No. 687,816. Patented Dec. 3, 1901.

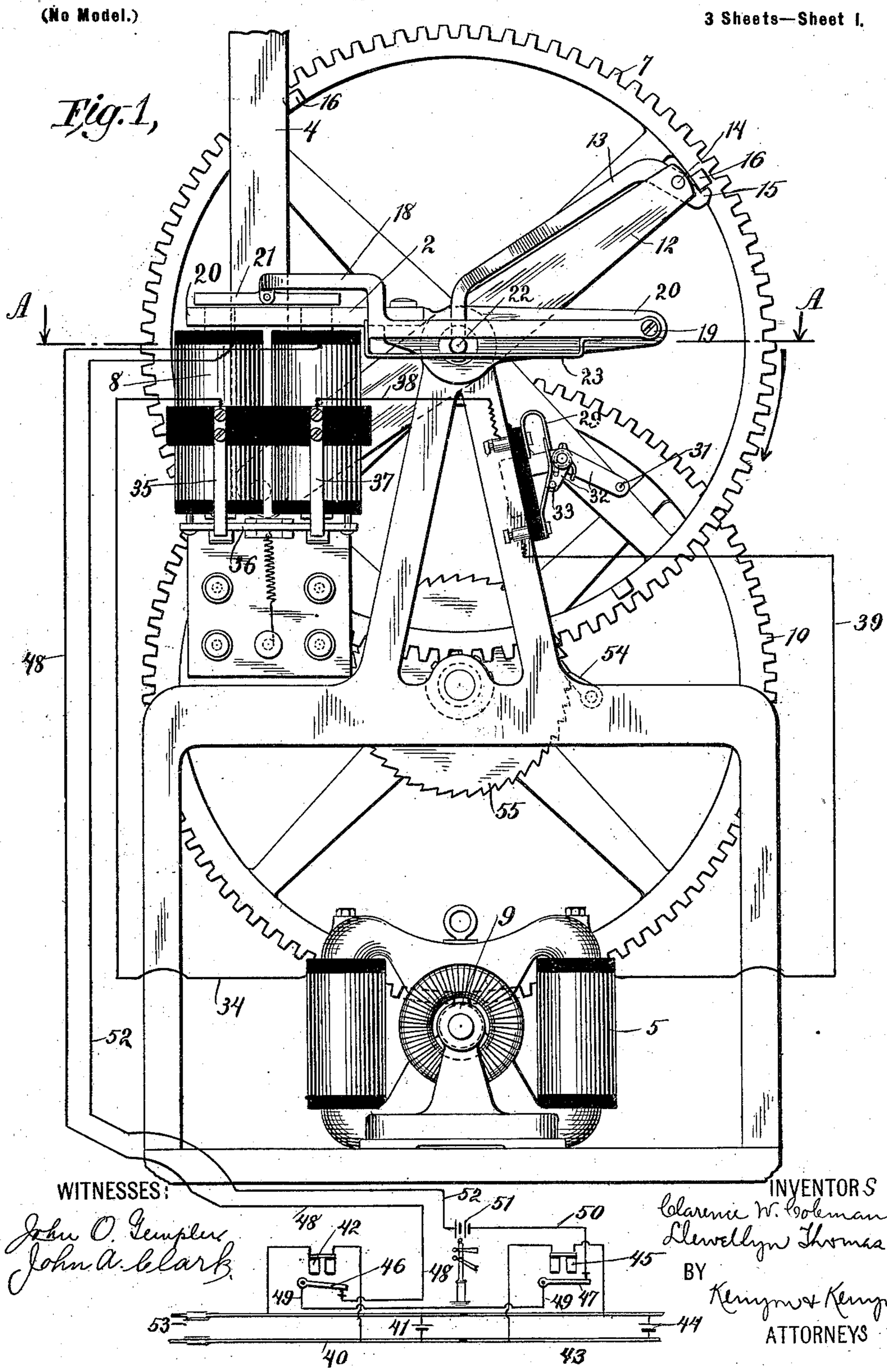
C. W. COLEMAN & L. THOMAS.

SIGNAL OPERATING APPARATUS.

(Application filed Feb. 16, 1901.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1,



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(No Model.) 3 Sheets—Sheet 2.

