A. BEVAN.

CIRCUIT CONTROLLER.

APPLICATION FILED SEPT. 16, 1907.

900,699.

Patented Oct. 13, 1908.

2 SHEETS—SHEET 1.

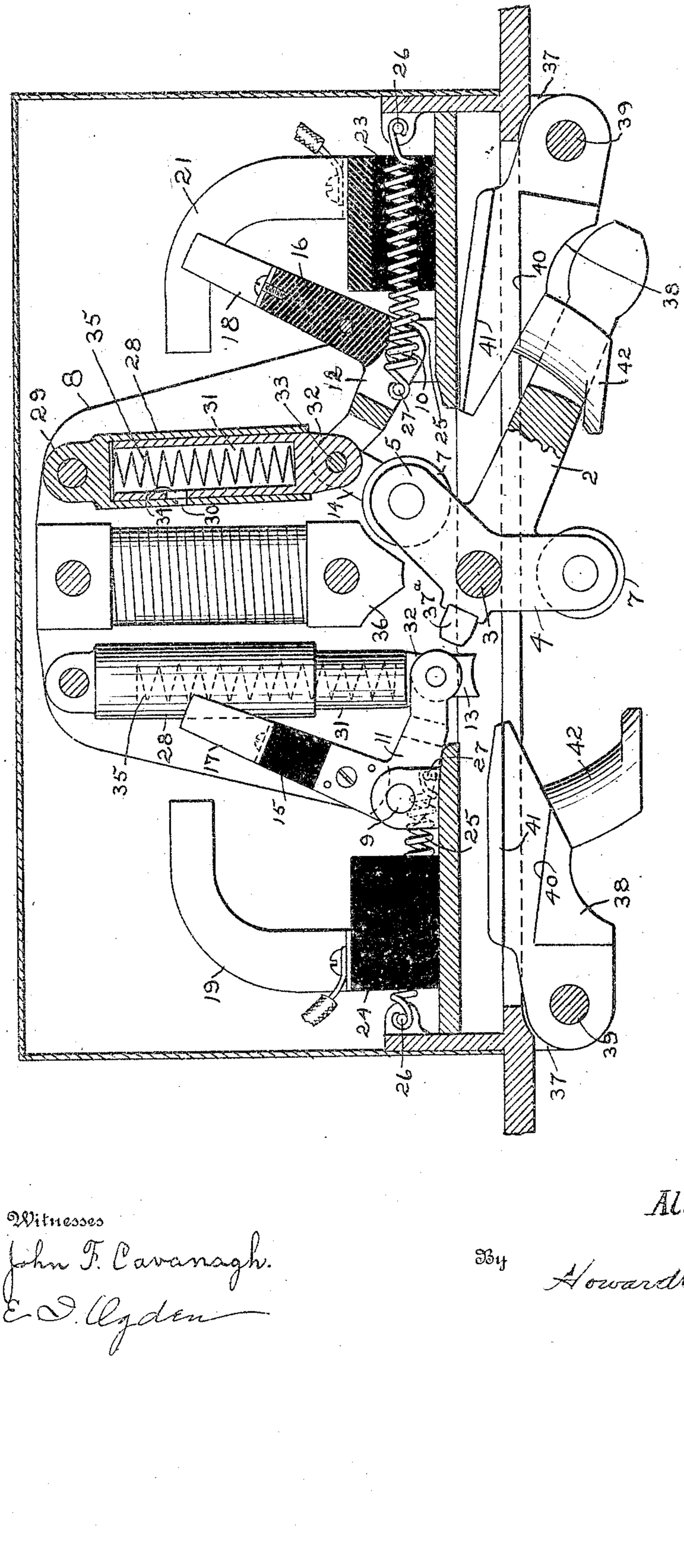

Fig. 1

Witnesses

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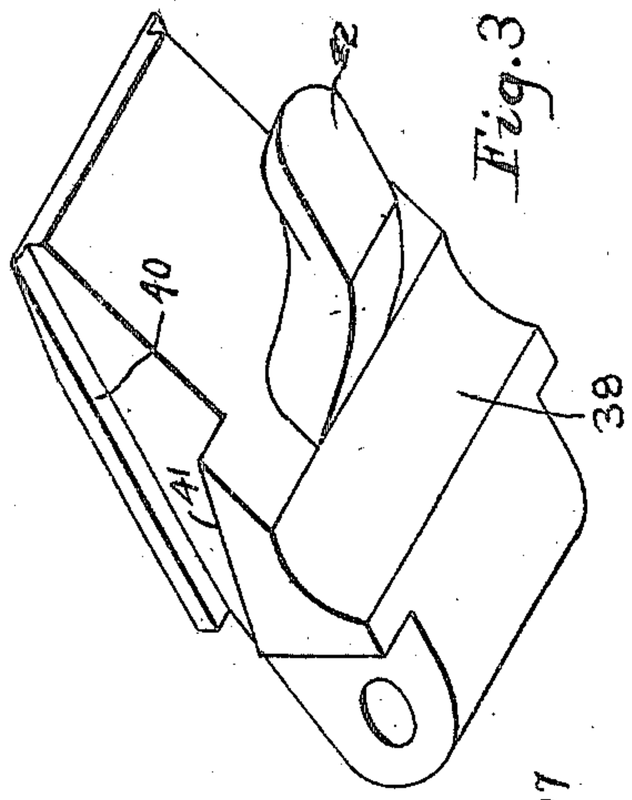

