A. C. LIVERMORE.

CIRCUIT CONTROLLER.

APPLICATION FILED MAR. 12, 1913.

1,126,043.

Patented Jan. 26, 1915.

2 SHEETS—SHEET 1.

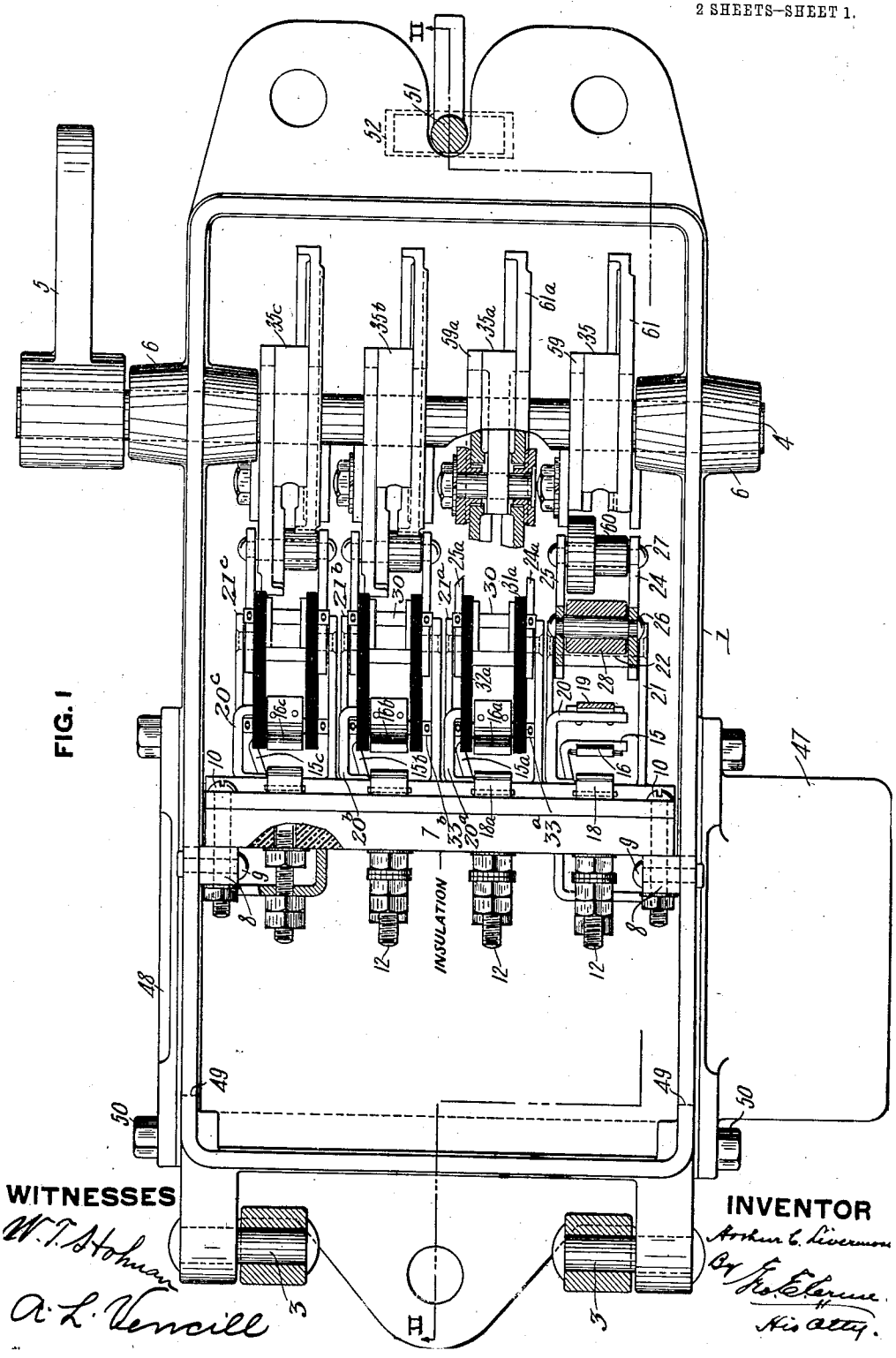


FIG. 1

WITNESSES

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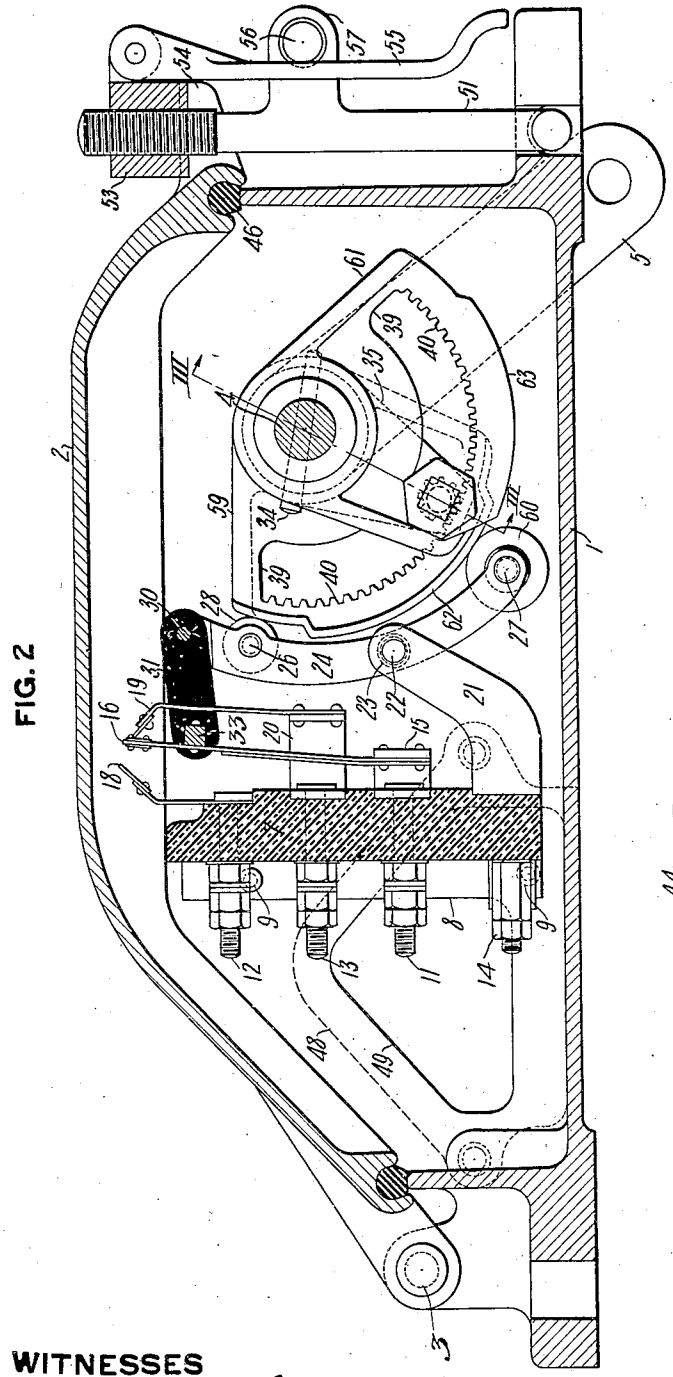


FIG. 2

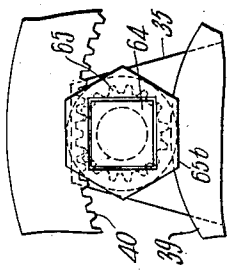


FIG. 4

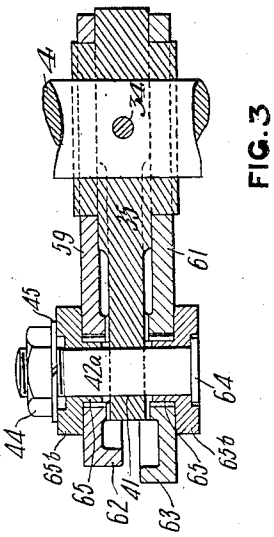


FIG. 3

WITNESSES

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ARTHUR C. LIVERMORE, OF EDGEWOOD BOROUGH, PENNSYLVANIA, ASSIGNOR TO THE UNION SWITCH & SIGNAL COMPANY, OF SWISSVALE, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

CIRCUIT-CONTROLLER.

1,126,043. Specification of Letters Patent. Patented Jan. 26, 1915.

