No. 733,789. PATENTED JULY 14, 1903.

L. G. WOOLLEY.

MAGNETO ELECTRIC SEMAPHORE SIGNALING.

APPLICATION FILED MAY 26, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

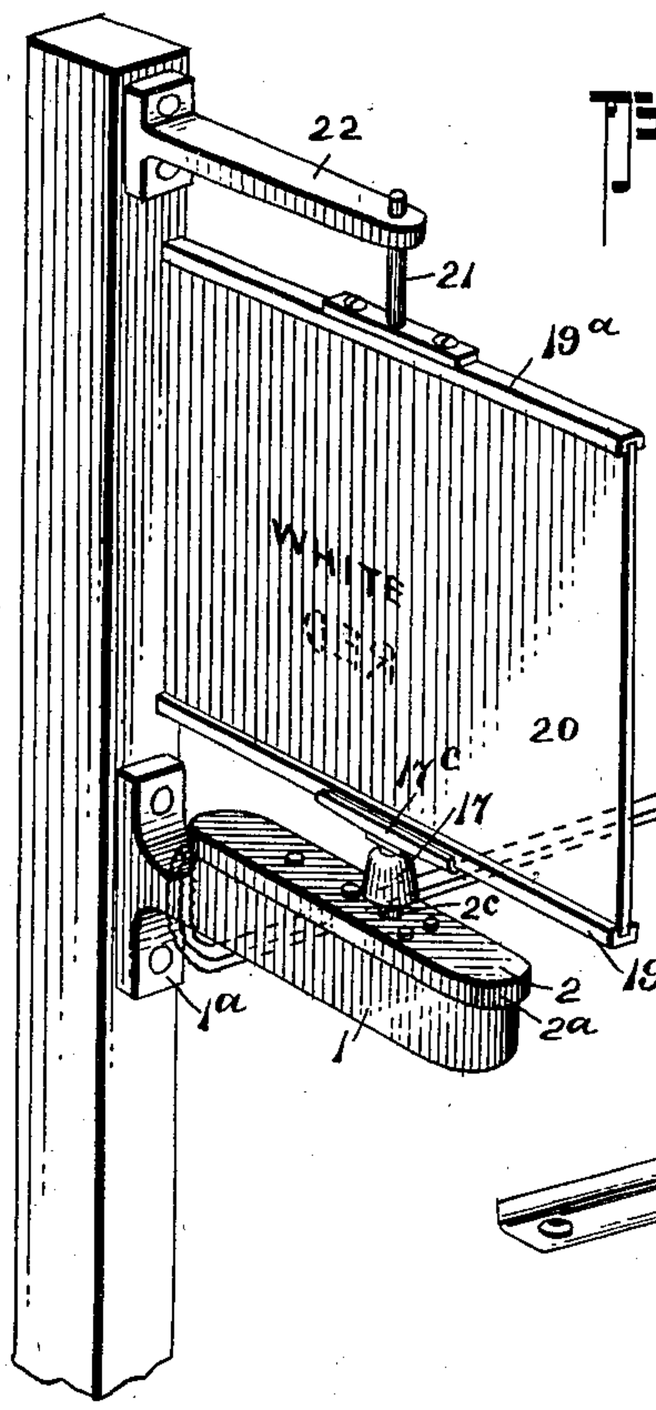


Fig. 1.