Fig. 3

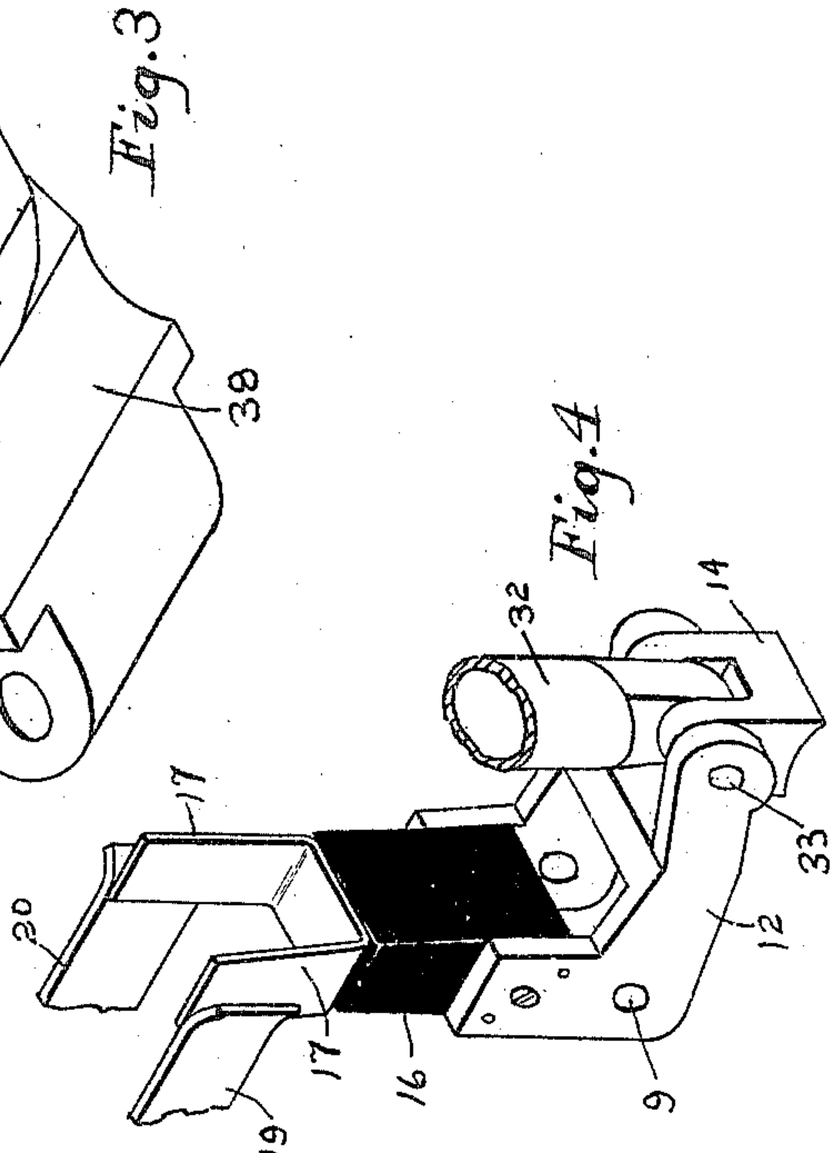

Fig. 4

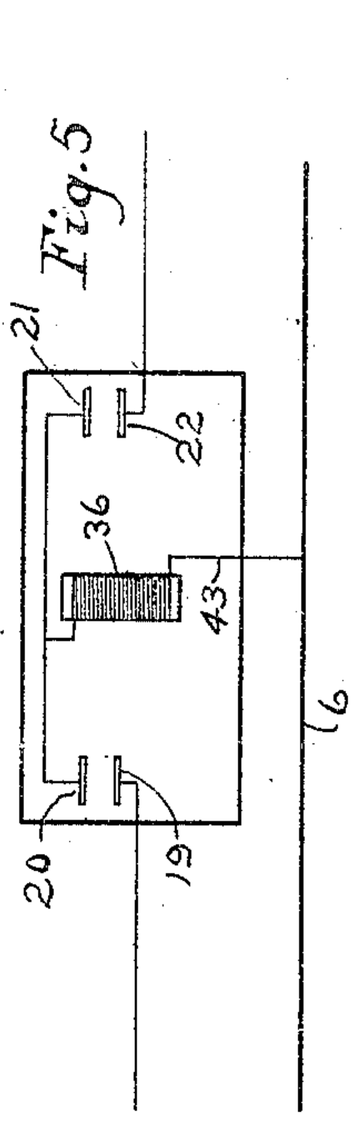

Fig. 5

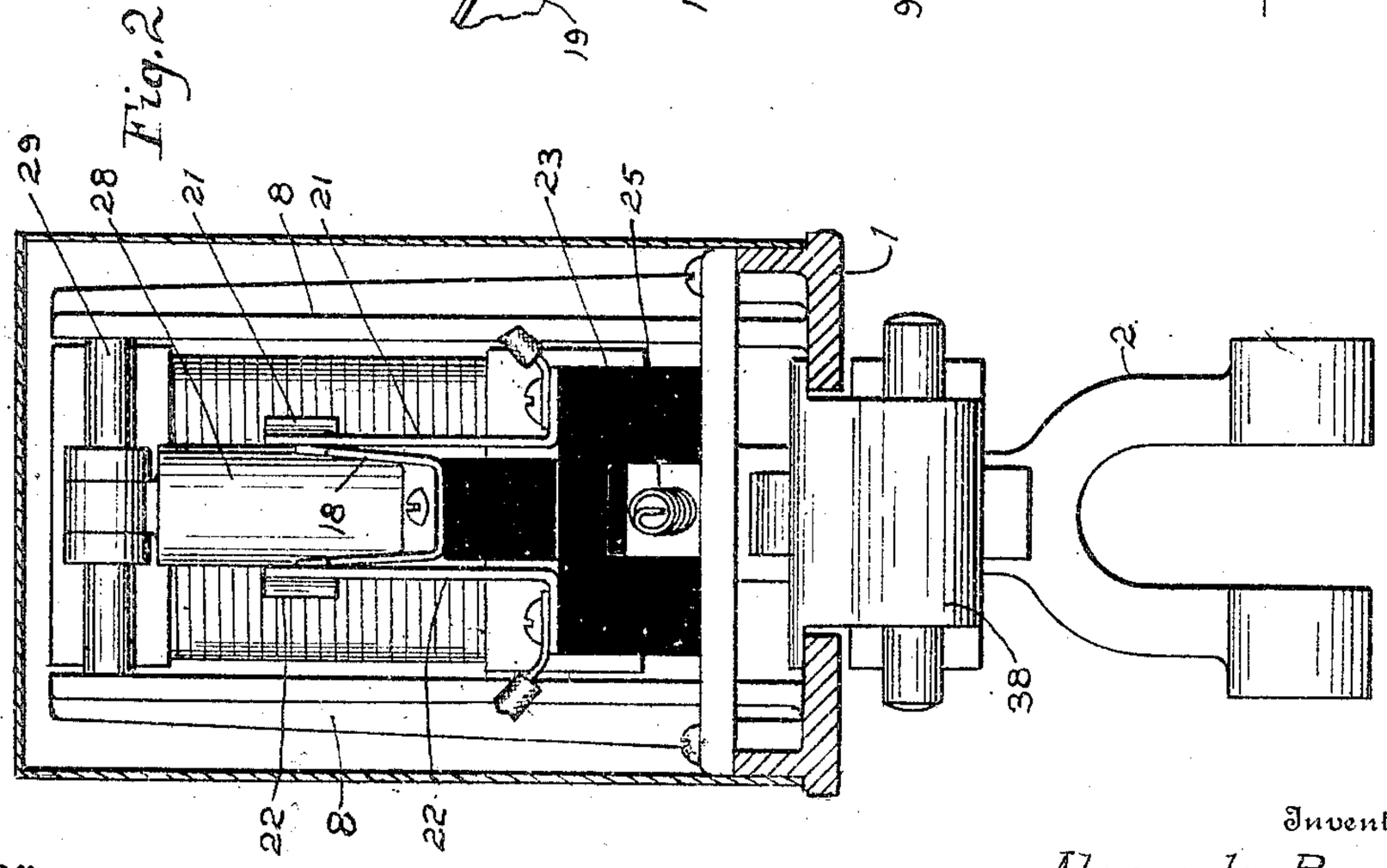

Fig. 2.

Witnesses

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UNITED STATES PATENT OFFICE.

ALEXANDER BEVAN, OF PROVIDENCE, RHODE ISLAND.

CIRCUIT-CONTROLLER.

No. 900,699. Specification of Letters Patent. Patented Oct. 13, 1908.

Application filed September 16, 1907. Serial No. 393,005.

To all whom it may concern:

Be it known that I, ALEXANDER BEVAN, a citizen of the United States, residing at the city of Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Circuit-Controllers, of which the following is a specification, reference being had therein to the accompanying drawing.

The object of the present invention is to provide a reliable and effective circuit controller of simple and durable construction for use primarily in operating electric railway signals, and of such design as to be readily adaptable for use either to control a single circuit, or to control two separate circuits.

To this end the device consists essentially of a centrally located actuating lever, with a suitably controlled circuit closer on either side of the same, each circuit closer being arranged to be operated independently to bridge one of two pairs of terminals according to which way the lever is moved.

