

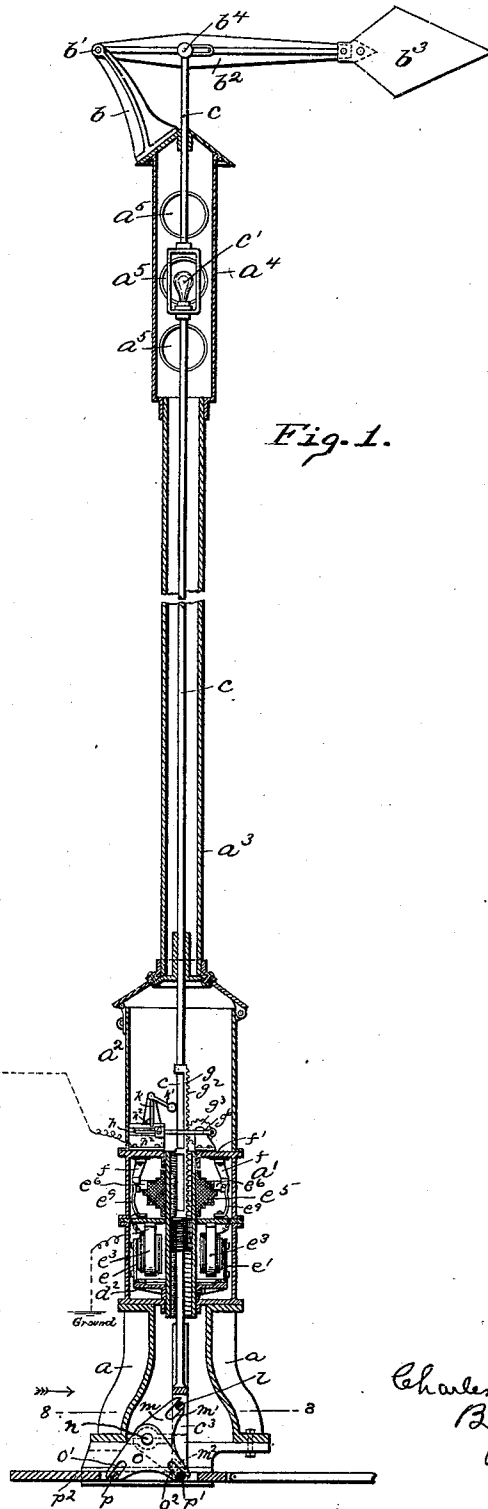
(No Model.)

5 Sheets—Sheet 1.

C. A. GEISSENHAINER.
SWITCH AND SIGNAL APPARATUS.

No. 580,973.

Patented Apr. 20, 1897.



Witnesses:

Wm. H. Harniss
Robert C. Follen

Inventor:
Charles A. Geissenhainer
By Kay Mottin
Attorneys:

