

E. McCLINTOCK.

RELAY.

APPLICATION FILED APR. 30, 1907.

923,874.

Patented June 8, 1909.

3 SHEETS—SHEET 1.

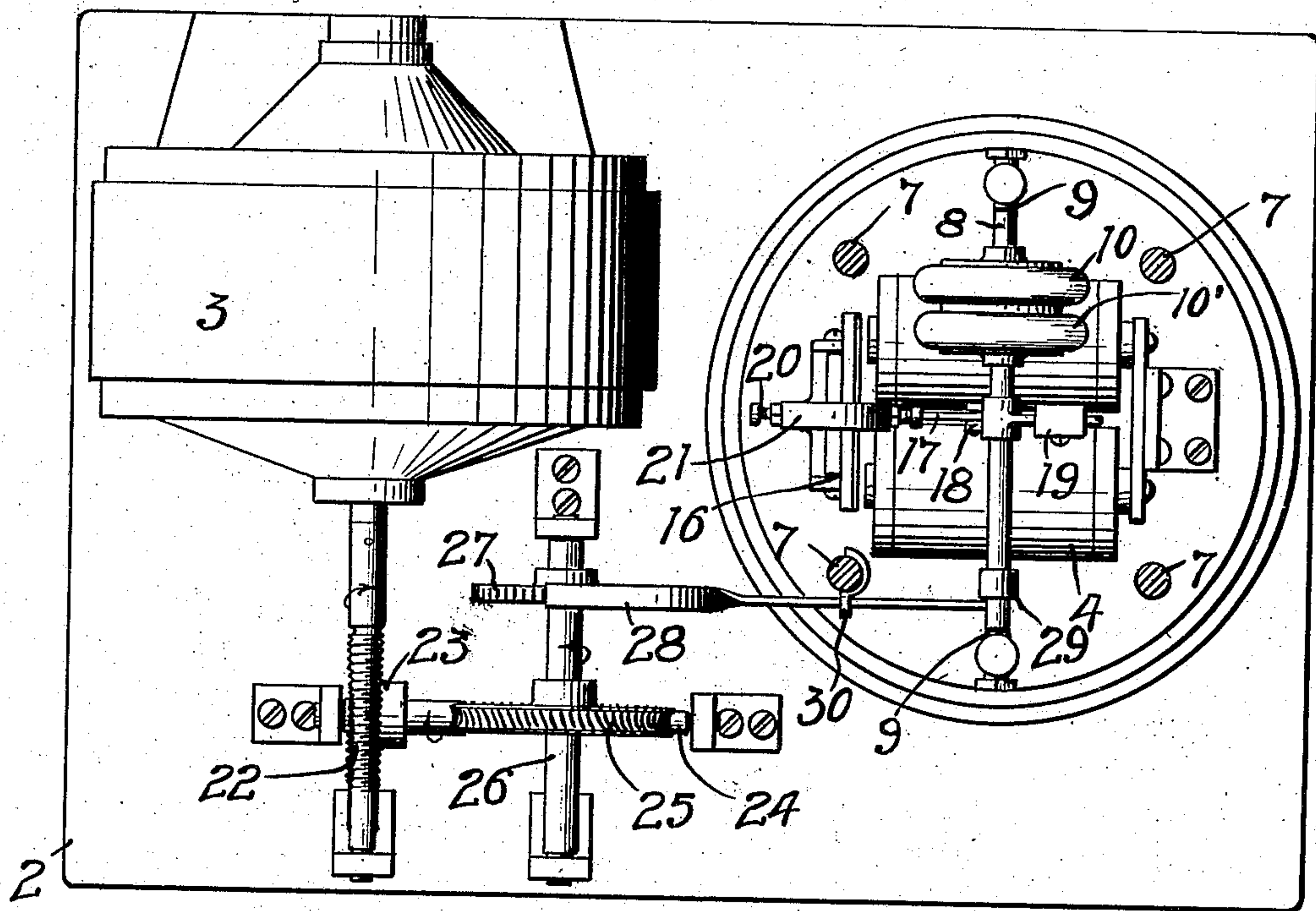


Fig 1.