With this arrangement the circuit controller may be used to control two distinct and separate circuits according as the actuating lever is moved in one direction or the other, or by electrically connecting one of the terminals in one of the circuits with the corresponding terminal in the other circuit the same circuit may be controlled whichever way the lever is moved, or still further, by omitting one of the duplicate sets of circuit closers but one circuit can be operated, and that only when the lever is moved in a given direction; hence this circuit controller can be readily adapted for use on the turnouts or sidings where the cars may be made to operate the same going always in the same direction, or it is equally well suited for use on the main line where the cars going in one direction will operate to set the signals, and going in the other direction will operate to clear the signals.

Circuit controllers of this class have heretofore proved fairly satisfactory only when operated at slow or moderate speeds, but have uniformly proved unreliable when operated for any considerable length of time at high rates of speed. The chief causes of failure to meet the requirements under these conditions have been:—first, the occasional rebound of the actuating lever after being struck by the rapidly moving trolley wheel, thus closing a second circuit on the opposite side; second, lack of durability, owing to the severe blows and strains to which the working parts are subjected; and third, the throwing of the trolley wheel from the wire. The device herein described is designed to overcome these defects, and includes as its working elements a central actuating lever, two pairs of insulated terminals, two insulated circuit closers for bridging said pairs of terminals, two inertia bumpers to absorb the momentum of the actuating lever and prevent rebound, a centrally located magnet to arrest the return motion of the lever when it reaches the normal or vertical position, and means for maintaining the circuit closed for a sufficient length of time to insure adequate operation of the signals.

It is thought that the two features of absorbing the forward motion and magnetically arresting the return motion of the actuating lever are entirely novel, as well as the method of controlling the circuit closer.

These and other features are illustrated in the accompanying drawings, and will be fully described and explained in the following specifications, and then pointed out in the appended claims.

Like characters designate corresponding parts in all the views.

Figure 1—is a side elevation with some of the parts in section to better illustrate the operation of the mechanism. Fig. 2—is an end elevation showing the casing and part of the frame in section. Fig. 3—is a perspective view showing the underside of the inertia bumper. Fig. 4—is a perspective view of the contact arm. Fig. 5—is a diagrammatic view showing the wiring of the circuit closer.