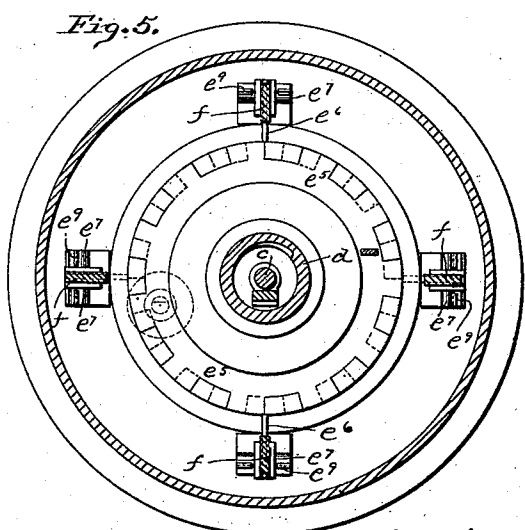
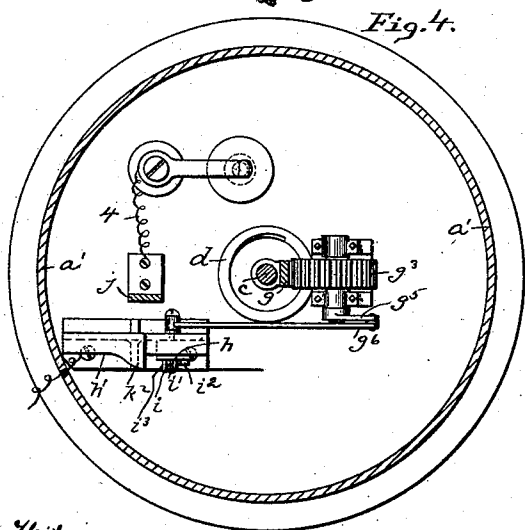
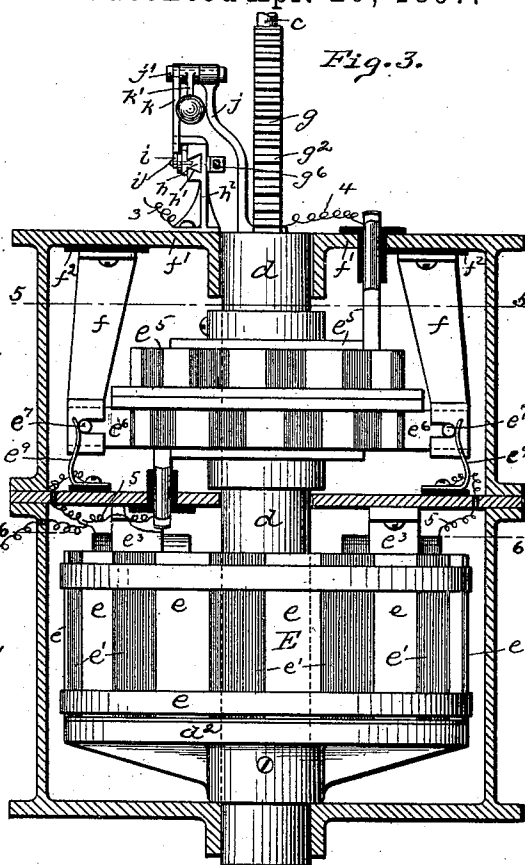
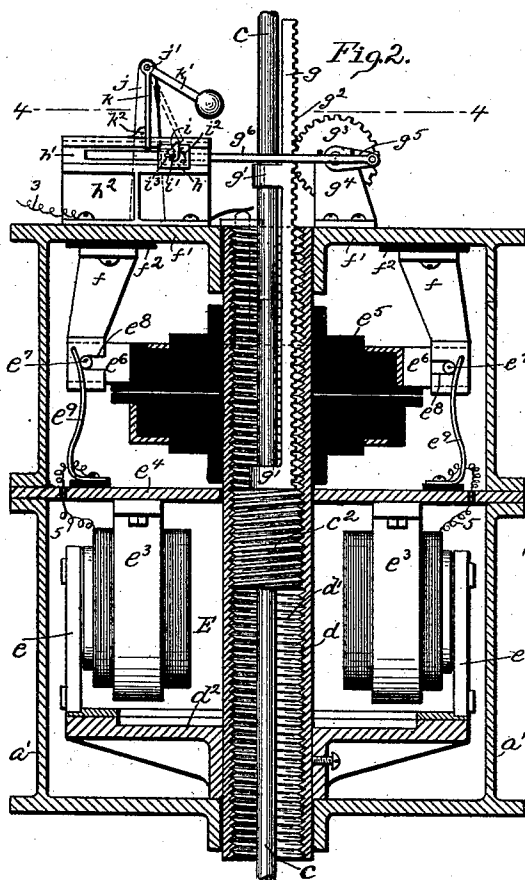
(No Model.)

5 Sheets—Sheet 2.

C. A. GEISSENHAINER.
SWITCH AND SIGNAL APPARATUS.

No. 580,973.

Patented Apr. 20, 1897.



Witnesses:

Walter Yamasie
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Attorneys.

(No Model.)

5 Sheets—Sheet 3.

C. A. GEISSENHAINER.
SWITCH AND SIGNAL APPARATUS.

No. 580,973.

Patented Apr. 20, 1897.

