No. 681,780. Patented Sept. 3, 1901.

# H. T. GIBBS.

## SIGNAL FOR ELECTRIC RAILROADS.

(Application filed Feb. 20, 1901.)

(No Model.) 2 Sheets—Sheet 1.

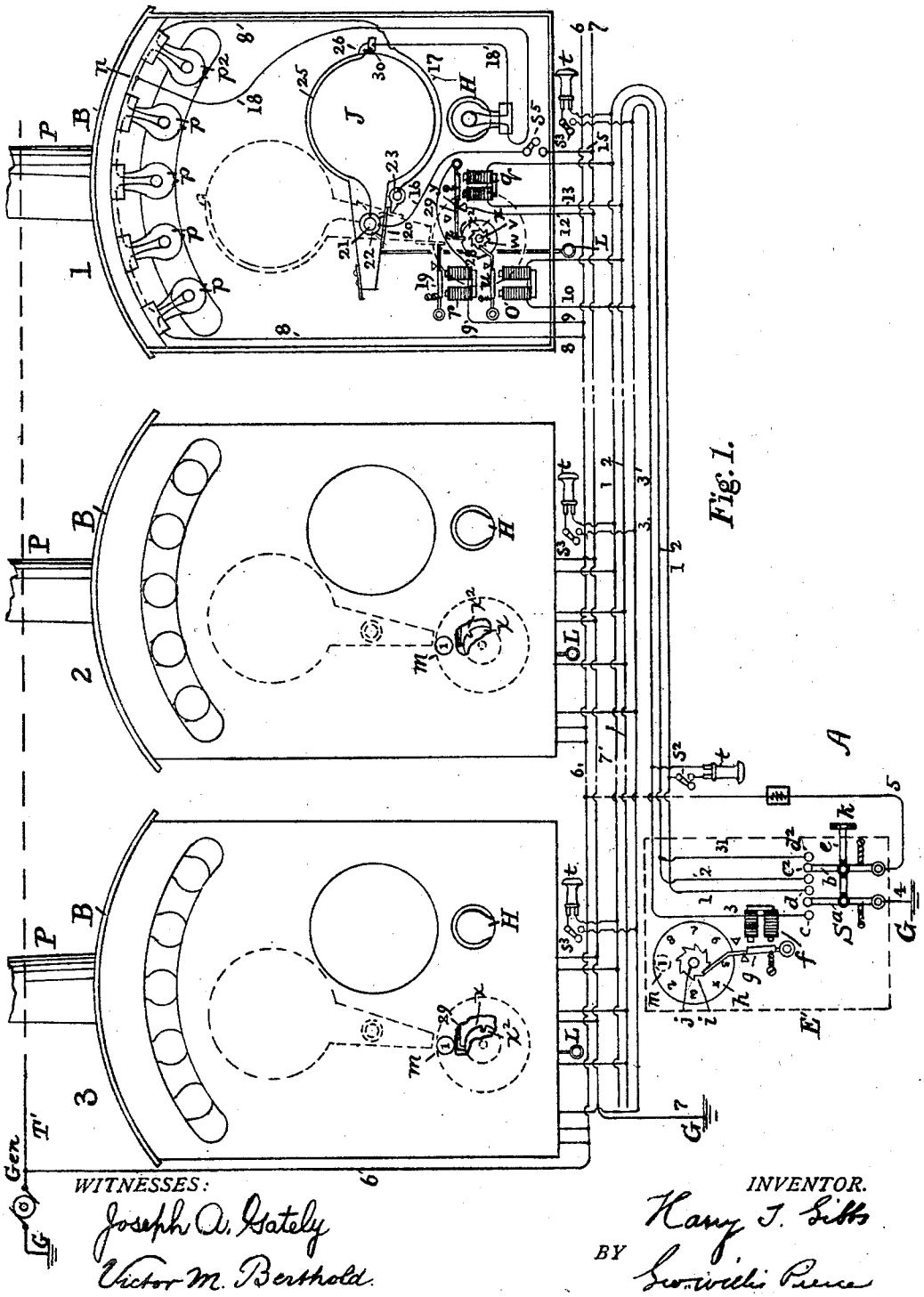

Fig. 1.