Referring to the drawings, at 1 is a suitable base which serves as a support for all the working parts, said base being mounted on or connected to the trolley wire in any suitable manner. Suspended midway of the base on an axis 3 is the actuating lever, which consists of the pendant or power-arm 2 and two side or load-arms 4 and 5. The lower end of this lever is forked to straddle the trolley wire 6, each load-arm consisting preferably of a pair of projecting lugs between which a contact roller 7 is mounted, although each load-arm may consist of a single projecting arm, omitting the roller.

On the sides of the base 1 are the upright standards 8—8 which form the supports for the air-chambers and checking magnet hereinafter described. Pivotally mount-

ed at 9 and 10 on either side of the actuating lever are two pairs of knee-levers 11 and 12, each pair of levers being joined together by a connecting bar and operatively related to its corresponding load-arm 4 or 5. Swinging pendants 13 and 14 are pivotally hung from said pairs of knee-levers to normally rest in contact with their respective rolls 7. Between the upward extensions of both pairs of knee-levers 11 and 12 are secured blocks of insulating material 15 and 16, which blocks carry the spring circuit closers 17 and 18. Two pairs of spring terminals 19—20, and 21—22 are mounted on the insulating supports 23 and 24, between which terminals the said circuit closers are thrown to close one or the other of the signal circuits each time the actuating lever is operated by a passing car.

A spiral restoring spring 25 is attached at one end to each of these knee levers at 27, and at its other end to the fixed point 26 in the frame, the function of these springs being to withdraw the circuit closer from between its corresponding circuit terminals, and thus open the circuit. The points 26 and 27 are so chosen that when the circuit closer has reached its limit of forward motion the movable point 27 and the fixed point 26 will be on opposite sides of the axis 9, and the heel of the insulating block 16 will have been moved backward and downward causing the spring 25 to assume a bent position in a line below the center of the pivoting point, as shown at the right of Fig. 1, so as to insure a slight restoring action by said spring even when the lever is in its extreme forward position. The downward pressure thus exerted by the heel of block 16 on springs 25 will be sufficient to start the point 27 downward and away from the dead center line, after which the tension of said spring will complete the return of the circuit closer to normal or open position. This arrangement will produce a slow motion of the circuit closer in the early part of its return movement, thus allowing sufficient time in which to operate the signals included in the circuit, but by the time said circuit closer has reached the ends of the terminals 21, 22, the point 27 will have moved so far out of line with the axis 10 that the tension of spring 25 will be sufficient to produce a quick break in the circuit.

To further regulate the return movement of the circuit closers an air chamber may be arranged to be operated in connection with each of the levers 11 and 12, if desired. Each air chamber consists essentially of two tubes each closed at one end, one of which telescopes within the other. The outer tube 28 is pivoted to swing on an axis 29 and is provided with an air vent 30, while the inner tube 31 is provided with an extension ear 32 through which passes the pivoting pin 33, thus connecting said inner tube with the outwardly extending end of the knee lever 12. At 34 is a slot through the wall of the tube 31, said slot being so located as to pass over the vent 30, during the movement of said inner tube. An open spiral spring 35 extends nearly the entire distance between the heads of the air chambers when said air chambers are fully extended, as shown in dotted line at the left of Fig. 1. At 36 is an electro-magnet rigidly supported between the standards 8—8. Opposite the lower pole of this magnet is an armature 37ª which is securely mounted in the upper end of the actuating lever 2, or the entire lever may be made of magnetic material if preferred.

On the underside of the base 1, and near its ends are two pairs of ears 37, between each pair of which is pivoted an inertia bumper 38, on an axis 39. Suitable extensions forming stop flanges 40 and 41 are provided to limit both the upward and downward motion of these bumpers, and retain them in proper position to effectively receive and absorb the blow from the actuating lever, and a downwardly extending finger 42 is also provided to hook and lock beneath the actuating lever as it is forced rapidly to one side and effectively prevent a quick rebound of the same.

