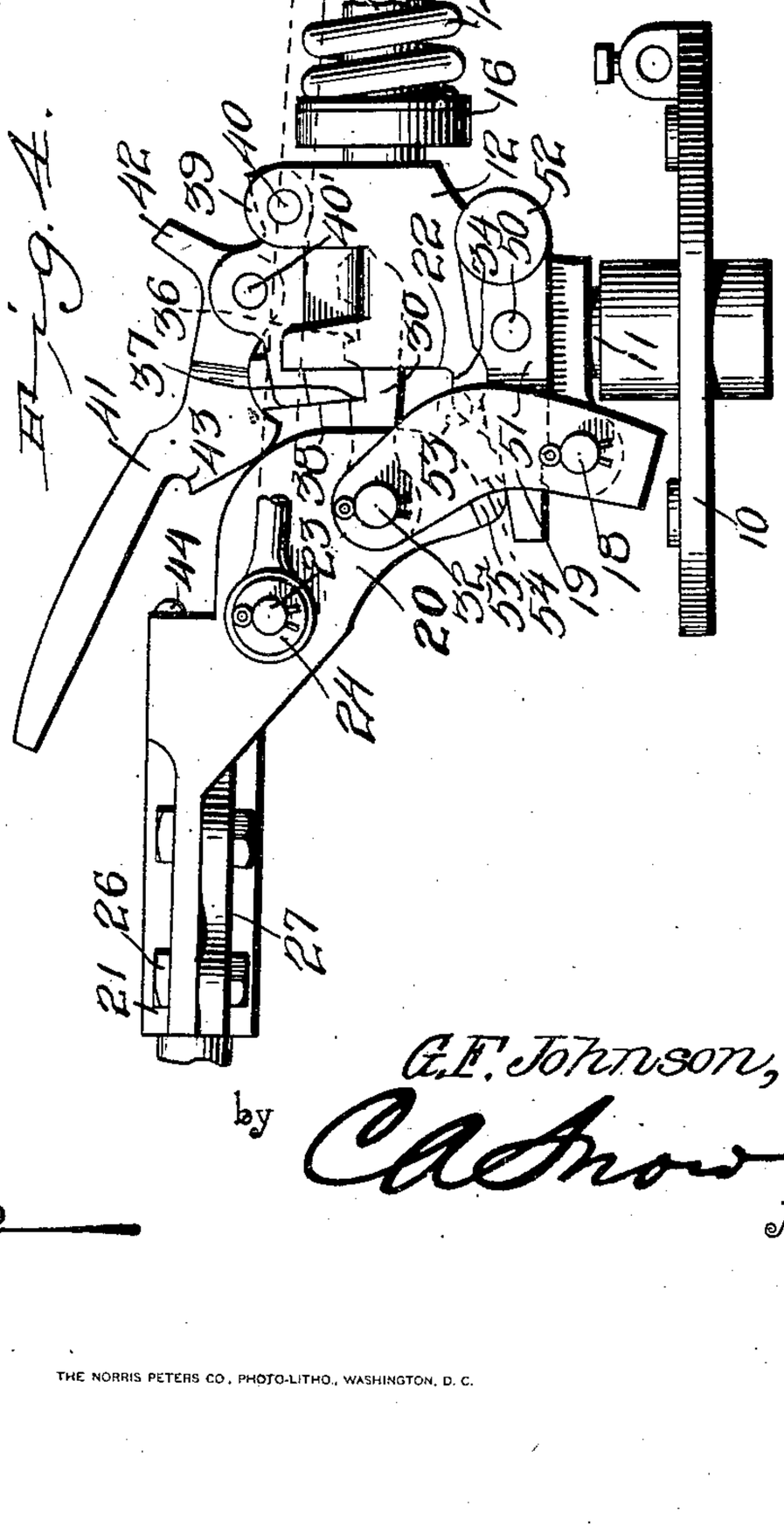


Fig. 8.