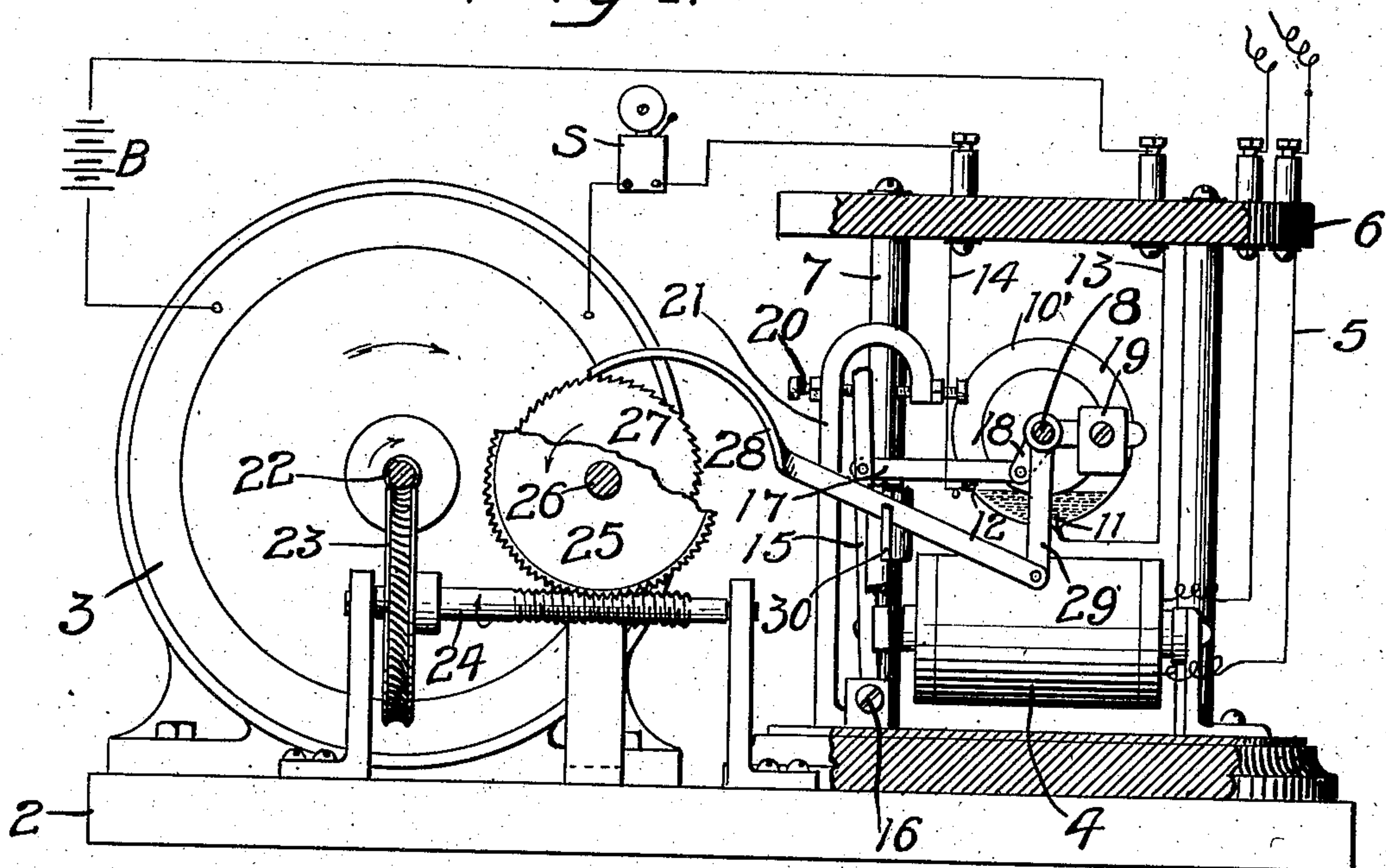


Fig 2.

WITNESSES
A. M. Walston
J. B. Era

INVENTOR
EDWARD McCLINTOCK
BY *Paul Paul*
HIS ATTORNEYS

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3 SHEETS—SHEET 2.