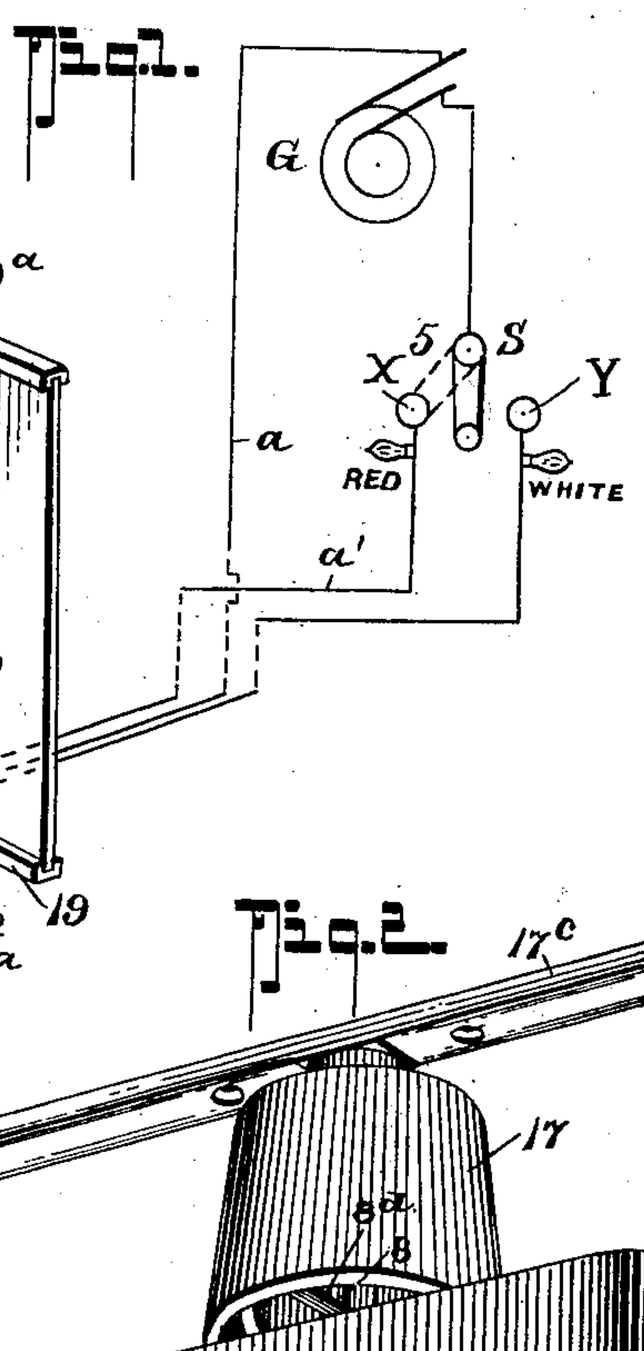