Fig. 2

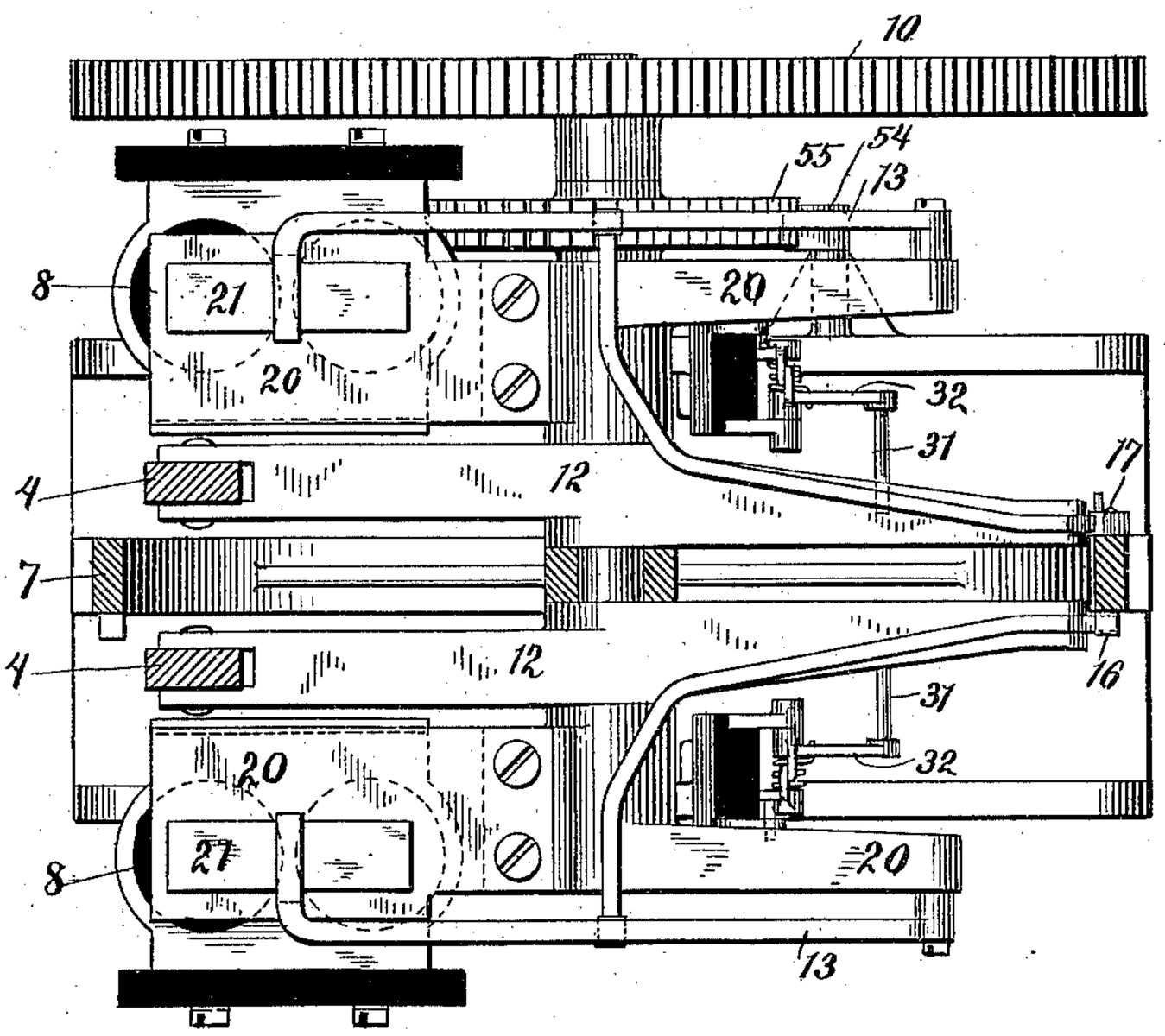

Fig. 5,

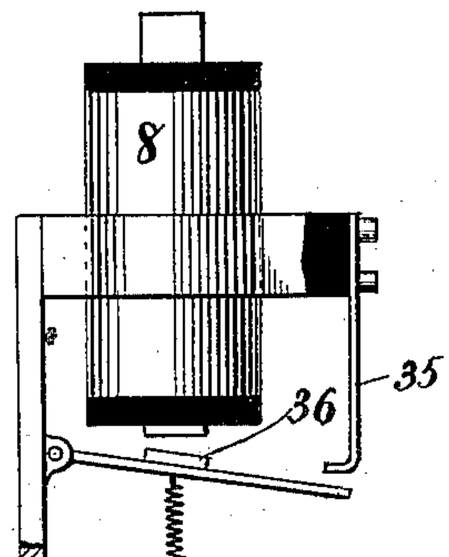

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Fig. 3.