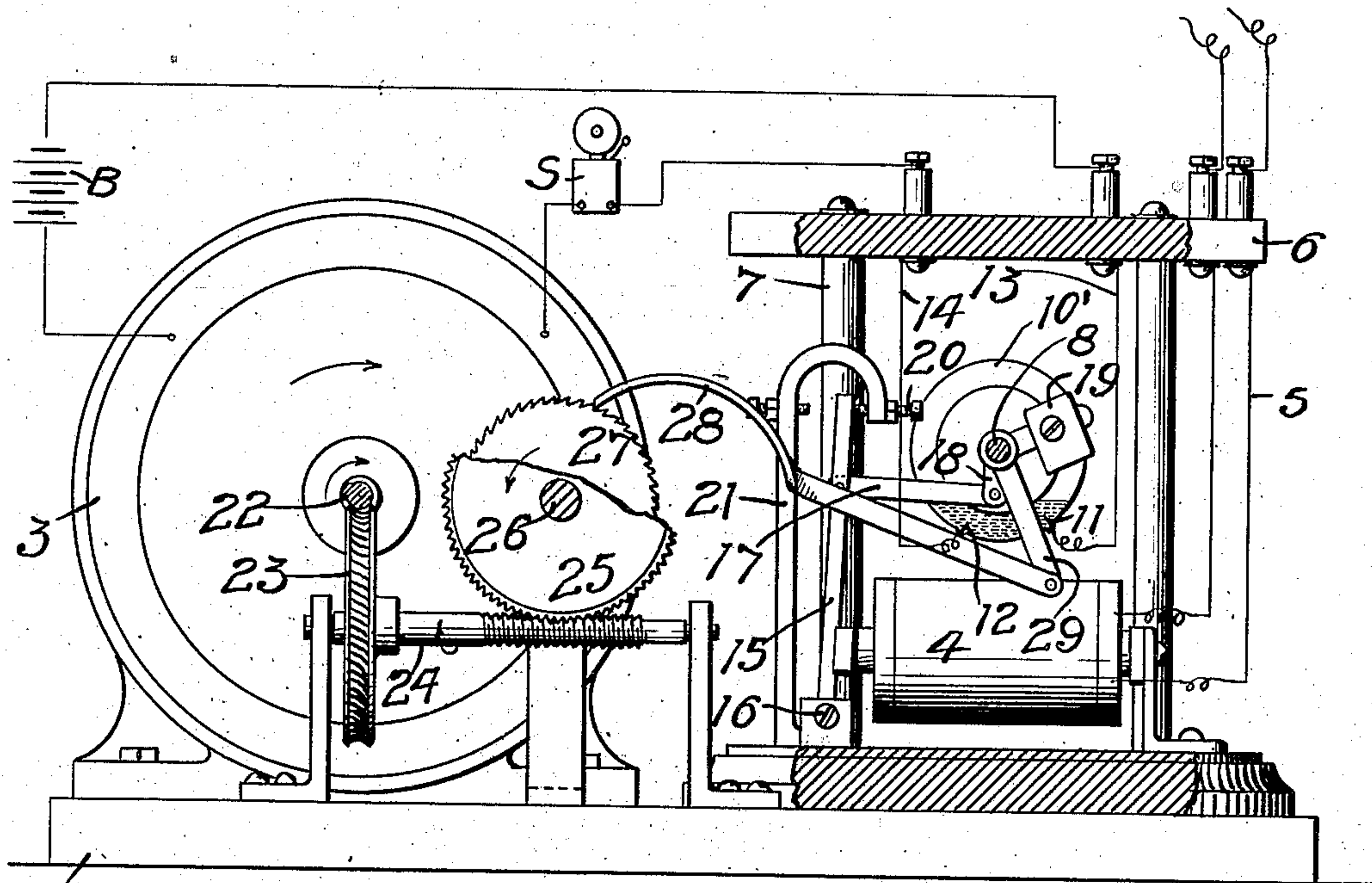


Fig 3.