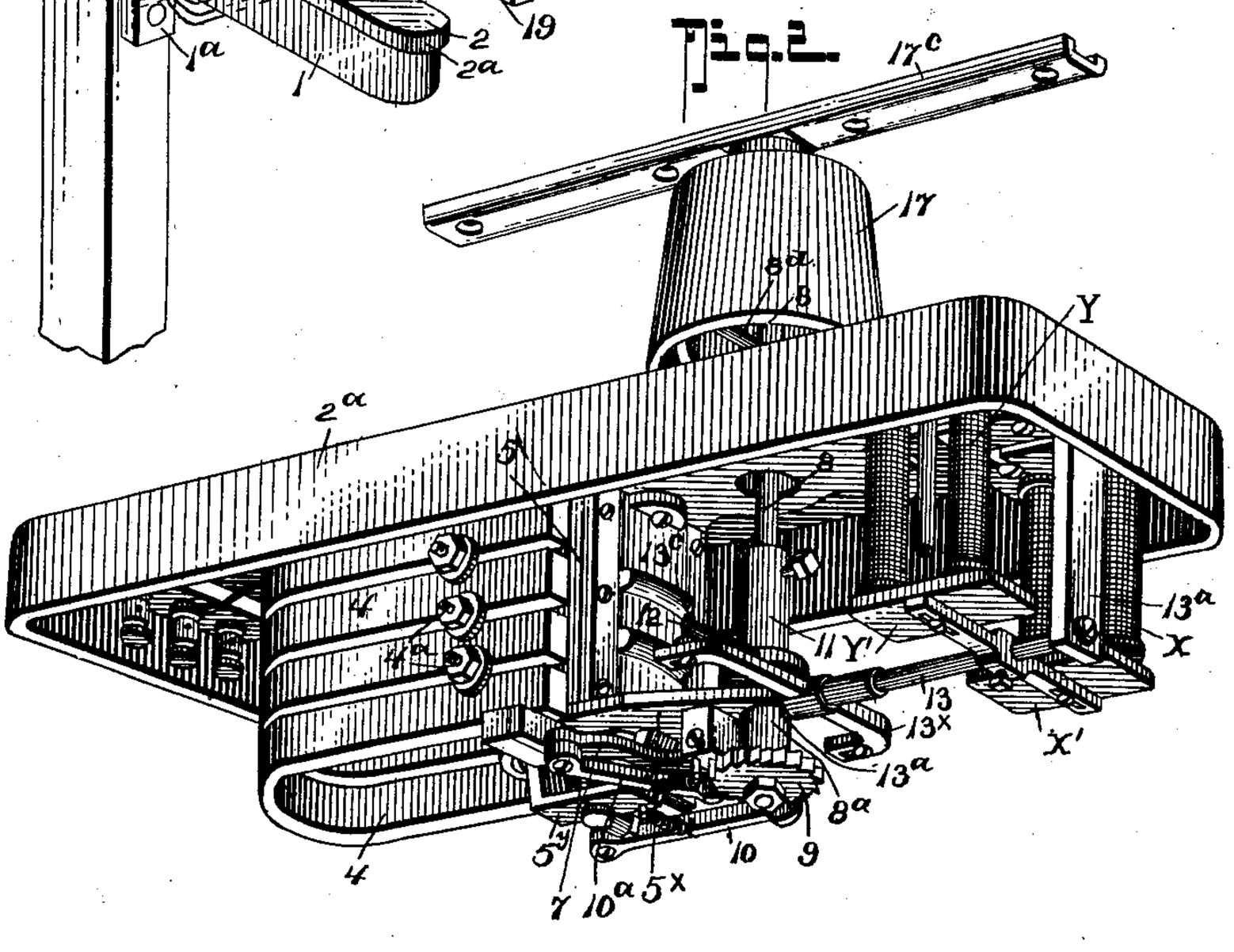