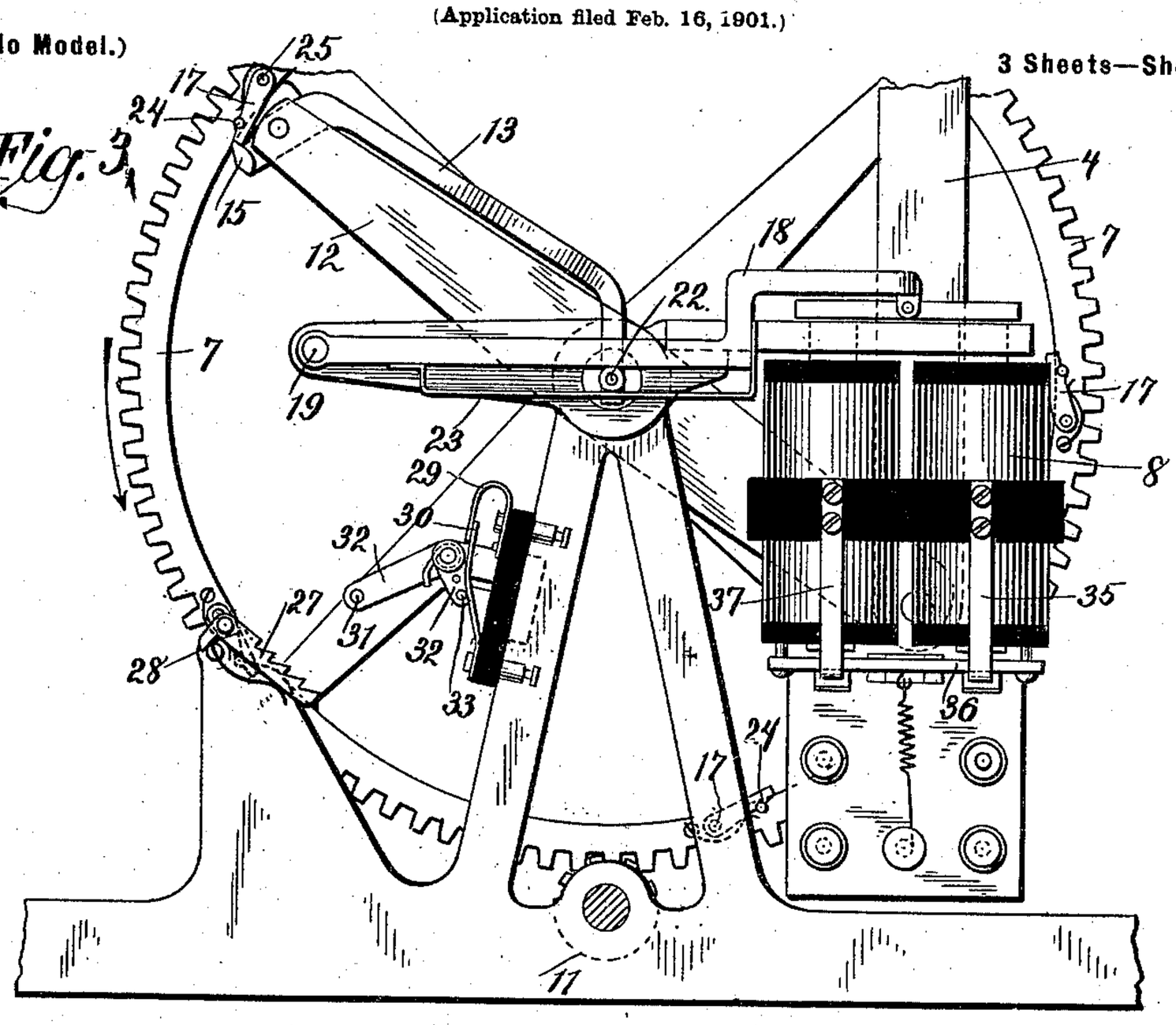
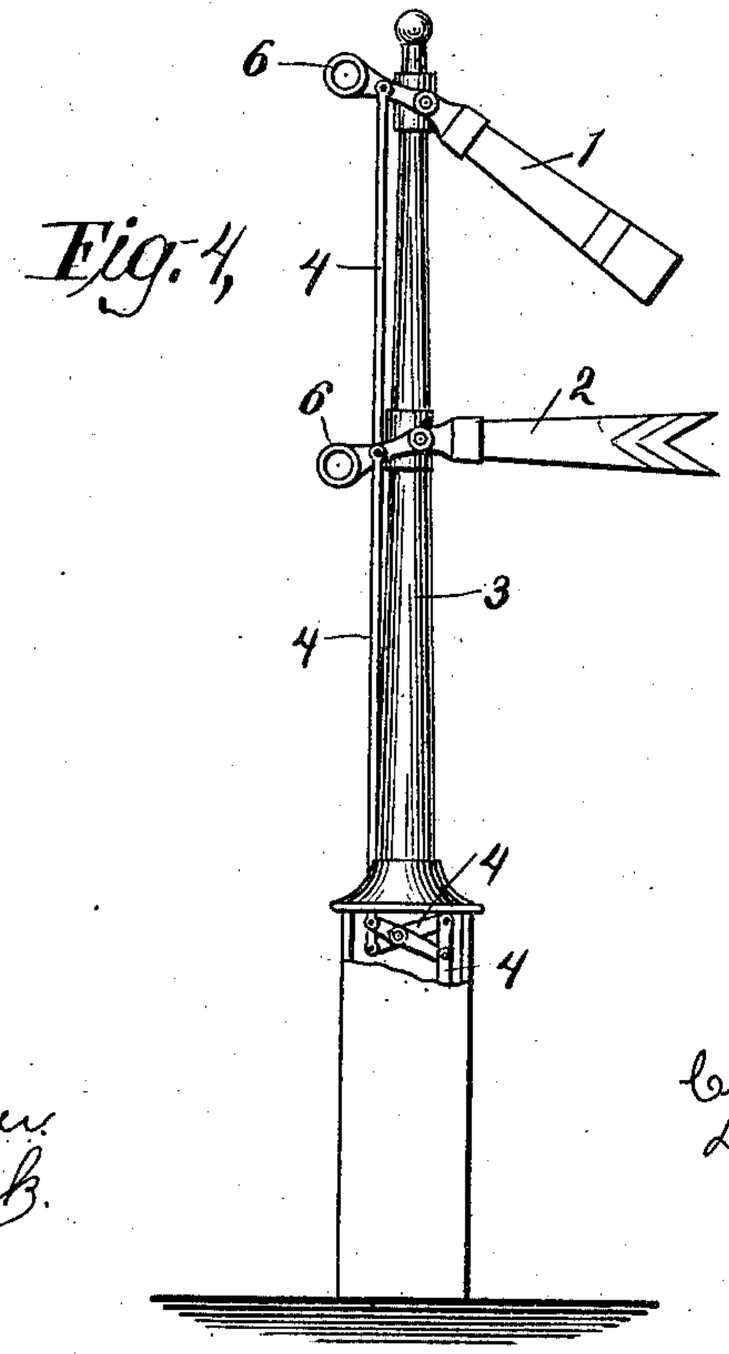