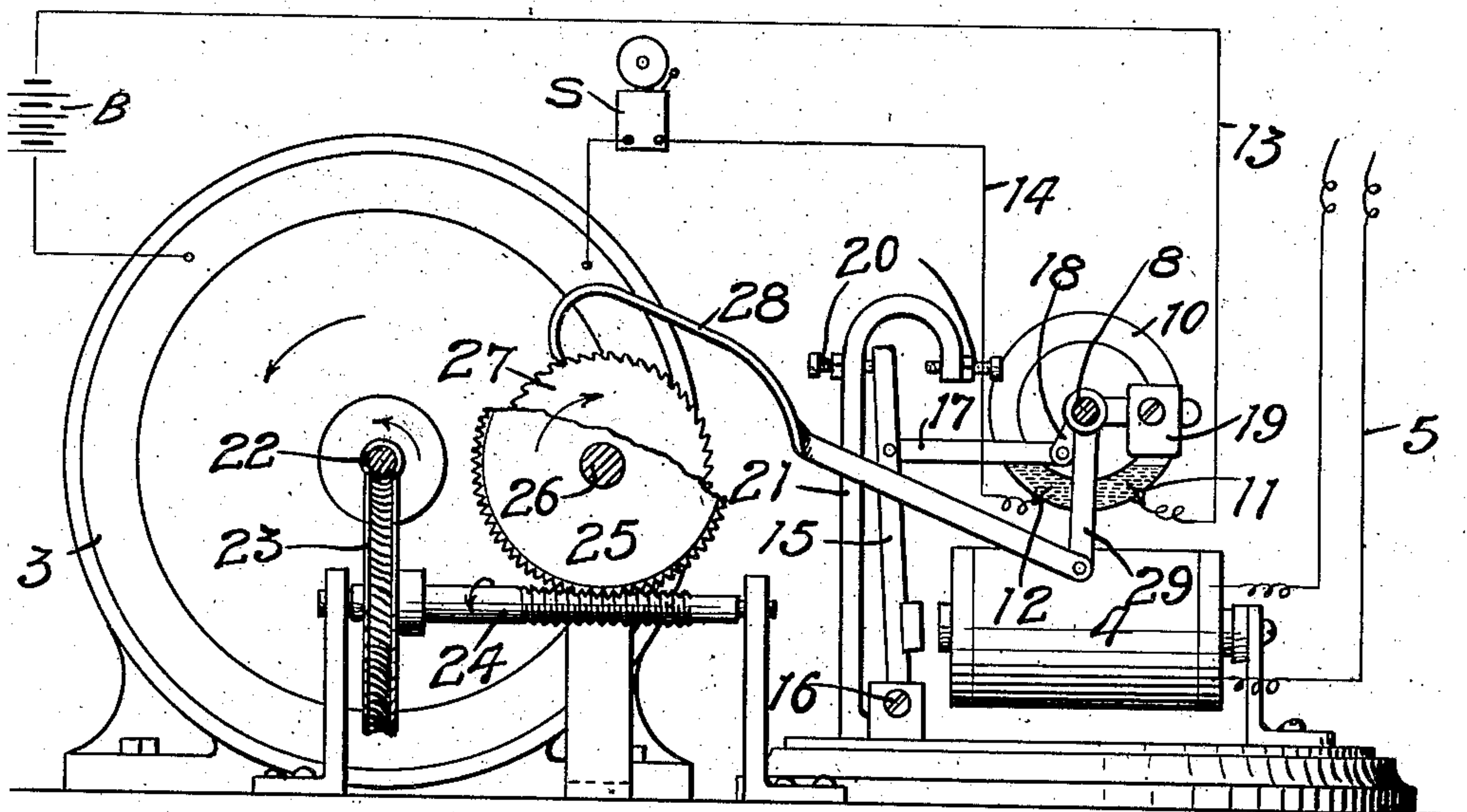


Fig 4.

WITNESSES
W. H. Walstrom
J. B. Era

INVENTOR
EDWARD McCLINTOCK
BY *Paul Paul*
HIS ATTORNEYS

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3 SHEETS—SHEET 3.