The operation of the device may be more fully described as follows: When the lever 2 is moved to one side, as shown in Fig. 1, the roller 7 acting on pendant 14 forces the lever 12 upward and thus throws the circuit closer 18 between the spring terminals 21 and 22, thereby closing one of the signal circuits. This movement carries the point 27 farther away from the point 26, thus increasing the tension of the spiral spring 25, and at the same time forces the inner tube 31 within its outer tube 28, and compresses the spiral spring 35. Both spiral springs 25 and 35 will now act to restore the circuit closer to normal, the former acting slowly at first, but both of said springs will be modified and controlled in their restoring action by the inner tube 31, which will move back without any checking effect until the upper edge of the slot 34 has reached the lower edge of the vent 30, when all the mechanism connected with the circuit closer will be retarded until the upper end of the inner tube comes opposite the vent 30. From this point all the parts will move freely to normal, and as the movement of the inner tube is timed to reach this point at the same time that the circuit closer leaves the circuit terminals, a quick break in the circuit is doubly assured.

It will now be noted that the time of contact is practically limited to the time required for the tube 31 to move back over the distance between the top of said tube and the upper edge of the slot in its wall, and this distance may be readily changed to meet varying requirements. This construction thus affords a two-fold control over the time of

contact and insures a quick break in the circuit without the use of unreliable valves.

The winding of magnet 36 is connected on one side to the trolley wire through the base 1, which connection is illustrated in Fig. 5 by line 43, and on the other side to both terminals 20 and 21, so that said magnet winding is included in either of the circuits closed by the movement of the lever 2, hence when said lever swings back to the vertical position after being operated by the trolley wheel the armature 37ª will be attracted by the pole of magnet 36 and said lever will be prevented from further movement in either direction until the controlling mechanism has returned to break the circuit as previously explained. The main reliance, however, for the prevention of derangement of the signaling system because of rebound when cars operate the actuating lever at high rates of speed, is the inertia bumper 38, whose mass is approximately equal to that of the said lever, and which is arranged to yield and has a limited upward motion on its axis 39. When the actuating lever is thrown violently to one side by the blow from a rapidly moving trolley wheel its motion will be absorbed or taken up by the bumper 38 in accordance with the well known laws of momentum, so that after striking the bumper said lever will drop back by gravity to its normal position, where it will be checked from further motion by magnet 36 as above described. It will be further noted that when the stop bumper 38 is thrown upward by the blow from lever 2 the forward portion of the curved finger 42 will be carried under the crotch of the said lever preventing the same from being suddenly thrown back by elastic reaction upon striking the bumper.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. A circuit controller comprising an actuating lever, a circuit terminal, a circuit closer, means whereby the movement of said lever causes said closer to engage said terminal and complete a circuit, and means for absorbing the excess momentum of said lever at the end of its effective stroke.

2. A circuit controller comprising an actuating lever, a circuit terminal, an insulated circuit closer, means whereby the movement of said lever will cause said closer to engage said terminal and complete a circuit, and yielding means for absorbing the excess momentum of said lever at the end of its effective stroke.

3. A circuit controller comprising an actuating lever, a circuit terminal, an insulated circuit closer, means whereby the movement of said lever causes said closer to engage said terminal and complete a circuit, means adapted to yield when said lever is thrown violently against the same, and means on said yielding means for engaging said lever to prevent a rebound of the same.

4. A circuit controller comprising an actuating lever, a circuit terminal on either side of said lever, an insulated circuit closer for each terminal, means whereby a movement of said lever will cause one of said closers to engage its terminal and complete a circuit, and means for absorbing the excess momentum of said lever at the end of its effective stroke when thrown in either direction.

5. In a circuit controller, an actuating lever, an insulated circuit closer operated through the movement of said lever, an inertia bumper arranged to yield and absorb the excess motion of said lever when struck by the same whereby rebound is prevented.

6. A circuit controller comprising an actuating lever, a circuit terminal, an insulated circuit closer, means whereby said closer is moved by said lever to engage said terminal to complete the circuit, and electro-magnetic means for positioning said lever.

7. In a circuit controller, an actuating lever, an insulated circuit closer operated to complete the circuit through the movemen of said lever, and electro-mangetic means fo preventing said lever from swinging past the vertical on its return from its operative movement.

8. A circuit controller comprising an actuating lever, a circuit terminal, an insulated circuit closer, means whereby the movement of said lever will cause said closer to engage said terminal and complete a circuit, means for absorbing the momentum of said lever and electro-magnetic means for arresting the return motion of said lever in its normal position.