Fig. 4.



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UNITED STATES PATENT OFFICE.

CLARENCE W. COLEMAN, OF WESTFIELD, NEW JERSEY, AND LLEWELLYN THOMAS, OF CHICAGO, ILLINOIS, ASSIGNORS TO THE HALL SIGNAL COMPANY, A CORPORATION OF MAINE.

SIGNAL-OPERATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 687,816, dated December 3, 1901.

Application filed February 16, 1901. Serial No. 47,647. (No model.)

To all whom it may concern:

Be it known that we, CLARENCE W. COLEMAN, a resident of Westfield, in the county of Union and State of New Jersey, and LLEWELLYN THOMAS, a resident of Chicago, Cook county, State of Illinois, citizens of the United States, have invented a new and useful Improvement in Signal-Operating Apparatus, of which the following is a specification.

Our invention relates to devices for operating signals or other objects which are to be moved by power into a set position. It is of especial value when used with railway-signals, and particularly automatic railway-signals, and in the drawings and specification in this case it is shown and described as thus used. It is not, however, limited to such use, but may be employed wherever an object is to be moved positively into a set position.

Our present invention is an improvement upon the invention shown, described, and claimed by Clarence W. Coleman in a previous application filed October 24, 1900, known as Serial No. 34,140, for signal-operating apparatus.

Our invention has for its object to provide electrically-controlled means—such, for instance, as a magnet—for controlling the connection between the motor and the signal or other object to be moved into set position and to do this in such a way that the magnet may remain stationary.

It also has for its object to improve and simplify the construction of such signal or other object having operating means and to make them more efficient in operation.

It consists of the novel devices and combinations herein shown and described.

In the drawings accompanying this specification and forming a part hereof, and in which similar reference characters in the different figures represent corresponding parts, we have shown and will now proceed to describe the preferred form or embodiment of our invention.

As shown, our invention is embodied in an automatic railway-signal-operating mechanism and is shown as operating two signals through a common operating part—namely, the usual home and distant signals employed in automatic railway signaling. As above stated, however, our invention is not limited to use in railway-signals, nor is it limited when used with railway-signals to the operation of two signals, as our invention may be employed in connection with a single signal or may be employed with any object which is to be moved positively into a set position.