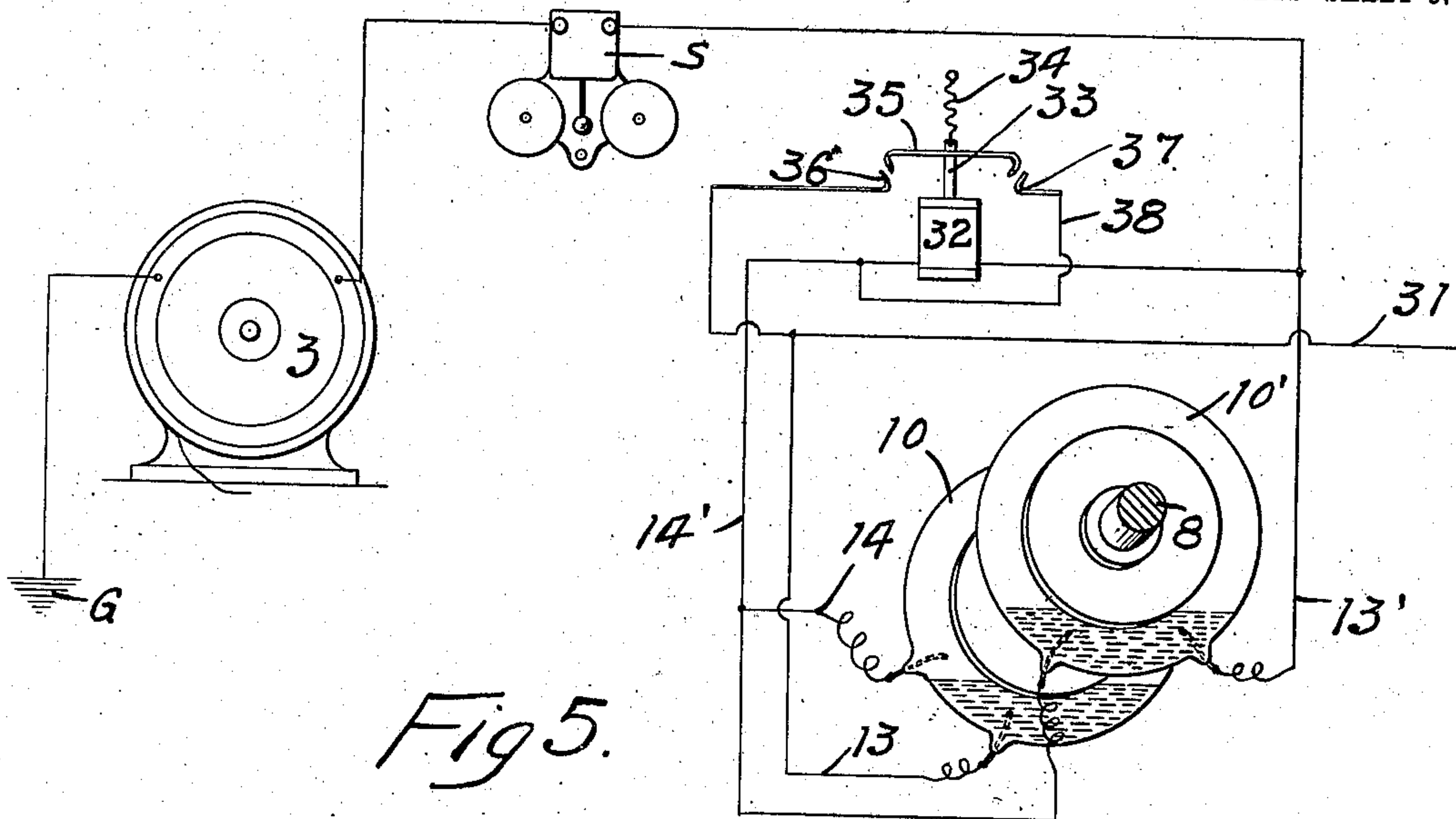


Fig 5.