Application filed March 12, 1913. Serial No. 753,717.

To all whom it may concern:

Be it known that I, ARTHUR C. LIVERMORE, a citizen of the United States, residing at Edgewood borough, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Circuit-Controllers, of which the following is a specification.

My invention relates to circuit controllers. I will describe one form of circuit controller embodying my invention, and will then point out the novel features thereof in claims.

In the accompanying drawings, Figure 1 is a top plan view, with cover removed, showing one form of circuit controller embodying my invention. Fig. 2 is a cross-sectional view on the line II—II of Fig. 1 looking in the direction of the arrows. Fig. 3 is a sectional view on the line III of Fig. 2; and Fig. 4 is a view showing in side elevation part of the structure shown in Fig. 3.

Similar reference characters refer to similar parts in each of the several views.

Referring particularly to Figs. 1 and 2, the reference character 1 designates an inclosing box, to which a cover 2 is secured by means of hinges 3.

Mounted in suitable bearings 6, 6 in the box 1 is a shaft 4, which, as here shown, is of circular cross-section throughout its length. Fixed to one end of the shaft 4 outside of the box 1 is a crank 5 by means of which this shaft may be oscillated. The crank 5 may be operated by any desired means such for example as by the movable rails of a railway switch.

Two cleats 8, 8 are arranged vertically on opposite inside walls of the box near one end, and are secured to the walls by rivets 9.

Bridged across the box from one cleat 8 to the other is a block 7 of insulating material which is secured to the cleats 8 by means of bolts 10. This block 7 serves as a terminal board for electrical connections, and also as a support upon which are mounted certain parts of the circuit controller as will hereinafter appear.

Mounted in the block 7 are a plurality of terminal posts 11, 12 and 13 each comprising as usual a machine screw passing through a hole in the block and one or more nuts on the screw. The head of each post 11 serves to hold in place a U-shaped member 15, 15ª, etc., the block 7 being channeled to receive one leg of each of these members so that the member is prevented from turning. To the inner face of the other leg of each of these members is riveted a contact finger 16, 16ª, etc., which fingers project upwardly and are adapted to engage with contacts 18, 18ª, etc., or with contacts 19, 19ª, etc. Each contact 18, 18ª, etc., is mounted on the block 7 and is secured thereto by the head of one of the terminal posts 12. Each contact 19, 19ª, etc., is riveted to one leg of another U-shaped member 20, 20ª, etc., whose other leg fits into a suitable channel in the block 7 and is held in place by the head of one of the posts 13.

Mounted in suitable holes in the block 7 near its bottom are bolts 14, the head of each of which holds in place a forked bracket 21, 21ª, etc., the arms of which extend outwardly under the contact springs. Riveted in the arms of each of these brackets is a shaft 22 upon each of which is trunnioned a pair of rocker arms 24, 25; 24ª, 25ª, etc. These arms are curved as shown in Fig. 2, and the two arms of each pair are united near their ends by pins 26 and 27 riveted in the arms.

Mounted to rotate on the pins 26 and 27 are rollers 28, 60, which rollers are engaged by cams as hereinafter explained to rock the arms. The arms 24, 25 are held in proper alinement at the shaft 22 by a collar 23 on the shaft fitting between the two arms.

The upper ends of the arms 24, 25 of each pair are offset slightly toward each other and are provided with holes through which passes a pin 30. Mounted on each end of this pin outside of the arms 24, 25, are links 31, 32; 31ª, 32ª, etc., of insulating material. These links are held on the pins by means of cotter pins passing through the pins outside of the links. The other ends of the links 31, 32 of each pair are provided with holes through which pass the reduced and rounded ends of a square block 33, 33ª, etc., the links being held on the ends of the block by cotter pins. Each block 33 is riveted to the corresponding contact finger 16. It will be seen, therefore, that rocking movements of each pair of rocker arms 24, 25, will cause reciprocation of the corresponding contact finger 16 between its contacts 18 and 19. These rocking movements

are caused by cams operated by the shaft 4 as I will now explain.