Referring to the specific form or embodiment of our invention shown in the drawings, Figure 1 is a side elevation of signal-operating mechanism for operating a home and distant signal embodying our invention and containing a diagrammatic view of some circuits that may be employed in connection with part of the signal-operating mechanism shown in the drawings. Fig. 2 is a plan of the part shown in Fig. 1 with certain of the parts shown in section. Fig. 3 is a side elevation of part of the signal-operating mechanism viewed from the opposite side from that of Fig. 1. Fig. 4 is a view of a standard, showing a home and distant signal with some of the connecting parts. Fig. 5 is a detail of the circuit-closing points of one of the motor-circuits.

Referring now to the specific form or embodiment shown in the drawings, 1 represents a home signal, and 2 a distant signal, arranged in a pair and mounted in the usual way upon the standard 3. As shown, the signals are positively moved to "safety" through a rectilinearly-moving or actuating rod 4 by means of a motor 5 by connections presently to be described and are normally held at "safety." The signals are counterweighted at 6 in the usual manner, so that when left free to move they will move to "danger." As shown, the two signals are operated upon a common motor 5. Power is transmitted from the motor through connections between it and the two signals, so as to operate the signals independently of each other. To accomplish this, we provide in the said connections a common operating part, which in the form shown in the drawings consists of a power-wheel 7, shown as a large gear-wheel. Between this power-wheel 7 and each signal-actuating rod we arrange a clutch, with which a projection or projections on the wheel are adapted to

engage to transmit motion from the power-wheel to the actuating-rod to move the signal. Each signal is provided with a clutch member, and each clutch member is electrically controlled through a yielding connection, which permits the clutch to engage or not with the projections upon wheel 7. In the form shown the means for electrically controlling the clutch consists of a magnet 8 for each signal and an armature-bar connected therewith, the clutch and armature-bar having a yielding connection to cause the clutch not to engage with the projection on the power-wheel when magnet 8 is not energized, but to cause it to engage with the projection and to transmit motion from the power-wheel to the signal when magnet 8 of the signal is energized. This yielding connection between the clutch and the armature-bar permits the operation of the parts, while permitting the magnet to remain stationary, as will be presently described.

Motion is transmitted from motor 5 and power-wheel 7 through gears 9, 10, and 11.

Each actuating-rod is pivotally connected to a lever 12, mounted concentric with power-wheel 7. Each lever carries a clutch member, which in the form shown consists of a clutch-lever 13, pivoted to lever 12 at 14 and having a toe 15, adapted to lie in the path of projections 16 or latch 17 on the power-wheel 7. Each clutch member 13 is controlled through its corresponding magnet 8 by means of an armature-bar 18, pivoted at 19 to the framework 20, which supports magnet 8.

21 is the armature, carried on the end of the armature-bar. Clutch member 13 and armature-bar 18 are yieldingly connected, so that when magnet 8 is deënergized and a projection 16 or latch 17 strikes toe 15 of the clutch-lever it will simply rock that lever on its pivot 14, lifting armature-bar 18 and allowing the projection 16 or latch 17 to slip by the toe 15 without moving the signal, and when magnet 8 is energized clutch member 13 will be prevented from rocking on its pivot 14 and motion will be imparted through power-wheel 7 and lever 12 will move actuating-rod 4 and the signal. In the form shown in the drawings this yielding connection is formed by means of a pin 22 entering and sliding in a slot formed on the lower side of armature-bar 18 by means of the bent piece 23. This bent piece is connected to armature-bar 18, as shown in Figs. 1 and 3, and practically forms a slot between the bent piece and the armature-bar in which pin 22 can slide. When magnet 8 is deënergized and projection 16 or latch 17 strikes toe 15 of the clutch, clutch-lever 13 is permitted to rock on pivot 14, as pin 22 can lift armature-bar 18 upward. In this way toe 15 is swung out of the way of projection 16 and no motion is imparted to lever 12 and rod 4. Whenever magnet 8, however, is energized armature-bar 18 is held downward and cannot be swung upward by pin 22, and clutch member 13 is substantially locked in its clutching or operative position, with toe 15 engaging with the projection from power-wheel 7. Pin 22 is in this position of the parts in line with the center of wheel 7. In this position of the parts lever 13 is rotated, carrying with it lever 12 and lifting rod 4, which pulls the signal into its set position, which in the form shown in the drawings is the safety position. It will of course be understood that if desired the set position might be the danger position or might be any position in which the signal or other object is to be positively moved. In Fig. 4 we have represented the home signal as thus positively moved to its safety position, while the distant signal is there shown as in the danger position.