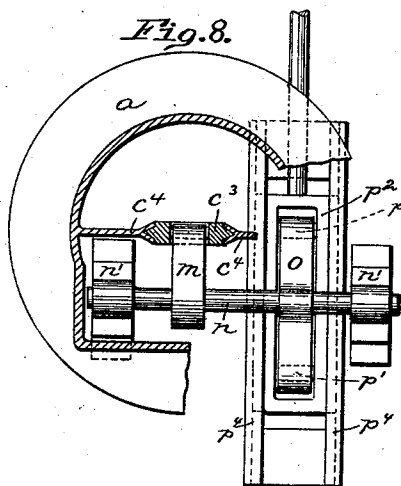
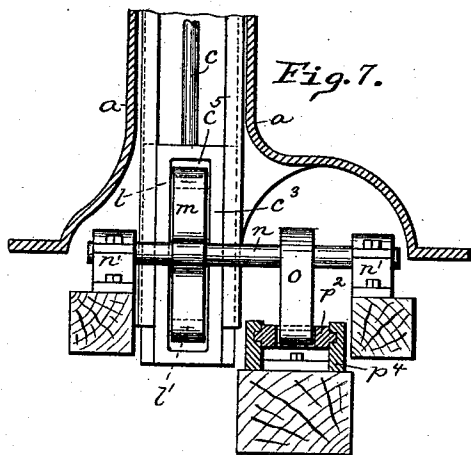
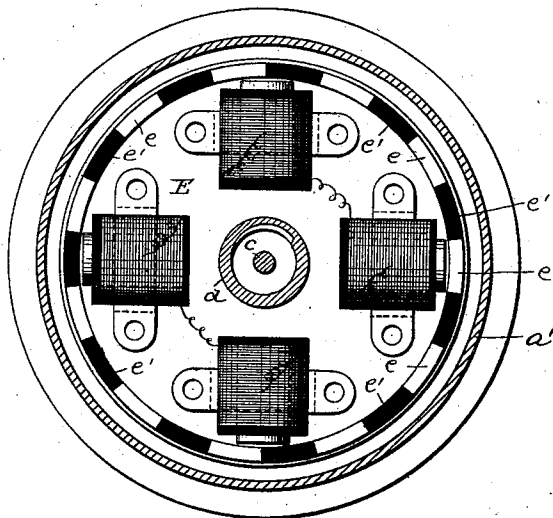


Fig. 6.



Witnesses:

Wm. V. Varnum
Robert C. Totten

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Attorneys.

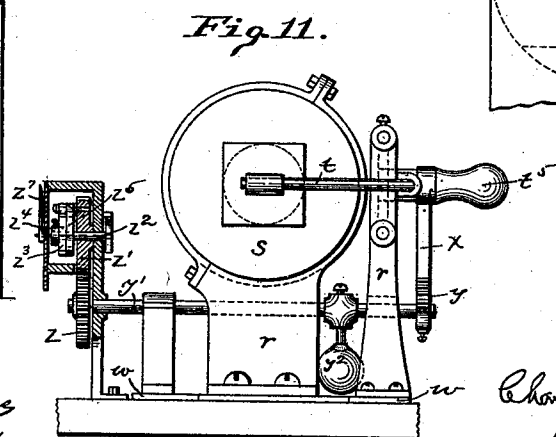
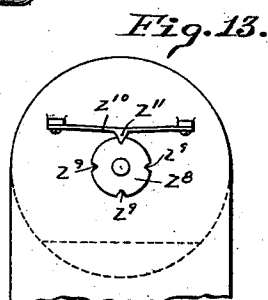
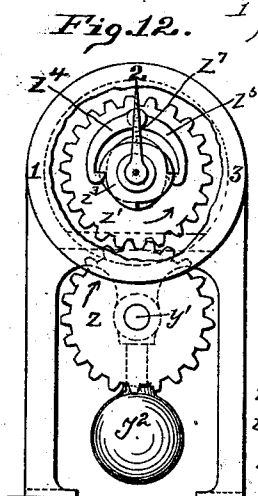
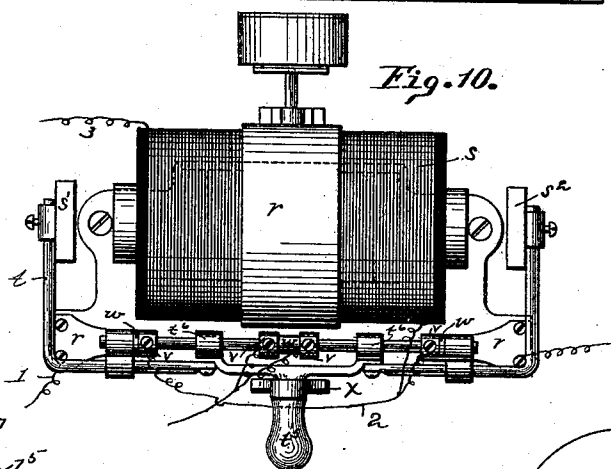
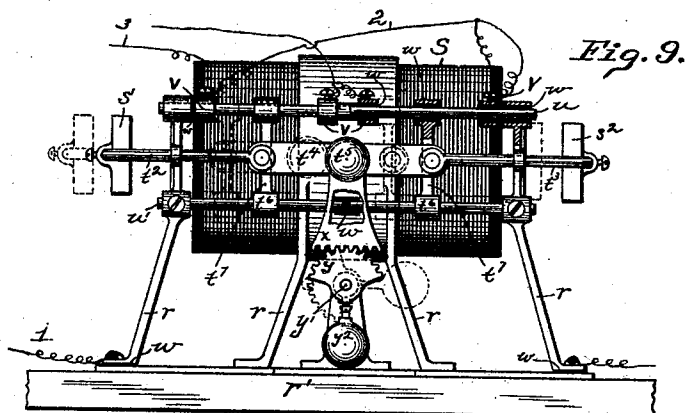
(No Model.)