Fig. 2.



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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 3.

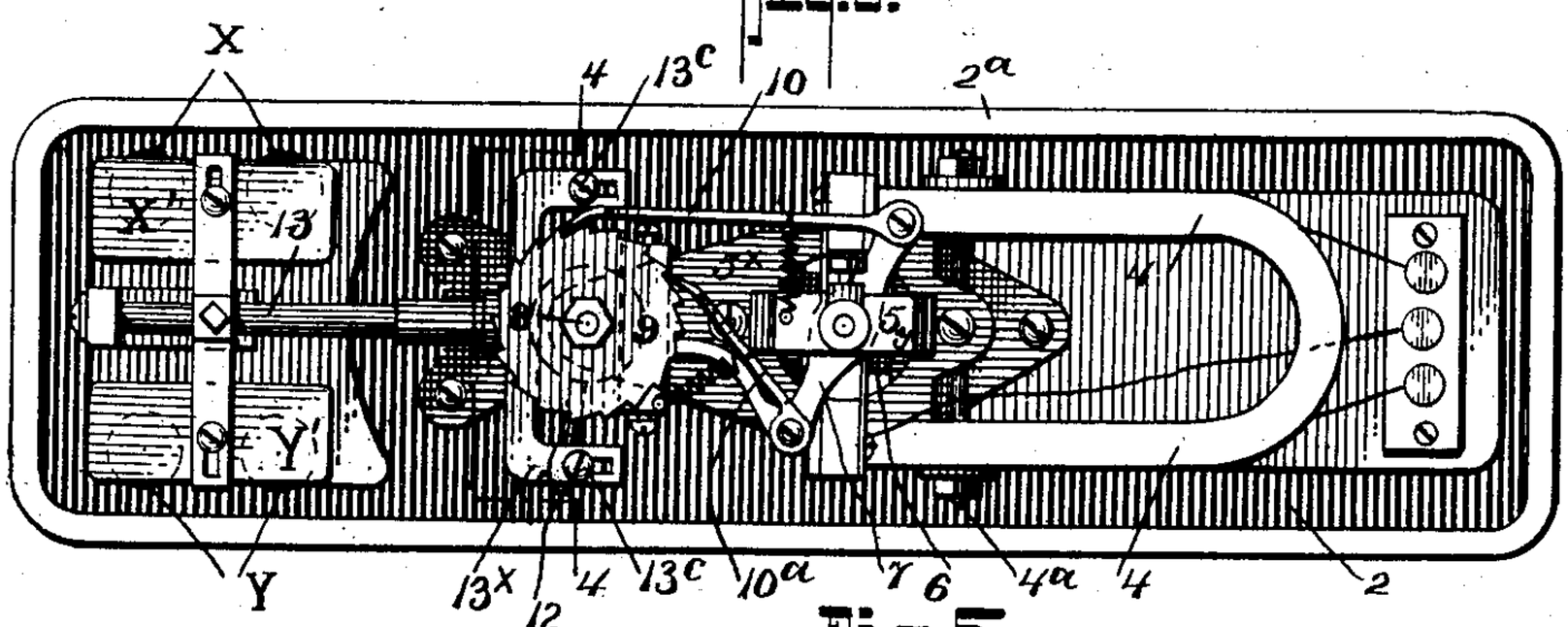


Fig. 4.

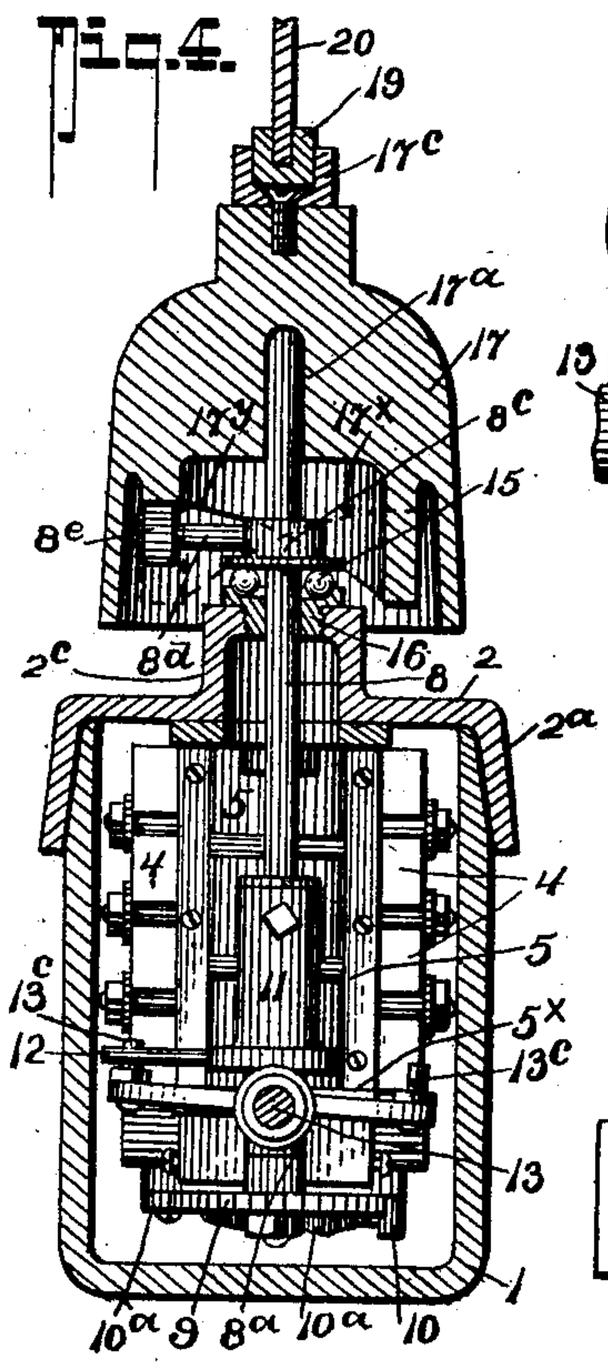


Fig. 5.