By the above means we are enabled to positively move the signal or other object to its set position by simple and efficient means and without the necessity of moving the signal-controlling magnet 8 or without movement of its armature-bar with the signal-operating mechanism. Magnet 8 and its armature-bar are accordingly stationary, except for the ordinary up-and-down movement of the armature-bar in the energized and deënergized positions of the magnet. This is a great advantage, as it simplifies the mechanism and enables the signal-controlling magnet to operate with greater certainty and to better advantage than when it is moved along with the signal-operating mechanism, as shown in the earlier application previously referred to herein. The form of clutch and the yielding connection between it and the signal operating or carrying rod can be widely varied without departing from our invention, so long as their connection is a yielding one to permit the motor to be operatively connected with the signal and to be disconnected therefrom without the necessity of moving the signal-controlling magnet.

In order to permit the independent operation of the two signals shown in the drawings and to permit each to be held in set position, we have shown the same means for such separate operation and for such holding as those shown in the application of Clarence W. Coleman, previously referred to. These parts will be therefore only briefly referred to, as follows: On one side of power-wheel 7 (shown in Fig. 3) the projection for engaging toe 15 is shown as a swinging spring-pressed latch pivoted at 25 to the wheel and having a pin 24 projecting from its side. The point of toe 15 engages a spring-pressed rack 27, and at the same time latch 17 is positively withdrawn from engagement with toe 15 of clutch-lever 13 by means of a cam-surface 28 upon the framework of the machine and adapted to lie in the path of pin 24, projecting from the side of latch 17. When wheel 7 is thus made, as shown in the drawings, a quarter-revolution has moved the

home signal to its set or safety position, and the signal is held in that position by means of rack 27 and toe 15, while power-wheel 7 is free to rotate further. On the other side of wheel 7 the projections from the wheel are shown as simply projection 16 and as in the form shown in the drawings the distant signal is operated after the home signal. In practice the home signal is moved to its set position, and then wheel 7 continues its rotation, moving the distant signal to its set position, whereupon wheel 7 then stops through the automatic deënergizing of motor 5 in a manner presently to be described.

Preferably the motor is deënergized automatically when either signal has been moved to its set position. Any suitable means may be employed for this purpose. The means shown consist of make-and-break contact-points 29 30 in the motor-circuit. These are automatically broken by lever 12 striking a pin 31, projecting from a bell-crank 32, upon one arm of which is mounted a pin 33. This pin strikes contact-point 30 and forces it away from contact-point 29, thus breaking the motor-circuit when the signal has reached its set position. The motor-circuit, as shown, runs through wires 34, metallic bar 35, mounted on magnet 8 and insulated therefrom, lower armature-bar 36 of magnet 8, metallic rod 37, wire 38, contact-points 29 30, wire 39 to battery and motor. This circuit, as will be seen, is closed at contact-points 35 36 37 when magnet 8 is energized and is automatically broken at contact-points 29 30 as long as the signal is in set position. Such a motor-circuit is provided for each signal.

Any suitable circuits may be employed for energizing or deënergizing the magnet 8. As such circuits form no part of this invention, the full circuits for operating both magnets are not shown. We have merely illustrated rail-circuits for operating one of the magnets. These circuits, as shown, consist of two normally-closed rail-circuits—one for block 40 from battery 41 through magnet 42 and a rail-circuit for block 43 from battery 44 through magnet 45. Magnet 42 controls circuit-closer 46, and magnet 45 controls circuit-controller 47. The circuit through magnet 8 runs through both circuit-controllers 46 and 47 and runs as follows: from one side of magnet 8 through wire 48, circuit-controller 46, wire 49, circuit-controller 47, wire 50, battery 51, wire 52, back to the magnet. With the track clear this circuit is normally broken at 46 and magnet 8 is deënergized. When a train enters upon block 40, as shown at 53, circuit-controller 46 drops, closing the circuit through magnet 8. This moves the signal to its set or safety position. When the train enters upon block 43, the circuit through magnet 8 is broken at 47, the magnet is deënergized, clutch 13 is unlocked, and its toe 15 disengages itself from projection 16 and the counterweight swings the signal to "danger." These circuits are shown in connection with the distant signal, but it will be understood that the same or any suitable circuits can be arranged with the home signal and, if desired, these circuits can be arranged in any well-known manner, so that one signal will affect the other or will affect signals in advance or in the rear, as desired.

Backward rotation of power-wheel 7 is prevented by means of pawl 54 engaging with the ratchet-wheel 55.

By means of our improved devices one or more signals or other objects can be moved into set position easily and efficiently, the controlling-magnet remains stationary, and the operating parts are simple and efficient. Many changes and modifications may be made in the form of apparatus shown in the drawings without departing from our invention.