5 Sheets—Sheet 4.

C. A. GEISSENHAINER.
SWITCH AND SIGNAL APPARATUS.

No. 580,973.

Patented Apr. 20, 1897.



Witnesses:

Walter H. Harniss
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Inventor:

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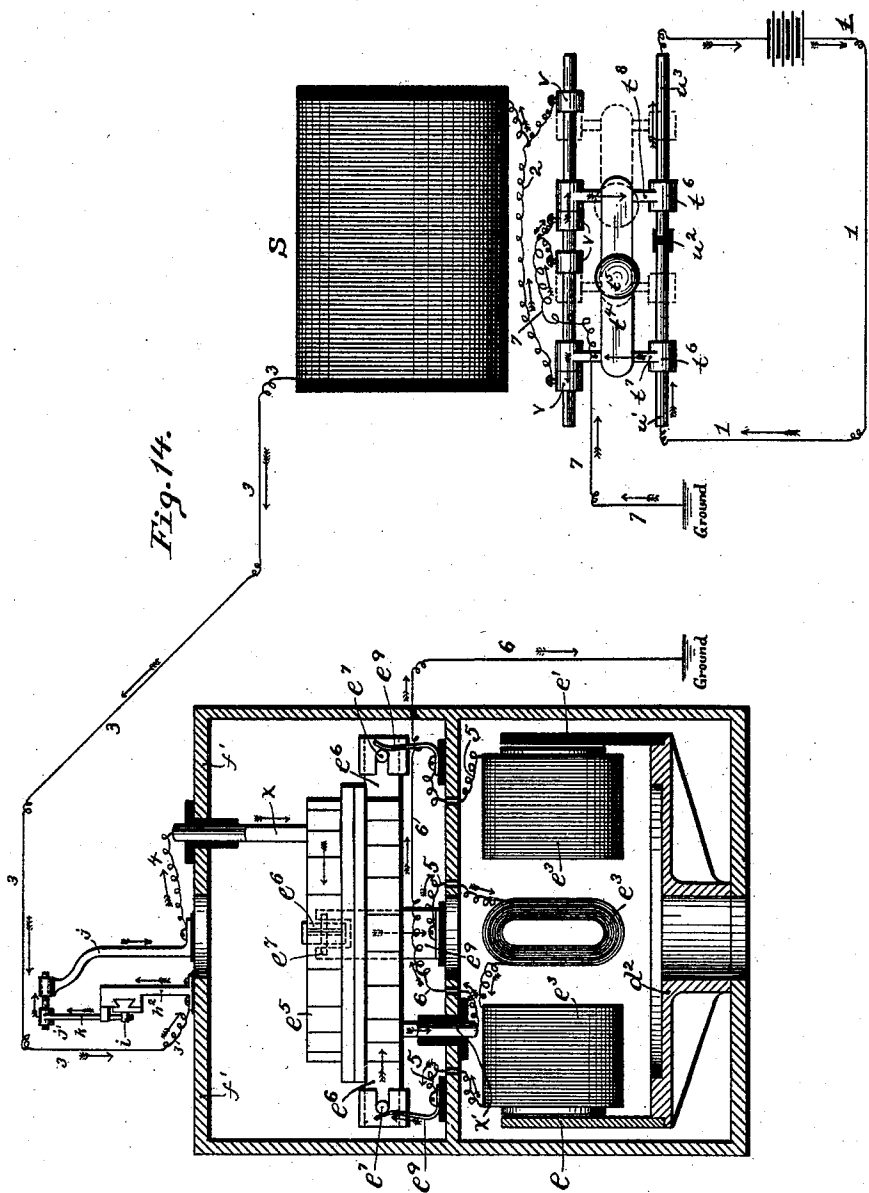
(No Model.)