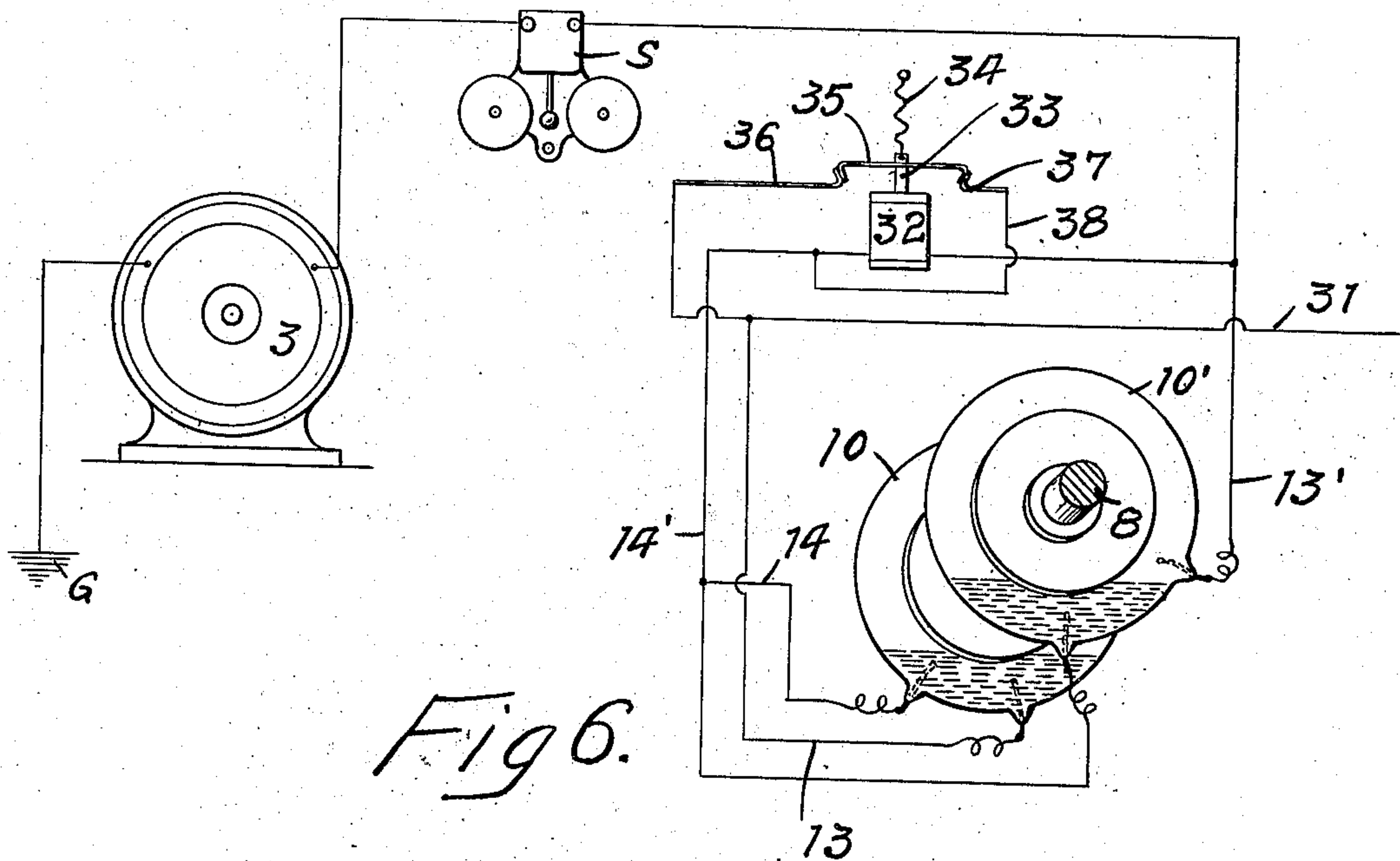


Fig 6.

WITNESSES
M. M. Malstrom
J. B. Era

INVENTOR
EDWARD McCLINTOCK
BY *Paul Paul*
HIS ATTORNEYS

UNITED STATES PATENT OFFICE.

EDWARD McCLINTOCK, OF ST. PAUL, MINNESOTA, ASSIGNOR TO McCLINTOCK
MANUFACTURING COMPANY, OF ST. PAUL, MINNESOTA.

RELAY.

No. 923,874.

Specification of Letters Patent.

Patented June 8, 1909.

Application filed April 30, 1907. Serial No. 371,052.

To all whom it may concern:

Be it known that I, EDWARD McCLINTOCK, of St. Paul, Ramsey county, Minnesota, have invented certain new and useful Improve-
5 ments in Relays, of which the following is a specification.

In the operation of a steam railroad, long sections of the track rails on both sides may be insulated for use in connection with cross-
10 ing and other signals. In an electric railroad, however, this is not permissible, as one side of the track is used for the return current and cannot contain insulated sections. Such sections, therefore, must be located on the
15 same side of the track and are made comparatively short and the signal mechanism must be put in operation while the car is passing over the sections. It is desirable that the signal be operated for a longer period of time
20 than while the car is passing over the insulated rail, and the object of my invention is to provide a device by means of which the signal may be operated for a predetermined period of time after the car has left the insulated rail section or sections, the length of the
25 period being determined by the circumstances and conditions surrounding each application or installation of the device.

The invention consists generally in a relay
30 having circuit closers and a signal circuit and means operated by a motor for actuating said circuit closers and holding them in their closed position for a predetermined period.

Further, the invention consists generally
35 in various constructions and combinations, all as hereinafter described and particularly pointed out in the claims.

In the accompanying drawings, forming part of this specification, Figure 1 is a plan
40 view of a signaling relay embodying my invention. Fig. 2 is a side elevation partially in section, of the same showing the normal position of the relay with the signal circuit open. Fig. 3 is a similar view illustrating
45 the position of the parts when the signal circuit is closed, and showing the means for locking the relay armature and the circuit closers. Fig. 4 illustrates a modification in the device to adapt it for use on a normally
50 closed circuit. Fig. 5 illustrates the application of the device, with the motor mechanism omitted, to a 500 volt current such as is used on street railway lines, showing the position of the parts when the circuit is open through
55 one of the rings. Fig. 6 is a similar view

illustrating another position of the same parts.

In the drawings, 2 represents a suitable base, 3 a motor, 4 a relay in a track circuit 5, the devices for closing this circuit being omit-
60 ted as they form no part of the present invention. A plate 6 is supported above the base 2 upon a series of posts 7. A shaft 8 is supported in suitable bearings 9 and is provided with a series of hollow rings of insulating ma-
65 terial secured on said shaft and containing a quantity of mercury. I have shown in this case two rings represented by numerals 10 and 10', but any desired number of these rings may be provided. 70

Contact points 11 and 12 project into the path of the mercury in the rings and are connected by conductors 13 and 14 and 13' and 14' through a battery B and a signal bell S to the motor 3. Several of these circuits may be
75 provided, one for each contact ring. The armature 15 of the relay is mounted at 16 and is connected by a link 17 with an arm 18 on the shaft 8 carrying a counter weight 19, which normally holds said armature away
80 from the relay. Stop screws 20 are mounted in a standard 21 on each side of the armature and are capable of adjustment for the purpose of limiting the stroke of the armature according to the degree of oscillation de-
85 sired of the circuit closing rings.