What we claim as new, and desire to secure by Letters Patent, is—

1. The combination of a motor, devices for operating a signal or other object to be moved into set position, connections between the motor and such devices including a stationary magnet, a clutch, and an actuating device therefor controlled by the magnet, the clutch and actuating device being yieldingly connected together and so arranged that, when the actuating device is held in its actuating position, the clutch will operatively connect the motor with the devices for operating the signal or other object to move the signal or other object into set position without moving the magnet and, when the actuating device is in its inoperative condition, the clutch will be inoperative and the signal or other object will be disconnected from the motor.

2. The combination of a motor, devices for operating a signal or other object to be moved into set position, connections between the motor and such devices including a power-wheel adapted to be driven by the motor, a lever mounted axially with said wheel and connected with the signal-operating devices, a clutch member pivoted on said lever and having a part adapted normally to lie in the path of a projection from the power-wheel, and an actuating device for the clutch member controlled by a magnet, the clutch and actuating device being yieldingly connected together and so arranged that, when the actuating device is held in its actuating position, the clutch member will operatively connect the power-wheel and lever to move the signal or other object into set position without moving the magnet and, when the actuating device is in its inoperative condition, the clutch will be inoperative and the signal or other object and power-wheel will not be connected with each other.

3. The combination of a motor, devices for operating a signal or other object to be moved into set position, connections between the motor and such devices including a power-wheel adapted to be driven by the motor, a lever mounted axially with said wheel and connected with the signal-operating devices, a

clutch member pivoted on said lever not axial with the power-wheel, and having a part adapted normally to lie in the path of a projection from the power-wheel, and an actuating-lever controlled by a magnet and pivoted so as not to move axially with the power-wheel, the clutch member and actuating-lever being so connected and arranged that one part of the clutch member will bear upon the actuating-lever at a point axial with the center of the power-wheel so that, when the actuating-lever is in its inoperative condition, the bearing-point of the clutch-lever will press the actuating-lever out of locking position and the clutch will be inoperative, and when the actuating device is held in its actuating position, the clutch-lever will operatively connect the power-wheel and the lever connected with the signal-operating devices and will itself be moved with the latter lever axially with the power-wheel, and the signal or other object will be moved into its set position but without moving the magnet.

4. The combination of a motor, devices for operating a signal or other object to be moved into set position, connections between the motor and such devices including a power-wheel adapted to be driven by the motor, a lever mounted axially with said wheel and connected with the signal-operating devices, a clutch member pivoted on said lever not axial with the power-wheel, and having a part adapted normally to lie in the path of a projection from the power-wheel, a magnet, an actuating-lever pivoted so as not to move axially with the power-wheel and carrying on one of its arms the armature of said magnet and adapted to be controlled by said magnet, and a projection from the clutch-lever adapted to bear upon the actuating-lever at a point axial with the center of the power-wheel so that, when the actuating-lever is in its inoperative condition, the said projection will press the actuating-lever out of actuating position and the clutch will be inoperative, and, when the actuating device is held in its actuating position, the clutch-lever will operatively connect the power-wheel and the lever connected with the signal-operating devices and will itself be moved with the latter lever axially with the power-wheel, and the signal or other object will be moved into its set position without moving the magnet.

5. The combination of a motor, devices for operating a signal or other object to be moved into set position, connections between the motor and such devices including a stationary magnet, a clutch, and an actuating device therefor controlled by the magnet, the clutch and actuating device being yieldingly connected together and so arranged that, when the actuating device is held in its actuating position, the clutch will operatively connect the motor with the devices for operating the signal or other object to move the signal or other object into set position without moving the magnet and, when the actuating device is in its inoperative condition, the clutch will be inoperative and the signal or other object will be disconnected from the motor, and a device for engaging with the clutch when the signal or other object has been moved to its set position for holding it in that position as long as the actuating device remains in its locking position.

6. The combination of a motor, devices for operating a signal or other object to be moved into set position, connections between the motor and such devices including a power-wheel adapted to be driven by the motor, a lever mounted axially with said wheel and connected with the signal-operating devices, a clutch member pivoted on said lever and having a part adapted normally to lie in the path of a projection from the power-wheel, an actuating device for the clutch controlled by a magnet, the clutch member and actuating device being yieldingly connected together and so arranged that, when the actuating device is held in its actuating position, the clutch will operatively connect the power-wheel and lever to move the signal or other object into set position without moving the magnet and, when the actuating device is in its inoperative condition, the clutch will be inoperative and the signal or other object and the power-wheel will not be connected with each other, and a device for engaging with the clutch member when the signal or other object has been moved to its set position for holding it in that position as long as the actuating device remains in its actuating position, and means for disengaging the projection of the power-wheel from the clutch member to permit the power-wheel to rotate further without affecting the signal.