5 Sheets—Sheet 5.

C. A. GEISSENHAINER.
SWITCH AND SIGNAL APPARATUS.

No. 580,973.

Patented Apr. 20, 1897.



Witnesses:

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Inventor:
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By Kay & Gotten
Attorneys

UNITED STATES PATENT OFFICE.

CHARLES A. GEISSENHAINER, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR
OF THREE-FOURTHS TO GEORGE W. GEISSENHAINER, CHARLES G. SMITH,
AND ALBERT W. SMITH, OF SAME PLACE.

SWITCH AND SIGNAL APPARATUS.

SPECIFICATION forming part of Letters Patent No. 580,973, dated April 20, 1897.

Application filed May 25, 1896. Serial No. 592,929. (No model.)

To all whom it may concern:

Be it known that I, CHARLES A. GEISSENHAINER, a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have
invented a new and useful Improvement in
Switch and Signal Apparatus; and I do hereby
declare the following to be a full, clear,
and exact description thereof.

My invention relates to electrically-operated switch and signal apparatus, its object being to provide a simple form of apparatus which will be very positive and sure in its action.

My invention comprises certain novel features in connection with such apparatus, all of which will be fully hereinafter set forth and claimed.

To enable others skilled in the art to make and use my invention, I will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 is a vertical section of my improved apparatus. Fig. 2 is an enlarged vertical section of the motor and its connections. Fig. 3 is a like view taken at right angles to Fig. 2. Fig. 4 is a section on the line 4 4, Fig. 2. Fig. 5 is a section on line 5 5, Fig. 3. Fig. 6 is a section on line 6 6, Fig. 3. Fig. 7 is an enlarged view, partly in section, of the lower end of the apparatus looking in the direction of the arrow, Fig. 1. Fig. 8 is a section on line 8 8, Fig. 1. Fig. 9 is a face view of the device for turning on or shutting off the current to the apparatus. Fig. 10 is a plan view. Fig. 11 is an end view thereof. Figs. 12 and 13 are detail views of track-indicator, and Fig. 14 is a diagrammatic view showing in detail the path of the current from the office instrument to track instrument and return.

Like letters and numerals indicate like parts in each of the figures.

While I do not limit myself to the exact form of my apparatus illustrated in Fig. 1, yet it illustrates a simple and convenient form.

The tower consists of the hollow base or support *a*, upon which the box *a'* rests, said box containing a motor and certain other parts, hereinafter more fully described, and

sheltering said parts from injury. This box *a'* may be provided with a suitable door *a²*, affording access to the interior thereof. Extending up from the box *a'* is the tube *a³*, connected at its upper end to the signal-box *a⁴*, which has the openings *a⁵* covered with colored glass for signaling purposes. On top of the signal-box *a⁴* is mounted the arm *b*, to which is pivoted at *b'* the lever *b²*. At the outer end of the lever *b²* is the indicator *b³*.

The lever *b²*, carrying the indicator *b³*, is pivoted at *b⁴* to the rod *c*, said rod extending down to the bottom of the tower. The upper end of the rod *c* carries the signal-light *c'*, which stands opposite one of the openings *a⁵* in whatever position the rod *c* assumes.

At the lower end of the rod *c* is the male screw *c²*, which engages with the female threads *d'* on the sleeve *d*. This sleeve *d* is secured to and revolves with the disk *d²*, said disk being revolved by the electric motor *E*.

The motor illustrated is a simple type of motor, but other types may be employed. This motor *E* is mounted on the disk *d²* and consists of the drum made up of alternate sections *e e'* of insulating and conducting material, respectively. Suspended within the drum *e* are the electromagnets *e³*, said electromagnets being secured to the plate *e⁴*. The commutator *e⁵* is mounted on the sleeve *d*. The brushes *e⁶* are supported in seats formed for them in the hangers *f*, suspended from the plate *f'*. The brushes *e⁶* have the studs *e⁷* formed thereon, which engage with recesses *e⁸* in the hangers *f*. Springs *e⁹* force the brushes *e⁶* into contact with the commutator. Insulating material *f²* is interposed between the hangers *f* and the plate *f'*.