Mounted on the shaft 4 are a plurality of crank arms 35, 35ª, etc., which arms are attached to the shaft by pins 34. One such crank arm is provided for each contact finger 16. The hub of each crank arm is turned down on each side to form a bearing on which is mounted a segment having a cam face adapted to coöperate with the rollers 28 and 60. As here shown, each crank arm carries two segments 59, 61; 59ª, 61ª, etc., which segments may be angularly adjusted with relation to the crank arm and may be locked in adjusted position by means hereinafter explained. The peripheries of these segments constitute cam faces, segment 59 having a swell 62, and segment 61 having a swell 63; swell 63 is higher, that is, it is at a greater radius from the center of shaft 4, than swell 62. The lower roller 60 is formed with two sections of different diameters, the section of greater diameter coöperating with the lower cam swell 62, and the section of lesser diameter coöperating with the higher cam swell 63. The length of each cam swell is such that as one roller rides onto the swell at one end, the other roller rides off at the other end.

The operation of the circuit controller is as follows: When the parts are in the positions shown in Fig. 2, the swell 62 on segment 59 bears on the larger section of roller 60, and roller 28 bears on the lower part of the cam face on the same segment, so that the rocker arms 24, 25 are locked in such position that contact finger 16 engages contact 19. When now the shaft 4 is rotated clockwise, as viewed in Fig. 2 (that is, when crank 5 is moved toward the left), the large diameter of roller 60 rides off from swell 62, and at the same time roller 28 rides onto the other end of this swell; also at the same time the small diameter of roller 60 comes into engagement with swell 63 but is not moved thereby. The movement of the rocker arms 24, 25 caused by the riding of roller 28 onto swell 62 is sufficient to move the contact finger 16 to a point midway between the contacts 18 and 19. The contact finger and rocker arms are positively locked in this position by the engagement of roller 28 with swell 62 and by the engagement of the small diameter of roller 60 with swell 63. When now the rotation of shaft 4 is continued in the same direction as before, the small diameter of roller 60 rides off from swell 63 at the same time that roller 28 rides onto the other end of this swell. The movement thus given to rocker arms 24 and 25, causes spring 16 to move into engagement with contact 18 where it is positively locked by the engagement of roller 28 with cam 63.

It will be seen from the foregoing that the contact finger 16 when in any one of its three positions is positively locked in such position by the cams.

Referring now particularly to Figs. 3 and 4, the means which I have here shown for angularly adjusting the segments 59 and 61 relative to the shaft 4 and for locking them in adjusted position is as follows. Each segment 59 and 61 is provided with an arcuate slot 39, one face of which is provided with gear teeth to form a rack 40. Passing through the slot 39 in each segment and also through a hole 41 in the crank arm 35 is a bolt comprising a shank 42ª, a thin square head 64, and a nut 44. This bolt holds in place two members each comprising a pinion 65 integral with a washer 65ᵇ. The washer portion 65ᵇ of each of these members is hexagonal in shape to receive a wrench, and is provided with a square countersink to receive the square head 64. It will be seen that the head 64 and the adjacent washer 65ᵇ and pinion 65 are in effect one integral member. Interposed between the nut 44 and the adjacent washer 65ᵇ is a lock washer 45, the diameter of which is less than the diameter of the faces of washer 65ᵇ which bear against segments 59 and 61.

It will be seen that the segments 59 and 61 can be independently angularly adjusted relatively to the shaft 4 by loosening nut 44, turning washers 65ᵇ separately with a wrench, and again tightening nut 44. During the process of tightening nut 44, the pinions 65 will not turn because the friction between each washer 65ᵇ and the corresponding segment face is greater than the friction between nut 44 and washer 45 and between washer 45 and adjacent washer 65ᵇ.

By virtue of the means for angularly adjusting the segments with relation to each other and to the shaft 4, each operation of the contact 16 may be caused to occur at any desired position of the operating arm 5. The adjustment may if desired be made such that the two cams 62 and 63 are coincident, thereby providing for only two positions of the contact finger 16.

The edges of the inside surface of the cover 2 are provided with a groove in which is located a gasket 46 which, when the cover is closed, engages the upper edges of the box, thereby rendering the box substantially watertight and dirt tight. The cover is held closed by means of a bolt 51 provided with a T head, which head fits in slots 52 in the base of box 1. The upper end of bolt 51 is threaded to accommodate a nut 53 which screws down against ears 54 on the cover 2, thereby closing the cover tightly against the box. Pivoted to the nut 53 is a hasp 55 which is bifurcated to straddle a tongue 57 on the bolt 51. This tongue is provided with a hole 56 which accommodates a pad lock (not shown) by means of which the cover 2 may be locked in the closed position.