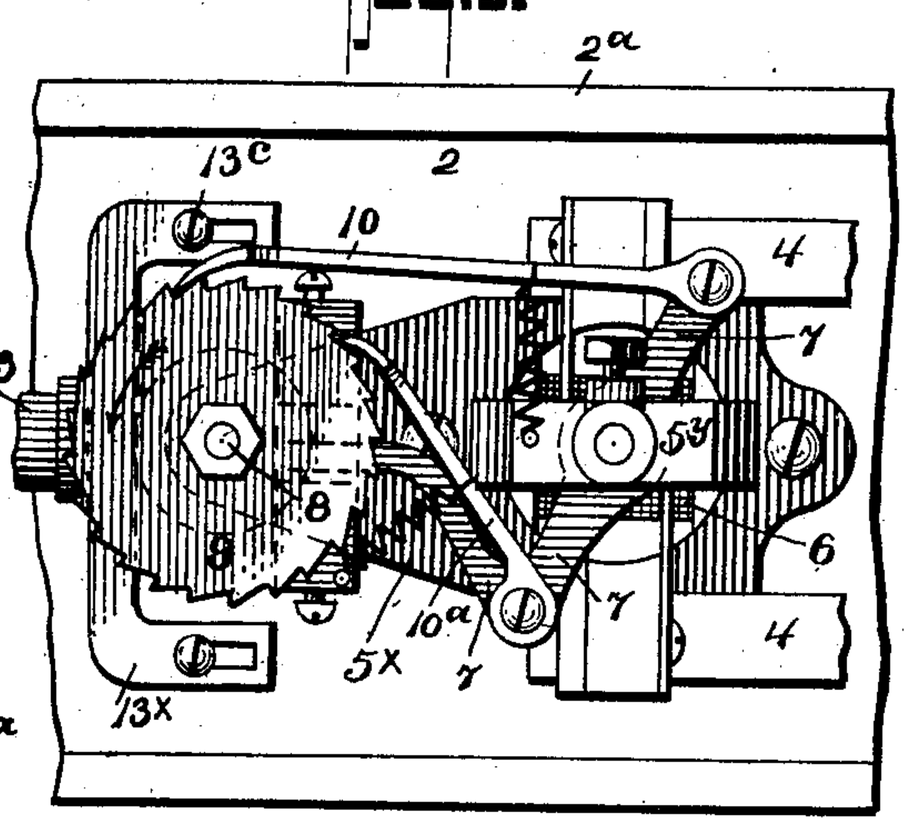
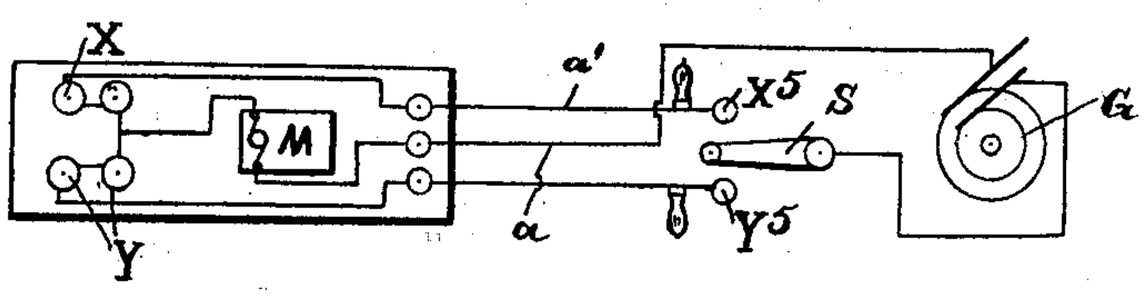


Fig. 6.



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UNITED STATES PATENT OFFICE.

LEONIDAS G. WOOLLEY, OF KENTON, OHIO, ASSIGNOR TO THE MAGNETO ELECTRIC COMPANY, OF NEW YORK, N. Y., INCORPORATED.

MAGNETO-ELECTRIC-SEMAPHORE SIGNALING.

SPECIFICATION forming part of Letters Patent No. 733,789, dated July 14, 1903.

Application filed May 26, 1902. Serial No. 108,969. (No model.)

To all whom it may concern:

Be it known that I, LEONIDAS G. WOOLLEY, residing at Kenton, in the county of Hardin and State of Ohio, have invented a new and Improved Magneto-Electric Semaphore Mechanism, of which the following is a specification.

This invention is in the nature of an improved semaphore mechanism especially designed for operation by magneto-electric means; and it primarily seeks to provide a mechanism of this character of a simple, economical, and stable construction in which the operation of setting the signals is effected in a quick and convenient manner and the action of the signal-setting devices rendered positive.

My invention in its generic nature comprehends a shiftable signal, a magneto-electric motor for setting the said signal, a magneto-electric generator located at a desired point, usually the tower or switch house, and an electrically-operated detent mechanism for controlling the movement of the signal, all of the said parts being so combined and coöperatively arranged, whereby by simply setting in operation the generator in the tower or switch house by manual or mechanical means the signal or semaphore will be instantly shifted from danger to safe position, or vice versa, as conditions may require.