The rack-bar *g* has the rings *g'*, which engage with the rod *c*, said rack-bar ascending and descending with the rod *c*. The teeth *g²* on the rack-bar *g* correspond in number to the length of the stroke of the male screw, and said teeth engage with the spur-wheel *g³*, mounted in bearings *g⁴* on the plate *f'*. The circumference of the wheel *g³* corresponds to the stroke necessary for the movement of the switch. The shaft on which the spur-wheel *g³* is mounted carries a crank *g⁵*, to the wrist-pin of which is attached the pitman *g⁶*. The

other end of the pitman g^6 is connected to the sliding head h , which is adapted to move back and forth in the guide h' on the plate h^2 . The sliding head h carries a pawl or trigger i , set on a stud i' . The trigger i is held in a vertical position by means of the spring i^2 and is only permitted to move in one direction owing to the stop i^3 on the sliding head h opposite to the spring i^2 .

In the rear of the plate h^2 is the standard j . Mounted on a pin j' at the upper end of the standard j is the pendent arm k , said arm being held normally in a vertical position by means of the weighted arm k' . A lug k^2 on the plate h^2 forms a stop for the pendent arm k , so that said arm is only free to swing in one direction.

The lower end of the rod c instead of being round has the portion c^3 , which is angular in cross-section, as shown in Fig. 8. This angular portion c^3 engages with the V-shaped guides c^4 , and in this manner the rod c is held from turning, but is permitted to move up and down. The angular portion c^3 of the rod c has the opening c^5 therein, within which are located the pins $l l'$. A bell-crank lever m is keyed on a shaft n , mounted in bearings n' at the base of the tower. This bell-crank lever m has the recesses $m' m^2$ formed at its outer ends, with which the pins $l l'$ respectively engage. A similar bell-crank lever o is keyed to the same shaft n at right angles to the lever m . This lever o has also the recesses $o' o^2$ formed in its outer ends, adapted to engage pins $p p'$ on the switch-lever p^2 , which moves in guides p^4 , as shown in Fig. 7.

Figs. 9, 10, and 11 illustrate the device for turning on and shutting off the current to the motor E. This instrument is to be located at suitable switch-stations which are situated at convenient distances along the road.

The frame r of the instrument is mounted on the plate r' . Supported on the frame r is the electromagnet s . The armatures $s' s^2$ are secured to the inwardly-extending portions $t t'$, respectively, of the rods $t^2 t^3$. The rods $t^2 t^3$ are connected to connecting-strap t^4 . The strap t^4 has the handle t^5 . Rings t^6 on the fingers t' on the strap t^4 are adapted to move along the rods $u u'$. The rings v on the rod u act as stops for the movement of the fingers t' in both directions. The letter w throughout Figs. 9, 10, and 11 indicates insulating material.

Depending from the handle t^5 is the toothed plate x , said plate engaging with the teeth of the sector y , keyed to the shaft y' . The weight y^2 is attached to the shaft y' , and said weight is adapted to hold said sector y normally in the position shown in full lines in Fig. 9.

On the shaft y' is a gear-wheel z , which meshes with the gear-wheel z' , loosely mounted on the shaft z^2 , said shaft carrying ratchet z^3 , keyed thereto and revolving therewith.

The gear-wheel z' carries two pawls $z^4 z^5$, which act upon the ratchet z^3 to revolve shaft z^2 . At the forward end of shaft z^2 is the finger z^7 , so connected as to revolve therewith. At the rear end of said shaft, as shown in Fig. 13, is the wheel z^8 , having indentations z^9 in its periphery. The shaft z^2 is held from following the return movement of the gear z' by means of the leaf-spring z^{10} , which holds the lug z^{11} in the indentations in wheel z^8 . This keeps the finger z^7 from moving except when ratchet z^3 is acted upon by one of the pawls $z^4 z^5$. As shown in Fig. 12, the hand points to No. 2, which indicates that the central track is open. Now if the operator wishes to throw the switch over to track 1 he moves the handle t^5 in direction of arrow, Fig. 10, thus moving weight y^2 to position shown in dotted lines, Fig. 9, the gear-wheels $z z'$ revolving in direction of arrows shown in Fig. 12. The pawl z^5 will engage the ratchet z^3 and carry the finger from the point 2 till it registers with 1. The pawl z^4 will drop by its own weight from the ratchet z^3 , and when the electric current is broken the weight y^2 returns the frame carrying the contacts t^6 to their normal positions and the gears $z z'$ follow the reverse movement of the shaft y' . The lug z^{11} , however, engaging with the indentations z^9 of wheel z^8 , keeps the shaft from returning until the switch is moved in the reverse direction from that shown by arrow, Fig. 10. It will be noticed that upon the return movement of the shaft, as just described, the pawls $z^4 z^5$ return to the position shown in Fig. 12 without acting upon the ratchet to turn the shaft, the pawl z^5 riding freely over the ratchet, and the pawl z^4 , being kept in a vertical position by its own weight, does not engage with the tooth of the ratchet z^3 until the normal position is reached.