The shaft of the motor is provided with a worm 22 meshing with a worm gear 23 mounted on a worm shaft 24 that is arranged substantially at right angles to the motor
90 shaft. A second worm gear 25 engages the worm shaft 24 and is mounted on a shaft 26 parallel with the motor shaft. A ratchet 27 is secured on the shaft 26 and an arm 28 has one end adapted to engage the teeth of said
95 ratchet and is pivotally connected at its opposite end to a lever 29 secured on the shaft 8. A suitable guide 30 for the arm 28 is provided on one of the posts 7.

In operation, the circuit 5 being closed, the
100 relay will be energized and its armature attracted, the shaft 8 rocked and the signal circuits closed through the contact points in the hollow rings. The lever 29 will be swung to-
105 ward the right with the rocking of the shaft 8 and the arm 28 slipping over the teeth of the ratchet will be prevented thereby from returning to its normal position and allowing the counter weight to return the contact
110 rings and the relay armatures to their normal

position when the circuit 5 is broken after the passage of the car over the insulated rail section. The motor will be set in motion and revolved at a high speed and its movement transmitted through the reduction gearing constructed preferably in about the ratio of 10,000 to one, to revolve the ratchet 27 and allow the contact rings to return to their normal position. The operation of the ratchet will be very slow and it will require a considerable period of time for the lever 29 to return to its normal position and the hollow rings to be revolved sufficiently to raise one of the contact points out of the mercury. and during this time the signal will be operated even though the car may have passed off the insulated section of the track. I am thus able to provide for the operation of the signal for a considerable time even though the circuit at the track is but momentarily affected.

In Fig. 4 I have shown a slight modification in the construction of the device to adapt it for use on a closed circuit, the teeth of the ratchet being reversely arranged and the lever 29 being thrown toward the left instead of the right and held in that position by the ratchet until the motor has rotated the ratchet shaft a predetermined distance. In other respects the operation of the device corresponds to the one described.

The period of time during which the circuit will be closed through the hollow rings may be regulated by means of suitable resistance in the armature circuit and by varying the length of the lever 29.

This device is capable of use wherever it is desired to provide means for keeping a signal circuit closed for a predetermined period after the circuit controlling the signal has been opened.

In Fig. 5 which illustrates the normal condition of the parts, a conductor 31 is connected with a trolley wire through a sufficient number of lamps, not shown, to cut down the current to the required voltage for the bell and motor. In this position the solenoid 32 is short circuited through the circuit closing ring 10 and the conductors 13' and 14'. Contact points in the ring 10 are open as indicated, one of them being out of the mercury. The conductor 13 is connected to the conductor 31 and the conductor 14 leads to the conductor 14' from the ring 10. The solenoid 32 is inserted into the conductor 14' and has an armature 33 normally retracted by a spring 34. A circuit closing plate 35 is carried by the said armature and adapted to engage a terminal 36 connected with the conductor 31 and a terminal 37 that has a conductor 38 leading to the conductor 14'. When the circuit is closed between the contact points of the ring 10 by the rotation of the said ring to the position indicated in Fig. 6, the current flowing in from the conductor

31 will pass through the mercury in the ring to the conductor 14' and from thence through the solenoid to the conductor 13', the alarm bell, the motor and the ground G, causing the bell to ring and starting the motor. The energizing of the solenoid 32 will attract its armature 33 and move the circuit closing plate 35 into engagement with the contacts 36 and 37. A new path for the current will be established through the conductor 31, contacts 36 and 37, plate 35, conductor 38, solenoid and conductor 13', to alarm bell, motor and ground. The time element heretofore described will permit the circuit closing rings to rotate slowly, first opening the contacts of ring 10. As there is already another path provided for the circuit through the solenoid and its contact piece there will be no arcing of the current at the contacts of the ring 10 when the circuit is being opened therethrough. When the circuit closers have rotated a sufficient distance the circuit between the contacts of ring 10' will be closed again and the solenoid will again be short circuited through the conductors 13' and 14'. The solenoid will thereupon be deenergized and the spring 34 will withdraw the circuit closing plate 35 and open the circuit through the bell and motor to the ground. The quick break at the contacts 36 and 37 will prevent arcing at those points and as the circuit through ring 10 has already been broken no arcing will take place at any point in the circuit. The operation described may then be repeated.

I claim as my invention:—

1. The combination, with a signal circuit having a circuit closer comprising a hollow rocking ring containing a conducting agent and having terminals, of a relay circuit arranged when closed to operate said circuit closer, and means for locking said closer to prevent opening of said signal circuit for a predetermined period after the opening of said relay circuit.