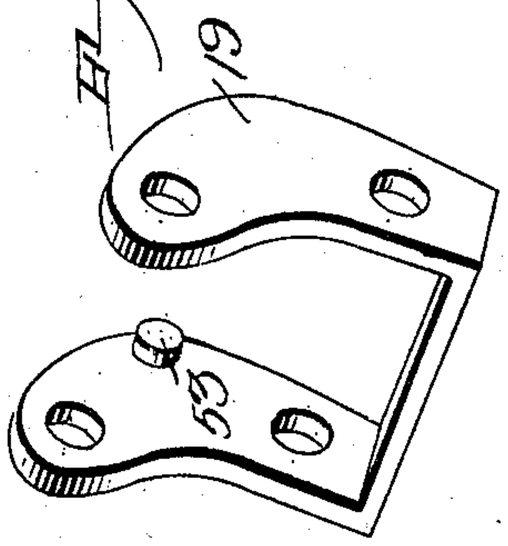
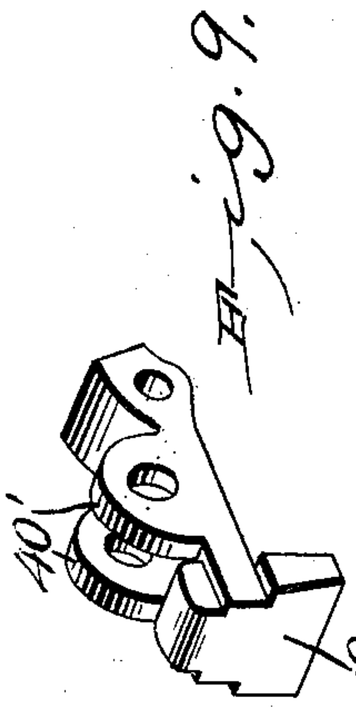


Fig. 9.



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UNITED STATES PATENT OFFICE.

GEORGE FREDERICK JOHNSON, OF PINNERS, VIRGINIA.

TROLLEY-STAND.

SPECIFICATION forming part of Letters Patent No. 725,719, dated April 21, 1903.

Application filed June 26, 1902. Serial No. 113,328. (No model.)

To all whom it may concern:

Be it known that I, GEORGE FREDERICK JOHNSON, a citizen of the United States, residing at Pinners, in the county of Norfolk and State of Virginia, have invented a new and useful Trolley-Stand, of which the following is a specification.

This invention relates to certain improvements in trolley-arm-supporting devices for electric railways, and has for its principal object to provide an improved form of trolley-stand or trolley-arm support of that class in which the arm or pole is automatically lowered to hold the trolley below the conducting-wire in the event of the wheel accidentally jumping from the wire.

A further object of the invention is to insure the lowering of the arm by gravity by first relaxing the tension of the spring or springs used to hold the arm in working position and to prevent any accidental upward movement of the arm to operative position under a tensional strain less than that to which the spring is initially adjusted.

A still further object of the invention is to provide a structure of this class in which the trolley-arm may be readjusted to operative position without undue strain or exertion on the part of the operator by changing the fulcrum-point of the arm and the leverage through which the force exerted by the operator is utilized to adjust the arm in accordance with the gradually-increasing resistance offered by the spring as the latter is placed under tensional strain.

A still further object of the invention is to construct the trolley-stand in such manner that the operator may readily determine the position of the parts by sense of touch and in which the various members are locked between successive steps in the operation of readjusting the arm and trolley to operative position.

With these and other objects in view the invention consists in the novel construction and arrangement of parts hereinafter described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims.

In the drawings, Figure 1 is a side elevation of a trolley-stand, illustrating the compression-spring and a portion of the trolley-arm in the position assumed when the arm is in operative position with the trolley in contact with the current-conducting wire. Fig. 2 is a similar view, a portion of the spring being omitted, illustrating the position assumed by the parts immediately after the trolley has jumped from the wire and the pole is drawn forward to a nearly vertical position by the stress of the spring. Fig. 3 is a side elevation illustrating the next movement of the arm, the latter having dropped to the rear by gravity, and in this position the trolley being in a plane below and out of contact with the conducting-wire. Fig. 4 is a side elevation illustrating the position of the parts immediately after the initial downward pull of the pole by the operator in an attempt to restore the arm to operative position. Fig. 5 is a similar view illustrating the position of the parts when the operator is about to exert the second or final pulling strain on the arm to compress the spring to working position, the fulcrum and the leverage being altered to compensate for the greater stress of the spring due to compression. Fig. 6 is an end elevation of the trolley-stand looking in the direction of the arrow 6 in Fig. 2. Fig. 7 is a detail perspective view of the main frame of the trolley-stand, the movable members and spring being removed in order to more clearly illustrate the construction. Figs. 8, 9, 10, and 11 are detail perspective views of several of the more important members of the support detached.