My invention in its more complete make-up includes a novel construction of electrically-controlled detent mechanism for regulating the movement of the signal-setting devices in which is embodied a double-acting detent-adjusting device, including a pair of independent electromagnets, each acting to set the detent in alternate opposite directions, and a switch mechanism located in the tower-house for bringing into electrical circuit either electromagnet at will.

In its more subordinate features my invention consists in certain novel details of construction and peculiar combination of parts, all of which will hereinafter be fully explained, and particularly set out in the appended claims, reference being had to the accompanying drawings, in which—

Figure 1 is a perspective view of my invention, illustrating the general arrangement of my semaphore mechanism, the magneto-generator and the switch devices being also diagrammatically represented. Fig. 2 is an inverted perspective view of the magneto-electric mechanism for controlling the semaphore-carrying shaft. Fig. 3 is an inverted plan view of the same. Fig. 4 is a vertical transverse section thereof on the line 4 4 of Fig. 3. Fig. 5 is an enlarged plan view of the ratchet-and-pawl mechanism that joins the armature-shaft with the signal-carrying shaft. Fig. 6 is a diagram illustrating the correlative arrangement of the generator, the switch devices, usually located in the tower-house, and the magneto-electric machine for controlling the semaphore or signal.

In carrying out my present invention I provide a suitable casing 1, having a bracket-piece 1^a for conveniently attaching said casing to the signal-post. Within the casing 1 is detachably supported a semaphore or signal operating mechanism, the peculiar and novel construction of which is best shown in Figs. 2 and 3, by reference to which it will be noticed the entire operating mechanism is pendently mounted upon a bed-plate 2, having pendent ends and side flanges 2^a, which merge with each other, adapted to lap over the casing 1, as clearly shown in Fig. 1, and thereby provide for shedding water and dirt and keeping the same out of the casing 1, which contains the operating mechanism.

The operating mechanism consists of a magneto-electric machine embodying a series of permanent magnets 4 4, the pole ends of which are clamped upon a casting 5 by the clamp-bolts and nuts 4^a, as shown, and the said casting 5 is firmly bolted to the bed-plate 2.

Within a chamber in the casting and between the poles of the magnets 4 is mounted an armature 6, which, *per se*, is of the ordinary construction and journaled at its inner end in a suitable bearing in the casting 5 and at its outer end in the bearing-bracket 5^a in the plane below the lower magnet. (See Fig. 2.)

The armature 6 in my construction of operating mechanism is held to oscillate between the polar ends of the magnets—that is to say, to partially rotate in opposite directions—to produce, as it were, an oscillatory movement

of the double-ended lever-arm 7, fixedly connected to the lower end of the armature-shaft, the purpose of which will presently appear.

The semaphore-supporting shaft 8 has its lower end journaled in a bracket 8^a on the casting extension 5^x, and its lower end carries a toothed wheel 9, held in a horizontal plane with a pair of pawls 10 10^a, pivotally connected to the opposite ends of the lever 7 on the armature-shaft and which engage with the wheel 9 upon the same side of its axis, as clearly illustrated in Figs. 3 and 5, whereby to impart a rotary motion to the shaft 8 as the lever 7 is oscillated in a manner presently explained.

Upon the shaft 8 is detachably mounted a sleeve 11, provided with a radially-projecting stop-finger 12, which coöperates with the detent devices that limit the rotary movement of the shaft 8. These detent devices, which, as hereinbefore stated, are electrically controlled, consist of a horizontally-disposed shaft 13, held to rock in bearings 13^a 13^a. At one end the rock-shaft 13 has fixedly attached thereto a pair of oppositely-disposed armature-plates X' Y', each of which coöperates with an independent electromagnet X Y, held in the circuit that passes from the magneto-generator in the tower-house, as will be best understood from the diagram view, Fig. 6, by reference to which it will be noticed the generator G, which produces an alternating current, is permanently connected by a wire *a* with the magneto-electric motor M, and the electromagnet X joins with the terminal post X^5 in the tower-house, while the electromagnet Y connects with the terminal post Y^5.