The wires for carrying the current are represented by the numerals 1 2 3 4, &c.

The operation of my improved apparatus is as follows: When the indicator b^3 is in the position shown in Fig. 1 and it is desired to raise it and at the same time operate the switch, the operator at the proper station throws the handle t^5 to the left, bringing one pair of the rings t^6 into contact with the stop v and the armature s' into contact with the core of the electromagnet s . The current passes from the battery by wire 1 to the frame r , along the rod u' , through the finger t' , as shown in dotted lines, Fig. 9, to the ring v , thence by way of the wire 2 to the coils of the electromagnet, and from the coils by the wire 3 to the motor E. The wire 3 is connected to the plate h^2 , so that the current is conveyed therefrom to the arm k , down the standard j , along the wire 4 to the brush x , thence to the commutator c^3 . The current thus brought to the commutator is collected therefrom by the brushes e^6 and carried through the spring e^9 , wire 5, to one pair of the electromagnets, whereupon the drum e will be rotated together with the sleeve d and commutator c^3 , the current pass-

ing alternately into each pair of magnets. After passing through the magnets the current returns by the other wire (marked 5) to the other spring e^9 , through brush e^6 to the lower commutator, thence through the brush a' and wire 6 to the ground. From the ground it follows wire 7 to the ring v' , along the finger t^8 to bar u^3 , (the bars u' and u^3 being insulated from each other at u^2), and thence to battery.

The rotation of the sleeve d with its female threads engaging the male screw c^2 will elevate the rod c . As the rod c ascends the indicator b^3 will be raised to give the signal, or if it be at night the signal-light c' will be opposite the top opening a^5 . Furthermore, as the rod c ascends, the pin l , engaging with the recess m' , will raise the lever m and rock the shaft n . The other lever o will move with its recess o' in engagement with the pin p on the switch-lever p^2 , the recess o^2 disengaging itself from the pin p' of the switch-lever p^3 at the same time. In this manner the switch-lever p^2 will be drawn in and the switch operated. Meanwhile by the ascent of the rod c the rack-bar g has revolved the spur-wheel g^3 , causing said wheel to make a complete revolution. The first half of the revolution of the spur-wheel g^3 drives the sliding head h over to the extreme left of the guide h' . The trigger i in this movement of the sliding head is permitted to pass the pendent arm k , but upon the last half of the revolution of the wheel g^3 the sliding head h moves back to the right of the guide h' . The trigger i comes in contact with the pendent arm k , and as said trigger is held from turning in that direction it carries the arm k with it to the position shown in dotted lines, Fig. 2, where the pendent arm k is just being freed from the trigger to fall back to its position as shown in full lines. As the current passes by way of the trigger to the pendent arm k and thence to the motor, it is apparent that just as soon as the arm k is released from the trigger the circuit will be broken and the motor stopped. This will occur the instant the indicator b^3 has been raised to the proper position and the switch-lever has been operated. At the same time the instant the circuit is broken the magnet of the electromagnet s will be demagnetized, whereupon the weight y^2 on the shaft y' will move the sector y back to the position shown in full lines, Fig. 9. The sector working in the teeth of the plate x will bring the parts of the instrument to the positions shown in Fig. 9, when the current will be shut off.

To reverse the current and lower the indicator, it is only necessary to push the handle t^5 to the right, when the operation hereinbefore described is repeated in a reverse direction. The current will follow wire 1 to the bar u' and finger t^7 , as before; but the finger now being in the position shown in dotted lines, Fig. 14, the current passes to the ring v' first, thence through wire 7 to ground, and, as will be readily seen, the current will follow a course exactly opposite to that hereinbefore

outlined, returning by way of wire 3, magnet s , wire 2, ring v , finger t^8 , and bar u' to battery.

I do not limit myself to the exact construction set forth in the drawings, but claim all equivalent constructions. It is apparent that the apparatus may be employed for signaling purposes alone, or, if desired, only for switching purposes, and that it may be employed in a horizontal position where it is convenient to operate it in that way.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In apparatus for operating switches or signals, the combination of a longitudinally-movable rod, a screw on said rod, a rotatable sleeve engaging said screw, an electric motor on said sleeve, tripping mechanism for cutting off the current to said motor, and connections between said rod and said tripping mechanism, substantially as set forth.