In order to permit wires or cables to enter the box 1 for connection with the terminal posts 11, 12, and 13, I provide holes 49, one in each side of the box. One or the other of these holes when not in use may be covered by a plate 48 secured to the box by screws 50. The wires entering the box are preferably protected by a cover 47 which is also secured to the box by screws 50 and which is adapted to fit tightly over a "bootleg" through which wires are usually led up to the box.

Although I have herein shown and described only two forms of circuit controller embodying my invention, it is understood that various changes and modifications may be made therein within the scope of the appended claims without departing from the spirit and scope of my invention.

Having thus described my invention, what I claim is:

1. A circuit controller comprising an electrical contact device adapted to have three controlling positions, a rocker arm operatively connected with said device, two rollers carried by said rocker arm, one on each side of the pivotal point of the arm, one of said rollers having two sections of different diameters, a shaft adapted to oscillate, two cams carried by said shaft at different radii from the center thereof, one of which cams co-acts with said rollers to move the contact device to two of its controlling positions, and the other of which cams co-acts with one of said rollers to move the contact device to its third controlling position.

2. A circuit controller comprising an electrical contact device adapted to have three controlling positions, a rocker arm operatively connected with said device, two cam-engaging members carried by said rocker arm, one on each side of the pivotal point of the arm, one of said members having two sections of different heights, a shaft adapted to oscillate, two cams carried by said shaft at different radii from the center thereof, one of which cams co-acts with one section of the double member and with the other roller, and the other of which cams co-acts with the other section of the double member and with the said other roller, each of said cams being of such length that as one member rides up on one end of the cam the other member rides off from the other end of the cam.

3. A circuit controller comprising an electrical contact device adapted to have three controlling positions, a rocker arm operatively connected with said device, two cam-engaging members carried by said rocker arm, one on each side of the pivotal point of the arm, one of said members having two sections of different height, a shaft adapted to oscillate, two cams carried by said shaft at different radii from the center thereof, one of which cams co-acts with one section of the double member and with the other roller, and the other of which cams co-acts with the other section of the double member and with the said other member, and means for angularly adjusting said cams on the shaft relative to each other and to the shaft.

4. A circuit controller comprising an electrical contact device adapted to have three controlling positions, a rocker arm operatively connected with said device, two rollers carried by said rocker arm, one on each side of the pivotal point of the arm, one of said rollers having two sections of different diameters, a shaft adapted to oscillate, two cams carried by said shaft at different radii from the center thereof, the cam of smaller radius being adapted to co-act with the larger section of the double roller to move the contact device to and lock it in one extreme position and to co-act with the other roller to move the contact device to an intermediate position, the cam of larger radius being adapted to co-act with the smaller section of the double roller to lock the contact device in said intermediate position and to co-act with the said other roller to move the contact device to and hold it in the other extreme position.

5. A circuit controller comprising a contact device adapted to have a middle position and two extreme positions, a rocker arm operatively connected with said device and having two cam-engaging members located respectively on opposite sides of the point about which the arm rocks, one of said members comprising two sections of different height, a shaft adapted to be oscillated, and two cams carried by said shaft at different radii from the center thereof, one of which cams engages one section of the double cam-engaging members and the other cam-engaging member to move the contact device from its middle position to one extreme position and back to its middle position, and the other of which cams engages with the single-section member and the other section of the double member to move the contact device from the middle position to its other extreme position and back to its middle position.

In testimony whereof I affix my signature in presence of two witnesses.

ARTHUR C. LIVERMORE.

Witnesses:
CHARLES B. GRACEY,
G. HERMAN WEGNER.

Correction in Letters Patent No. 1,126,043.

It is hereby certified that in Letters Patent No. 1,126,043, granted January 26, 1915, upon the application of Arthur C. Livermore, of Edgewood Borough, Pennsylvania, for an improvement in "Circuit-Controllers," an error appears in the printed specification requiring correction as follows: Page 3, lines 48, 50, and 67, for the word "roller" read *member;* and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 23rd day of February, A. D., 1915.

[SEAL.]

J. T. NEWTON,

Acting Commissioner of Patents.