9. In a circuit controller, an actuating lever, an insulated circuit closer operated through the movement of said lever, an inertia bumper arranged to absorb the motion of said lever when struck by the same, and electro-magnetic means for preventing said lever from swinging past the vertical on its return from its operative movement.

10. In a circuit controller, an actuating lever, two insulated circuit closers adapted to be operated independently by the movement of said lever, inertia bumpers arranged one on either side of said lever to absorb the excess motion of the same, whereby rebound is prevented.

11. In a circuit controller, an actuating lever, two insulated circuit closers adapted to be operated independently by the movement of said lever, one or more inertia bumpers arranged on either side of said lever to absorb the motion of the same, and electro-magnetic means whereby said lever may be prevented from swinging past the vertical on its return from its operative movement in either direction.

12. A circuit controller, comprising an actuating lever, an insulated circuit closer operated by the movement of said lever, a yieldable bumper, and means on said bumper adapted to engage said actuating lever and prevent a re-bound of the same.

13. In a circuit controller, an actuating lever, an insulated circuit closer operated by the movement of said lever, an inertia bumper, a curved finger on the underside of said bumper adapted to be moved under the crotch of said actuating lever whenever the said inertia bumper is thrown upward by a blow from said lever, whereby the quick return motion of said actuating lever will be arrested.

14. A circuit controller comprising an actuating lever, a circuit terminal, an insulated circuit closer, means whereby the movement of said lever will cause said closer to engage said terminal and complete a circuit, a time regulator for controlling the duration of contact, means for absorbing the momentum of said lever and electro-magnetic means to act on said lever to prevent the same from swinging back past its normal position.

15. In a circuit controller, an actuating lever having two symmetrically disposed load arms, two insulated circuit closers adapted to be operated independently by the said load arms, two inertia bumpers arranged one on either side to absorb the motion of the said lever when struck by the same whereby rebound is prevented.

16. In a circuit controller, an actuating lever, an insulated circuit closer, a restoring spring for said circuit closer, said restoring spring being attached at one end to a fixed point and at the other end to a point movable to a position on the opposite side of the axis of the circuit closer from the said fixed point, and means for producing a bend in the said restoring spring to prevent action on a dead-center.

17. In a circuit controller, an actuating lever having oppositely disposed load-arms, an insulated circuit closer axially mounted and operatively related to each of said load-arms, a restoring spring for each of said circuit closers, said restoring spring being attached at one end to a fixed point and at the other end to a point movable to a position in a straight line extending from the fixed point through the axis of the circuit closer, and automatic means for causing a bend in the said restoring spring whereby action on a dead center is prevented.

18. In a circuit controller, an actuating lever having two oppositely disposed load-arms, a pivotally hung air-chamber adapted to be operated by each of said load-arms, and an insulated circuit closer regulated in its return movement by the action of each of said air-chambers.

19. In a circuit controller, an actuating lever having two oppositely disposed load-arms carrying pivoted rollers in each, a pivotally hung air chamber adapted to be operated directly by each of said rollers, and an insulated circuit closer regulated in its return movement by the action of each of said air-chambers.

20. In a circuit controller, an actuating lever having two oppositely disposed load-arms, two insulated circuit closers, a time regulator for each of said circuit closers, and means for independently operating said time regulators directly by the said load-arms.

21. In a circuit controller, an actuating lever having oppositely disposed load-arms each carrying a pivoted roller, two pivotally hung outer tubes having a vent hole in each, an inner tube telescoping within each outer tube, each inner tube having a slot so placed that it will pass over the vent hole in the outer tube during its movement within said outer tube, each inner tube being also operated directly by one of said rollers, and an insulated circuit closer regulated in its return motion by the movement of each inner tube.

22. In a circuit controller, an actuating lever, an insulated circuit closer adapted to be operated by said lever, two restoring springs acting on said circuit closer at substantially right angles to each other, one of said springs acting effectively to move said circuit closer during the first part of its return movement, and the other of said springs acting effectively to move said circuit closer during the last part of its return movement, whereby a comparatively slow and uniform return movement is produced.

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

ALEXANDER BEVAN.

Witnesses:

HOWARD E. BARLOW,

E. I. OGDEN.