2. In apparatus for operating switches or signals, the combination of a longitudinally-movable rod, an electric motor for operating said rod, said rod having teeth thereon, a spur-wheel engaged by said teeth, tripping mechanism for cutting off the current to said motor, and connections between said spur-wheel and said tripping mechanism, substantially as set forth.

3. In apparatus for operating switches or signals, the combination of a longitudinally-movable rod, an electric motor for operating said rod, a rack-bar on said rod, a spur-wheel engaged by said rack-bar, a sliding trigger adapted to cut off the current from said motor, and connections between said sliding trigger and said spur-wheel, substantially as set forth.

4. In apparatus for operating switches or signals, the combination of a longitudinally-movable rod, an electric motor for operating said rod, a rack-bar on said rod, a spur-wheel engaged by said rack-bar, a sliding head, connections between said spur-wheel and sliding head, a trigger on said sliding head, a pendent arm engaged by said trigger, and electrical connections between said trigger and said motor, substantially as set forth.

5. In apparatus for operating switches or signals, the combination of a longitudinally-movable rod, an electric motor for operating said rod, a sliding trigger, connections between said rod and said trigger, a pendent arm engaged by said trigger, and electrical connections between said trigger and said motor, substantially as set forth.

6. In apparatus for operating switches or signals, the combination of a longitudinally-movable signal-rod, an electric motor for operating said rod, a sliding trigger, connections between said rod and said trigger, a pendent arm engaged by said trigger, a stop in the path of said arm and electrical connections between said trigger and the motor, in one direction, substantially as set forth.

7. In apparatus for operating switches or

signals, the combination of a longitudinally-movable rod, an electric motor for operating said rod, a sliding trigger, connections between said rod and said trigger, a pendent arm engaged by said trigger, a stop in the path of said arm in one direction, a weight for holding said arm normally in contact with said stop, and electrical connections between said trigger and said motor, substantially as set forth.

8. In apparatus for operating switches or signals, the combination of a longitudinally-movable rod, an electric motor for operating said rod, a rack-bar on said rod, a spur-wheel engaged by said rack-bar, a crank, a pitman, a sliding head connected to said pitman, a trigger on said sliding head, a pendent arm engaged by said trigger, and electrical connections between said trigger and the motor, substantially as set forth.

9. In apparatus for operating switches or signals, the combination of a longitudinally-movable rod, a bell-crank lever having recesses therein adapted to engage pins on said rod, a second bell-crank lever mounted at an angle to said first bell-crank lever and having recesses therein, and switch-levers having projections thereon engaged by said second bell-crank lever, substantially as set forth.

10. In a device for applying the current to electrically-operated switch, or signal, apparatus, the combination of an electromagnet, a sliding frame, armatures on said frame adapted to be brought into contact with said electromagnet, connections between said frame and a suitable dynamo, and between said frame and the electromagnet, and mechanism for holding both of said armatures normally out of engagement with said electromagnet, substantially as set forth.

11. In a device for applying the current to

electrically-operated switch, or signal, apparatus, the combination with a suitable support, of an electromagnet, a sliding frame on said support, armatures on said frame adapted to be brought into contact with said electromagnet, connections between said support and a suitable dynamo, a toothed arm depending from said frame, a toothed sector engaged by said arm, and a weight on the shaft carrying said sector, and connections between said shaft and a track-indicator, substantially as set forth.

12. In a device for applying the current to electrically-operated switch, or signal, apparatus, the combination of an electromagnet, a sliding frame, armatures on said frame adapted to be brought into contact with said electromagnet, means for transmitting a current to said electromagnet through said sliding frame, and connections between said sliding frame and a track-indicator, substantially as set forth.

13. In a device for applying the current to electrically-operated switch, or signal, apparatus, the combination of an electromagnet, a sliding frame, armatures on said frame adapted to be brought into contact with said electromagnet, means for transmitting a current to said electromagnet through said sliding frame, a shaft adapted to be turned by said sliding frame, and connections between said shaft and a track-indicator, substantially as set forth.

In testimony whereof I, the said CHARLES A. GEISSENHAINER, have hereunto set my hand.

CHARLES A. GEISSENHAINER.

Witnesses:

ROBT. D. TOTTEN,
ROBERT C. TOTTEN.