2. The combination, with a signal circuit having a circuit closer, of a relay circuit arranged when closed to operate said circuit closer and means for locking said closer to prevent opening of said signal circuit and said means operating step by step for a predetermined period after the opening of said relay circuit to release said closer and open said signal circuit.

3. The combination, with a signal circuit having a circuit closer comprising a hollow rocking body containing a conducting agent and having terminals, of a relay circuit arranged when closed to operate said circuit closer, a lever and arm connected with said circuit closer, a ratchet engaged by said arm and a motor geared to said ratchet, for the purpose specified.

4. The combination, with a signal circuit having a circuit closer comprising a hollow

ring provided with contact points and containing a quantity of mercury normally out of engagement with one of said points, a relay circuit arranged when closed to oscillate said ring and cause the mercury therein to engage both of said contact points, and means for locking said ring to prevent its returning to its normal position for a predetermined period after the opening of said relay circuit.

5. The combination, with a signal circuit having a circuit closer comprising a hollow ring provided with contact points and mercury adapted to engage the same, a relay circuit having a relay and an armature connected with said ring, a counter weight normally holding said armature away from the relay magnet and the mercury out of contact with one of said points, and means for locking said ring when it is oscillated to a position with the mercury therein in contact with both points and said means allowing said ring to return with a step by step movement to its normal position, substantially as described.

6. The combination, with a signal circuit having a circuit closer, of a relay circuit arranged when closed to operate said circuit closer, a ratchet, an arm engaging the teeth of said ratchet and connected with said circuit closer, and a motor in said signal circuit having a reduction gear connection with said ratchet, substantially as described.

7. The combination, of a signal circuit having a circuit closer comprising a hollow ring provided with contact points and containing a quantity of mercury, a shaft whereon said ring is mounted, a lever provided on said shaft, a relay circuit having a relay, an arm mounted on said shaft and having a counter weight, a link connecting said arm with the armature of said relay whereby said armature is normally held out of contact with its magnet and the circuit is broken through the mercury in said ring, an electric motor in said signal circuit and means connecting said motor with said lever, whereby when said relay circuit is closed and said ring is oscillated it will be prevented from returning for a predetermined period to its normal position when said relay circuit is opened.

8. The combination, with a signal circuit having a circuit closer in circuit with a high tension current, of a secondary circuit connected with said signal circuit and adapted to form a second path for said current when the circuit is being broken at said closer, whereby arcing between the circuit closer contact points will be prevented, substantially as described.

9. The combination, with a signal circuit having a circuit closer in circuit with a conductor provided with a suitable resistance

and leading to a trolley line, of a solenoid provided in said signal circuit, and a secondary circuit arranged to be closed by the energizing of said solenoid and remain closed while the circuit is being broken at said closer, whereby arcing between the contact points of said circuit closer will be prevented.

10. The combination, with a signal circuit having a circuit closer in circuit with a conductor provided with suitable resistance and leading to a trolley line, said circuit closer comprising a hollow ring of insulating material having contact points and containing a quantity of mercury, adapted to close the circuit between said points, of a secondary circuit and means whereby said secondary circuit will be closed and a second path established for the current when the circuit is closed at said closer and said secondary circuit remaining closed while the circuit is being broken at said closer, whereby arcing between the points of said circuit closer will be prevented.

11. The combination, with a signal circuit in circuit through suitable resistance with a trolley line, of circuit closers comprising hollow insulating rings containing mercury and provided with contact points arranged to be immersed in the mercury, said signal circuit being connected with said contact points, means for rotating said rings, the circuit through one ring being opened while it is being closed through the other ring, a secondary circuit connected with said signal circuit and normally open, means for closing said secondary circuit when the circuit is closed between the contact points of one of said rings and said secondary circuit remaining closed while the contact is being broken in said ring, whereby arcing between the points of said ring will be prevented.

12. The combination with a signal circuit having a circuit closer comprising a hollow rocking body containing a conducting agent and having terminals, of a relay circuit arranged to operate said circuit closer and means to prevent opening of said signal circuit for a predetermined period after opening of said relay circuit.

13. The combination with a signal circuit having a circuit closer, of a relay circuit arranged to operate said circuit closer and means for locking said closer, said means operating step by step for a predetermined period to release said closer and open said signal circuit.

In witness whereof, I have hereunto set my hand this 20th day of April 1907.

EDWARD MCCLINTOCK.

Witnesses:

RICHARD PAUL,
J. B. ERA.