Similar numerals of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

The trolley-stand is supported on a suitable base-plate 10, secured to the roof of the car or to a suitable framework carried thereby and provided with a central opening for the reception of a depending stud 11, which forms the pivot-point for the trolley-stand and permits free movement of the latter as the pole or arm is adjusted in accordance with the direction in which the car is to travel. The main frame of the stand comprises a casting in the form of a block 12, having an opening for the reception of the threaded end of a spring-supporting bar or tube 13, carrying a helical compression-spring 14, extending between a sliding collar 15

near the outer end of the bar and one or more adjusting-nuts 16 on the threaded inner end of said bar, said nuts being adjustable in order to increase or decrease the stress of the spring.

The lower portion of the block 12 is extended rearwardly and provided with an opening 17, through which extends a pivot-pin 18, carrying a yoke 19, one arm of which is on each side of the block or frame, and between these arms are pivoted the depending arms 20 of a trolley-arm socket 21. The arms 20 are in the form of flat plates having curved front edges adapted at times to come into contact with the vertical face 22 of the block 12, and to suitable lugs 23 on the outer faces of said arms or plates are pivoted tension-rods 24, the opposite ends of which are pivotally connected to studs 25 on the opposite sides of the movable collar 15, said rods serving to transmit the expansive force of the spring to the arms or plates and, through the latter, to constantly hold the socket 21 and the trolley-arm in operative position so long as the trolley remains in contact with the under side of the current-conducting wire. The trolley-arm socket is made in two sections united by bolts 26, and for a reason hereinafter described the upper member of the socket is integral with the depending arms or plates 20, the lower socket member 27 being removable in order to permit the insertion and clamping of the lower end of the arm.

30 designates a catch-bolt having laterally-extended shoulders at its rear end, such shoulders fitting snugly between the adjacent inner surfaces of the arms or plates 20 and being pivotally connected thereto by the pivot-pin 32, which extends out beyond the outer faces of the plates 20 and engages in openings formed in the upper ends of the yoke 19. The forward end of the catch-bolt extends into the hollow end of the tube 13, the extreme end portion being pointed to facilitate its introduction thereinto in the initial assembling of the parts or should the trolley-arm fall beyond a predetermined position, as through the breakage or disconnection of the tension-rods, and to further facilitate the introduction of the bolt the block 12 is provided with a horizontally-disposed shoulder 34, immediately below and to the rear of the end of the tubes, on which the end of the bolt may rest. Under ordinary circumstances the end of the bolt never moves to the rear of the end of the tube, its outward limit of movement being indicated in Fig. 1. In the upper face of the bolt are formed two notches having abrupt rear walls 36 and 37, which may engage a pivoted dog 38, the dog having a forwardly-extended horizontal arm extending between pivot-ears 39, to which it is connected by a pivot-pin 40. When the dog is in its normal position in engagement with the wall 36 of the foremost notch, the parts are in a position illustrated in Fig. 1, the pivot-pin 32 forming the fulcrum for the swinging movement of the trolley-arm socket and the latter being held in the position indicated in Fig. 1 by the expansive force of the compression-spring. Excessive upward movement of the trolley-arm is under normal conditions prevented by the contact of the trolley with the current-conducting wire, the pole or arm swinging freely up and down to compensate for inequalities in the height of the trolley-wire.