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*Fig. 2.*

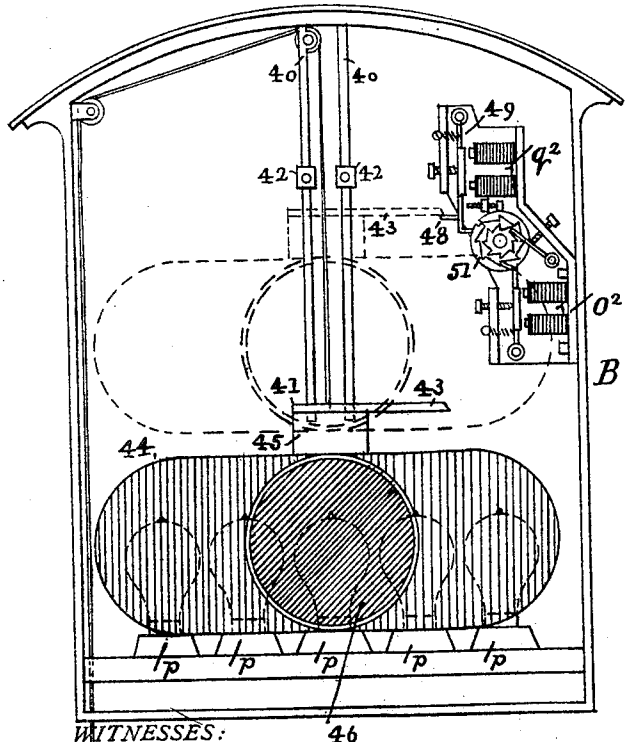
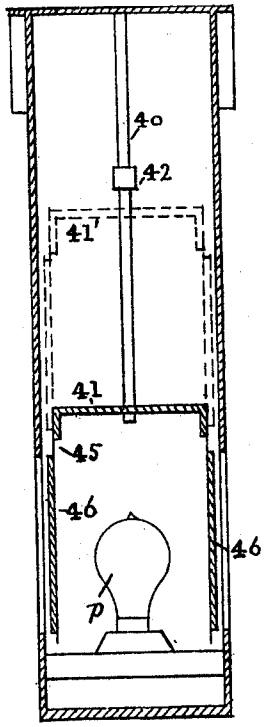



*Fig. 3.*

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# UNITED STATES PATENT OFFICE.

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## SIGNAL FOR ELECTRIC RAILROADS.

SPECIFICATION forming part of Letters Patent No. 681,780, dated September 3, 1901.

Application filed February 20, 1901. Serial No. 48,131. (No model.)

*To all whom it may concern:*

Be it known that I, HARRY T. GIBBS, residing at Portsmouth, in the county of Newport and State of Rhode Island, have invented certain Improvements in Signals for Electric Railroads, of which the following is a specification.

The present invention relates to signaling systems for electric railroads, and especially to the long single-track roads which extend across the country between small towns and which employ sidings or turnouts, upon which one or more cars stop to permit other cars coming in the opposite direction to pass.

The invention particularly relates to improvements in the system disclosed in Patent No. 655,765, granted to me October 31, 1899, to which reference is made. In this patent I have shown a signaling system consisting of a telephone-circuit extending from a power or other central station along the route of an electric railway, the conductors being carried upon the trolley-conductor-supporting poles and have provided telephone apparatus inclosed in suitable boxes, which are attached to the poles at required intervals, especially at the turnouts or sidings, and associated therewith are signals consisting of a series of electric lamps in a casing and also a semaphore-signal, by means of which special day and night signals may be set from the central station in order to call the attention of the motorman and conductor of a car, so that they may stop the car and receive a telephone-message. The present invention provides means whereby any number of such signal-stations may be located on a line of electric railway, and at any desired one of the stations signals may be set from a distant station to the exclusion of all of the others. The invention also consists in a new and improved form of signal-box and in the circuits devised to carry out the said improvements, all of which I will now proceed to describe, and point out in the appended claims.

Of the drawings which form a part of and illustrate the invention, Figure 1 is a diagram of the signaling system, showing three sub or post stations upon a circuit in connection with a central station. Fig. 2 illustrates a signal-box with its front removed, and Fig. 3 is a vertical section of Fig. 2.

Referring to Fig. 1, A represents a central station, and 1, 2, and 3 are sub or post stations on the line of an electric railroad. At the station A the parts inclosed in the dotted line E are in practice contained within a box or casing and consist of the double switch S and of the two pivoted bars *a* and *b*, connected by the rod *e*, but insulated therefrom. Upon the end of the rod is a button *k*. The bars are held in equilibrium by the springs *s s*. The bar *a* is grounded by the wire 4. *c*, *d*, $c^2$, and $d^2$ are button-terminals, respectively, of the conductors 3, 1, 2, and 30, with which the ends of the bars *a* and *b* are adapted to make contact. The electromagnet *f* is included in the conductor 3, and its armature *g* terminates in a detent, which is adapted to engage the ratchet-wheel *i*, secured to a shaft *j*, to which is also attached the disk *h*, upon the outer edge of whose face are the numerals "0, 1, 2, 3, 4, 5, 6, 7."