It should be stated the armature-plates X' Y' upon the rock-shaft 13 are so disposed relatively to magnets X Y that when either one of the said magnets X or Y is energized in the manner presently explained the armature member that is closed thereagainst will remain to its rocked position by the electrical energy maintained in the said energized electromagnet during the entire operation of polarizing the magneto-electric motor devices that control the movement of the signal-shaft 8. The rock-shaft 13 at its inner end has a cross-arm 13^x, in the opposite ends of which are adjustably mounted upwardly-extending projections or stops 13^c, which project in the path of the sweep movement of the member 12 upon the signal-shaft 8 when tilted upward in the path of the said member 12, as clearly shown in Fig. 4. The upper end of the signal-carrying shaft 8 is guided in a bearing 2^c in the bed or cap plate 2, and the said upper end has a fixedly-held collar 8^c, which rests upon ball-bearings 15, mounted in a ball-race 16, detachably connected with the portion 2^c of the bed or cap member 2.

The collar 8^c has a radially-projecting arm 8^d, upon which is mounted to rotate in a vertical plane a friction-roller 8^e. 17 designates a weighted hub centrally apertured at 17^a to receive the upper end of the signal-carrying shaft 8, the aperture 17^a being of sufficient depth to provide for a limited automatic vertical adjustment of the hub 17.

17^c designates a grooved casting integrally formed with the hub 17 or detachably connected thereto by screws, as shown, which is adapted to receive the frame 19, that carries the signal or semaphore plate 20, which plate is guided by having its upper end fit in the grooved member 19^a, provided with a central upwardly-extending spindle 21 in the vertical axis of the shaft 8, and which has a bearing in a bracket 22, extended out from the signal-post. Upon the under side the hub 17 has two cam-like bearing-surfaces 17^x 17^y, the latter being shown in dotted lines in Fig. 4, that merge with each other and which are adapted to alternately engage with the friction-roller 8^e, such connection between the hub 17 and the shaft 8 being utilized to provide for the automatic returning of the hub with the signal to either of its normal positions in case the same is moved by hand or accidentally turned away from its proper signaling position, it being understood that no matter in which direction the hub 17, with the signal attached thereto, is independently rotated upon the shaft it will return to its proper signaling position. It should be stated that in practice the hub is sufficiently weighted that the frictional contact of the same with the bearing-arm 8^d, the roller 8^e, and the collar 8^e, and the roller-bearings therefor, the connection between the hub and the shaft 8 is sufficient to cause the said hub, with its signal, to rotate with the shaft.

The manner in which my semaphore mechanism operates is briefly explained as follows: Assuming the white or safety face of the signal to be in the direction of an approaching train and it is desired to set the signal to the red or danger side, the operator in the tower-house turns the switch S over to the terminal X^5, as indicated by dotted lines in Fig. 1. This being done, by rotating the generator G an alternating current is then sent through the permanent wire *a* and the wire *a'* from the terminal X^5 to the electromagnet X, which being energized pulls its coacting armature into engagement therewith and closes a circuit from the generator through the motor M, whose magnets being constantly polarized effects an oscillatory motion of the armature 6, which motion by reason of the oscillation of the lever 7 effects a continuous rotation of the toothed wheel 9 in the direction indicated by the arrow and correspondingly rotates the shaft 8, which operation continues until the shaft 8 shall have made a half-revolution, at which time the stop member connected with the rock-shaft 13 on the end adjacent that of the armature close down against the magnet X will be in the path of movement of the radial projection 12, connected with the shaft 8, and thereby prevent the shaft from rotating further, irrespective of the continuation of

electrical energy in the magneto-electric motor or in the electromagnet X. The signal having been thus sent, the operator in the tower-house turns the switch S back to the neutral position, (shown in Fig. 1,) it being obvious that should he desire to bring the safety or white side of the signal in view it is only necessary to turn the switch S to the terminal Y^5 and operate the magneto-generator G the same as before, at which time the shaft 13 will be rocked and the stop which last engaged the member 12 will be disengaged therefrom and the shaft 8 permitted to continue in its rotation until it completes another half-revolution to bring the white side of the signal again in place, when its rotation will be again arrested by the other stop controlled by the rock-shaft 13.