About midway of the length of the horizontal portion of the dog 38 are two ears or lugs 40′, between which is pivoted the lower end of a combined stop and dog-releasing bar 41, having at its lower end an arm 42, adapted for contact with that portion of the locking-dog in front of the lugs 40′. The upper end of the bar 41 is adapted at times to ride against the upper or forward face of the arm-receiving socket 21, and at a point intermediate of its length said bar is provided with a notch or recess 43, adapted for the reception of a lug 44, carried by the socket member, and owing to the fact that the upper or forward face of the socket member forms an integral part of the arms or plates 20 the position of these parts remains unaltered without regard to any variation of thickness or diameter of the lower end of the trolley-arms. The diameter and weight of the trolley-arms vary considerably; but by employing a removable socket member 27 on the under side of the arm-support I am enabled to adapt a device to the support of poles or arms of different diameter without alteration in the position of the upper portion of the socket member and consequent interference with the coaction of the lug 44 and notch or recess 43.

Extending through the block 12 is a pivot-pin 50, on which are fulcrumed a pair of arms 51, arranged at each side of the block and provided at their front ends with enlarged or rigid portions 52, normally tending to elevate the rear ends of the arms, excessive upper movement of said arms being prevented by stop pins or lugs 53, projecting from the inner faces of the arms of yoke 19. The arms are arranged in the same plane with the arms or plates 20, and their rear ends at times will be in contact with abrupt shoulders 54, arranged at the lower ends of said arms or plates, as shown in Fig. 5, the point of contact between the ends of the arms and these abrupt shoulders then forming a fulcrum-point for the movement of the trolley-arm and its supporting-socket. During preliminary adjustment of the arm to operative position or during a movement of the parts from the position indicated in Fig. 3 to that indicated in Fig. 4 the pivot-pin 18 will form a fulcrum-point for the arm and socket, the arms or plates being provided with laterally-extended lugs 55, which engage with the rear faces of the yoke-arms during this movement

and for the time being rigidly lock the yoke-arms to the arms or plates 20 and transfer the fulcrum to the pin 18.

When the parts are in the position illustrated in Fig. 1, the expansive force of the compression-spring is exerted through the tension-rods and tends to pull the trolley-arm and its socket upwardly and forwardly, with the pivot-pin 32 as a fulcrum, the trolley being held in intimate contact with the trolley-wire. In this position forward bodily movement of the socket member and arm is prevented by the engagement of the dog 38 with the abrupt wall 36 of the foremost notch of the catch-bolt.

When the trolley jumps the wire, there is no further resistance to the pivotal movement of the trolley-arm and its socket, and with the pivot-pin 32 as a fulcrum the socket and arm move upwardly and forwardly, the front face of the socket member forcing the arm 41 forward, with the lugs 40′ as a fulcrum, until the arm 42 of said arm 41 comes into contact with the front portion of the horizontal arm of the dog 38. The fulcrum-point of the arm 41 is thence transferred to the pivot-pin 40 and results in the raising of the dog from contact with the locking-shoulder 36, permitting the spring to draw the socket member and yoke forwardly, with the pivot-pin 18 as a fulcrum, the catch-bolt 30 sliding within the spring-supporting tube 13 until the curved forward face of the arms or plates 20 come into contact with the vertical plates 22 of the block 12. When the position indicated in Fig. 2 is reached, the spring is fully relaxed and the arm and socket are free to fall by gravity to the position indicated in Fig. 3. It will be observed that the curvature of the front faces of the arms or plates 20 is on a line eccentric to the studs 23, by which the tension-bars are connected to said plates, this being for the purpose of preventing any abrupt rearward fall of the trolley-arm when the tension of the spring is relaxed. When the downward movement of the trolley-arm starts, the point of contact between the curved faces of the plates 20 and vertical wall 22 is the fulcrum-point on which the arm and socket move, and as the downward movement continues this fulcrum-point gradually shifts to a greater distance from the center of the studs 23 and results in the exercise of a slight compressive force on the spring 14, the movement being gradual and resulting in the gradual cushioning of the trolley-arm until the latter assumes a position of rest, as indicated in Fig. 3, the trolley being then in a plane below and out of contact with the trolley-wire. When this movement occurs suddenly, there is sometimes a tendency to rebound, and to prevent any upward movement which would tend to bring the upper portion of the trolley-arm into the path of the cross-wires or other support the pivoted arm 41 comes into play. It will be observed that when the trolley-arm comes to rest in the position indicated in Fig. 3 the lugs 55 are in contact with the rear faces of the arms of the yoke 19, the fulcrum-point of the trolley-arm and socket being thence transferred to the pivot-pin 18, and as the leverage exerted on the spring is lessened by the increased distance between the fulcrum-point and the load or point of attachment of the plates 20 and tension-bars there can be but little force exerted tending to compress the spring. Should, however, there be any tendency to rebound, the lug 44 will strike against the arm 41, entering the recess 43 and preventing further upward movement of the trolley-arm and socket.