7. The combination of a motor, devices for operating a signal or other object to be moved into set position, connections between the motor and such devices including a power-wheel adapted to be driven by the motor, a lever mounted axially with said wheel and connected with the signal-operating devices, a clutch member pivoted on said lever and having a part adapted normally to lie in the path of a projection from the power-wheel, an actuating device for the clutch controlled by a magnet, the clutch member and actuating device being yieldingly connected together and so arranged that, when the actuating device is held in its actuating position, the clutch will operatively connect the power-wheel and lever to move the signal or other object into set position without moving the magnet and, when the actuating device is in its inoperative condition, the clutch will be inoperative and the signal or other object and the power-wheel will not be connected with each other, and a device for engaging with the clutch member when the signal or other object has been moved to its set position for holding it in that position as long as the actuating device remains in its actuating position, and means for disengaging the projection of the

power-wheel from the clutch member to permit the power-wheel to rotate further without affecting the signal, and means for preventing backward rotation of the wheel.

8. In an apparatus for controlling the movement of two signals or other movable objects into set position, the combination of a power-wheel adapted to be driven by a motor, a lever for each signal mounted axially with the power-wheel and connected with the devices for operating said signal, a clutch member pivoted on each lever and having a part adapted normally to lie in the path of a projection from the power-wheel, an actuating device for each clutch member, a stationary magnet for controlling each clutch member, each clutch member and actuating device being yieldingly connected together and so arranged that, when the actuating device is held in its actuating position, its clutch will operatively connect the power-wheel with the devices for operating the corresponding signal or other objects to move it into set position without moving the magnet and, when the actuating device is in operative condition, the clutch will be inoperative and the said signal or other object will be disconnected from the power-wheel, a device for engaging with one of the clutch members when its signal or other object has been moved to its set position for holding it in that position as long as the actuating device remains in its actuating position, and means for disengaging the corresponding projection of the power-wheel from the said clutch member to permit the power-wheel to rotate further to actuate the operating devices of the other signal without affecting the set position of the first-mentioned signal, whereby the two signals or other objects may be moved by the power-wheel into set position independently of each other.

9. In an electrically-controlled apparatus for converting rotary motion into rectilinear motion to move a signal or other object into set position, the combination of a power-wheel, a lever connected with the signal or other object and mounted axially with the power-wheel, means for connecting the lever with the power-wheel to cause the former to rotate with the latter and for disconnecting them, and a stationary magnet controlling said connecting and disconnecting means.

10. In an electrically-controlled apparatus for converting rotary motion into rectilinear motion to move a signal or other object into set position, the combination of a power-wheel, a rectilinearly-moving rod, a lever pivoted to said rod, a clutch member carried by said lever for connecting and disconnecting the lever and power-wheel and a stationary magnet controlling said clutch member.

11. In an electrically-controlled apparatus for converting rotary motion into rectilinear motion to move a signal or other object into set position, the combination of a power-wheel, a rectilinearly-moving rod, a lever pivoted to said rod, a clutch member carried by said lever for connecting and disconnecting the lever and power-wheel and a stationary magnet controlling said clutch member, the clutch and the armature of the magnet being yieldingly connected together so that, when the magnet is deënergized, the clutch member will not operatively connect the power-wheel and lever, and, when the magnet is energized, it will connect them and the clutch member will revolve with the lever without moving the magnet or its armature.

12. In an electrically-controlled apparatus for converting rotary motion into rectilinear motion to move two signals or other objects into set positions independently of each other, the combination of a power-wheel, a rectilinearly-moving rod for each signal or other object, a lever pivoted to each rod, separate means for connecting and disconnecting each of said levers and the power-wheel, and a stationary magnet for each lever for controlling the said connecting and disconnecting means between its lever and the power-wheel, whereby the two signals or other objects may be moved by the power-wheel into set position independently of each other.

13. In an electrically-controlled apparatus for converting rotary motion into rectilinear motion to move two signals or other objects into set positions independently of each other, the combination of a power-wheel, a rectilinearly-moving rod for each signal or other object, a lever pivoted to each rod, a clutch member carried by each lever for connecting and disconnecting its lever and the power-wheel and a stationary magnet for controlling each clutch member.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

CLARENCE W. COLEMAN.
LLEWELLYN THOMAS.

Witnesses for Coleman:
GEO. W. MILLER, Jr.,
EDWIN SEGER.
Witnesses for Thomas:
RICHARD T. SPENCER,
F. J. ANDREWS.