While the broad construction and arrangement of parts shown in the accompanying drawings and herein described present a practical arrangement of mechanism for effecting the generic results described, yet I desire it understood that I do not confine myself to the exact details of construction and arrangement of parts, as these may be modified or varied without departing from the spirit of my invention or the scope of the appended claims.

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

1. A magneto-electric semaphore, comprising a rotatable semaphore-carrying shaft, said shaft having a stop-finger near one end, a magneto-electric motor for imparting motion to said semaphore-carrying shaft, electromechanical devices for limiting the rotary movement of the semaphore-shaft, said electromechanical device including a horizontally-disposed shaft, a U-shaped member carried by said horizontally-disposed shaft, said member having lugs for engaging with the finger on the semaphore-carrying shaft, electromagnets for imparting an oscillatory motion to the said horizontally-disposed shaft, and an alternating magneto-generator for energizing the motor and the electromagnets for the purposes described.

2. A magneto-electric semaphore comprising a rotatable semaphore-shaft, a finger mounted near the lower end of said shaft, a ratchet-disk mounted upon the lower end of said shaft, an electromechanical detent for engaging with the finger on the semaphore-carrying shaft for limiting the movement of the said shaft, a magneto-electric motor including a reciprocating armature, connections between the said armature and the ratchet-disk, on the semaphore-shaft for imparting a rotary motion to the said shaft and a single electrogenerating mechanism for energizing the motor and the electromechanical detent device, said magneto-electric motor being adapted to operate by means of an alternating current, substantially as shown and for the purposes described.

3. A magneto-electric semaphore, comprising a base, a semaphore-carrying shaft mounted on said base, a finger mounted near the lower end of said shaft, a ratchet-disk mounted upon the lower end of said shaft, a horizontally-disposed shaft mounted upon said base, a U-shaped member connected to said horizontally-disposed shaft at one end thereof, said U-shaped member having lugs for engaging the finger on the semaphore-carrying shaft at predetermined times, electromagnets for imparting an oscillatory movement to the horizontally-disposed shaft at predetermined times, a magneto-electric motor including a reciprocating armature mounted upon said base, connections between said reciprocating armature and the ratchet-disk upon the semaphore-shaft whereby the oscillation of the motor-armature will impart a rotary motion in one direction only to the semaphore-carrying shaft, as and for the purposes specified.

4. In a mechanism as described, a rotatable signal-carrying shaft, a magneto-electrical motor for driving said shaft, a detent mechanism for stopping the motor action on the rotary shaft at predetermined intervals, said detent mechanism including a rock-shaft having stop devices for coöperating with the rotary signal-shaft, said rock-shaft having a pair of oppositely-disposed armatures, an electromagnet for each armature, a generator for the motor and the electromagnets, and switch devices in the generator-circuit for shifting the generator-current into either magnet, at will, all being arranged substantially as shown and described.

5. In a mechanism as described, the combination with the rotary signal-carrying shaft, said shaft having an adjustably-mounted radial projection, a magneto-electric motor for imparting a rotary motion to the said shaft, a detent mechanism consisting of a rock-shaft having oppositely-projected arms, each arm having a member projected in the path of the movement of the radial projection on the signal-shaft, a pair of oppositely-disposed armatures mounted on the rock-shaft, a separate magnet for each armature, a generator for energizing the magnets and the motor, and switch devices in the generator-circuit for shifting the generator-current into either one of the magnets, at will.

6. In a semaphore mechanism of the character described, the rotatable shaft having a radially-extending supporting-arm, provided with a roller-bearing, a weighted semaphore-plate holder, adapted to rotate with the shaft by frictional contact, supported thereon for free movement, and adapted to gravitate to a normal position, substantially as shown and for the purposes described.

7. In a semaphore mechanism of the character described, the combination with the rotary shaft, said shaft having a laterally-projecting supporting-arm, provided with a roller-bearing, a semaphore-plate holder, consisting of the weighted hub centrally apertured to re-

ceive the end of the rotary shaft, said hub having oppositely-disposed annular camways for engaging the roller-bearing of the radial supporting member, the camway and the bearing being relatively arranged, whereby the weighted hub with the semaphore will gravitate to a predetermined or normal position, substantially as shown and for the purposes described.

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