When the conductor or other operative desires to readjust the trolley-arm to operative position, he pulls on the usual trolley cord or rope ordinarily attached to the trolley-arm at a point near the trolley and pulls the arm and socket down to the position illustrated in Fig. 4, the pivot-pin 18 acting as the fulcrum-point, owing to the fact that the lugs 55 are in contact with the rear faces of the yoke-arms and serve to temporarily lock the yoke-arms rigidly to the arms or plates 20. When the arm and socket have reached the position indicated in Fig. 4, the locking-dog 38 falls and engages the shoulder 37 of the rearmost notch in the catch-bolt 30, and thus securely holds the bolt in its adjusted position, the spring being slightly compressed and being held compressed by the locking-dog. As the resistance of the spring to compression increases in proportion to the extent to which it is compressed, the conductor or other operator could not ordinarily exert sufficient pulling strain to set the spring under the initial tension, and one of the principal objects of the present invention is to permit the setting movement to be accomplished with but little exertion by shortening the leverage and shifting the fulcrum of movement of the trolley-arm and socket member to compensate for the increased resistance of the spring when partially compressed.

When the operator has lowered the trolley-arm and socket member to the position indicated in Fig. 4 and the locking-dog is in engagement with the shoulder 37, he gradually releases the strain on the pulling-cord and permits the arm and socket member to rise under the influence of the spring to the position indicated in Fig. 5, the pivot-pin 32 serving as a fulcrum during this portion of the movement. The upward movement to the position shown in Fig. 5 is limited by the engagement of the lug 44 and the notch or recess 43, and when the upward movement stops by reason of this engagement the operator knows that the several parts are adjusted in proper position for the subsequent movement to adjust the tension of the spring to operative position. During the latter part of the upward movement to the position shown in Fig. 5 the weighted arms 51 have moved to the position shown in Fig. 5, their outer ends

being then immediately in front of and in contact with the shoulders 54 of the socket-plates 20. With the parts in the position shown in Fig. 5 the operator again pulls the trolley-arm down, this time with the point of contact between the ends of the arms 51 and shoulders 54 as a fulcrum, the load-point remaining the same, while the fulcrum is changed and the leverage is shortened, enabling the operator to pull the arm downwardly against the increased tension of the spring with approximately the same degree of force exerted as during the initial movement, with the pin 18 as a fulcrum. The second downward pull results in an outward movement of the catch-bolt 30 until the locking-dog is in engagement with the shoulder 36 of the foremost notch, this being the operative position and the only further moving necessary being to allow the pole to rise until the trolley is in contact with the under side of the current-conducting wire and the several parts have reassumed the positions shown in Fig. 1.

While the construction herein described, and illustrated in the accompanying drawings, is the preferred form of the device, it is obvious that various changes in the form, proportions, size, and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of my invention.

Having thus described my invention, what I claim is—

1. In a device of the class specified, a trolley-stand, a pivotally-mounted trolley-arm, a spring for holding the arm in operative position, means for releasing the arm from the tension of the spring when the trolley leaves the wire, and means for changing the fulcrum and leverage of the trolley-arm in restoring the arm and spring to operative position.

2. In a device of the class specified, a trolley-stand, a spring-supported pivotally-mounted trolley-arm, mechanism for automatically relaxing the spring and permitting the arm to fall by gravity when the trolley leaves the wire, and means for changing the fulcrum and leverage of the arm in proportion to the increasing resistance of the spring during the readjustment of the arm and spring to operative position.

3. In a device of the class specified, a trolley-stand, a pivotally-mounted trolley-arm, a spring supporting the arm in operative position, means for automatically relaxing the spring and permitting the arm to fall by gravity when the trolley leaves the wire, and means for changing the fulcrum-point of the arm and increasing the effective leverage thereof after an initial movement of the arm and the partial compression of the spring.

4. In a device of the class specified, a trolley-stand, a trolley-arm mounted for pivotal and bodily movement, means for locking the arm against bodily movement when the trolley is in contact with the wire, means for automatically releasing the arm and relaxing the spring when the trolley leaves the wire, and means for readjusting the arm, the locking device and the spring, and for changing the effective leverage of the arm to compensate for the increasing resistance of the spring during such movement.

5. In a device of the class specified, a pivotally-mounted trolley-arm, a spring for maintaining the same in operative position, and means for shortening the distance between the fulcrum-point of said arm and the point at which the spring is attached to said arm during the compression of the spring and the adjustment of the arm from an inoperative to an operative position.

6. In a device of the class specified, a trolley-stand, a pivotally-mounted trolley-arm supported thereby, a spring for holding the arm in operative position, means for automatically relaxing the spring and permitting the arm to assume an inoperative position when the trolley leaves the wire, means for locking the spring against expansive movement after a partial compression of the same, and means for shortening the distance between the fulcrum-point of the arm and the point of attachment of the spring after the initial compression to thereby secure increased leverage and compensate for the increased resistance of the spring to further compression.

7. In a device of the class specified, a pivotally-mounted trolley-arm, a compression-spring for supporting the same, means for automatically locking the spring when partly compressed by a downward movement of the arm, and means for changing the fulcrum and leverage of the arm to permit the further compression of the spring to operative position.

8. In a device of the class specified, a trolley-stand, a pivotally-mounted yoke carried thereby, a trolley-arm pivotally mounted on the yoke and having lugs adapted to engage the yoke-arms, a spring for maintaining the arm in operative position, a locking device for holding the fulcrum-point of the arm in operative position, means for automatically disengaging said locking device when the trolley leaves the wire, and means for engaging and forming a fulcrum for the lower portion of the trolley-arm during a portion of the movement of the latter from an inoperative to operative position.

9. In a device of the class specified, a trolley-stand, a pivotally-mounted trolley-arm, a spring for maintaining the arm in operative position, means for automatically relaxing the spring and permitting the lowering of the arm when the trolley leaves the wire, and means for limiting the extent of upward movement of said arm during the resetting operation to prevent contact between the trolley and wire until the spring is recompressed to initial operative position.

10. In a device of the class specified, a trol-

ley-stand, a trolley-arm mounted for a pivotal and bodily movement, a spring and a locking device for maintaining the arm in operative position, means for automatically releasing the locking device and relaxing the spring when the trolley leaves the wire, and means for limiting the extent of upward movement of said arm during the resetting operation to prevent contact between the trolley and wire until the spring is recompressed to initial operative position.

11. In a device of the class specified, a trolley-stand, a yoke pivoted thereto, a trolley-arm-supporting socket pivotally connected to said yoke and provided with yoke-engaging lugs, a notched catch-bar carried by the socket, a locking-dog engaging said bar, a dog-operating lever adapted to move the dog to unlocking position by the forward movement of the socket when the trolley leaves the wire, said lever forming a stop for limiting upward movement of the arm until the supporting-spring is fully compressed, and pivoted levers adapted to automatically engage with and form a fulcrum for the lower portion of the socket member after an initial compression of the spring.

12. In a device of the class specified, a trolley-stand, a yoke pivoted thereto, a trolley-arm-supporting socket pivotally connected to said yoke and provided with yoke-engaging lugs, a notched catch-bar carried by the socket, a locking-dog engaging said bar, a dog-operating lever adapted to move the dog to unlocking position by engagement with the socket when the trolley leaves the wire, a spring connected to the socket member, pivoted levers adapted to engage with and form a fulcrum for the lower portion of the socket, and a stop-shoulder on said socket adapted to engage the dog-operating lever when said pivoted levers have moved to socket-engaging position.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

GEO. FREDERICK JOHNSON.

Witnesses:

W. F. PERRY,

W. J. ATWOOD.