The conductors 3 2 1 extend to the post-stations and have branches extending into the signal-boxes B, which are secured to the trolley-poles P. Conductors 6 and 7 also extend to each signal-box, the former being connected to the trolley-conductor, while the latter is grounded. A separate wire 6 may be brought down the poles from the trolley-conductor and attached thereto at each signal-box, and a separate wire 7 may extend to the ground at each box and probably would be the case in practice. A wire 5 connects the switch-bar *b* with the trolley-conductor 6, and at all of the stations a telephone *t* is in a normally open bridge 38 between the conductors 3 and 1. The signal apparatus within the boxes B is much the same as in the patent referred to. There are a series of lamps in the wire 8, which connects with the wire 6, which includes all the lamps when the semaphore J is raised, as shown in dotted lines, when fixed terminal 23 of the wire 8 connects with the plate 17, in connection with the ring 22, which is one terminal of wire 16, the other being the switch $s^5$, which when closed completes a circuit by wire 15 to ground-conductor 7 and forms a path for current from the

conductor 6 and lights the lamps. A shunt-circuit is provided by wire 18 from point $n$ on wire 8 to the signal-lamp H and the fixed terminal 30. By the present invention I am enabled to select any one of the number of signal-boxes and trip the semaphore at that box and set the signal H thereat, thus attracting the attention of the motorman of a car approaching the selected post-station and bring him to the telephone at said station.

The selective apparatus at each box is the same and consists of the electromagnets $r$, $o$, and $q$. The coils of the magnet $o$ are in the bridge 10 between the conductors 2 and 3, the coils of the magnet $q$ are in the bridge 13 between the conductors 1 and 2, and the coils of the magnet $r$ are in circuit with the wire 9, which connects conductor 6 with the armature 29 of the magnet $q$. The armature 19 of the magnet $r$ when retracted is adapted to hold the semaphore in its upward position, and when it is attracted the semaphore falls by gravity. Between the magnets $o$ and $q$ in suitable bearings is a spindle $v$, to which is secured the ratchet-wheel $w$, the cam $x$, and the wheel $h^2$, upon the edge face of which are numerals corresponding to those upon the wheel $h$ at station A, and a hole $m$ is cut in the front casing of the boxes B, across which the numerals rotate to be seen. The extremity $z$ of the armature 29 rides upon the edge of the cam $x$ and out of contact with the stop $y$, which is connected to the conductor 7 by the wire 12, and in the periphery of the cam is a slot $x^2$ into which the end $z$ of the armature is adapted to fall, and when in this position the armature is in contact with the stop $y$. The armature $u$ of the magnet $o$ terminates in a detent 28, which engages with the teeth of the ratchet-wheel $w$. As stated, the apparatus is the same in each box B, but the location of the cam-slot $x^2$ is different in each box, one being behind the other in rotation, as shown at the boxes, portions being cut away to show this feature at stations 2 and 3. It will be seen that when the armatures 29 are out of the slots connection cannot be had with stops $y$, and therefore the semaphores J cannot be tripped.

In the operation suppose, for example, it is desired to drop the semaphore J at station 1 and set the signal H. The disk $h$ at the stations will normally be at unison, so that "0" shows through the orifices $m$. The operator at station A pushes in the button $k$, and bar $a$ contacts with button $c$ and bar $b$ with button $c^2$, and a circuit is formed from ground G, wire 4, conductor 3, magnet $f$ through the bridges 10 at each signal-box, magnets $o$, conductors 2 and 5, trolley-conductor and ground, and the armature $g$ of magnet $f$ is attracted, as are all the armatures $u$ of magnets $o$ in the signal-boxes. The key is released and the circuit is broken, whereupon the said armatures fall back and rotate their respective ratchet-wheels one tooth. At the same time the cams $x$ at the signal-boxes are rotated, as well as the index-disks $h^2$, and at post-station 1 the slot $x^2$ of the cam is brought under the point $z$ of the armature 29. The operator then pulls out the button $k$, and the bar $a$ is upon $d$, and the bar $b$ is upon $d^2$, and a circuit is made from ground via wire 4, conductor 1, bridge 13, and magnet $q$, conductors 2, 30, 5, and 6, trolley-wire and ground, and the magnet $q$ is magnetized and pulls the armature 29 down, its end $z$ coming into the slot $x^2$, and the armature is closed to the stop $y$, and current flows from generator G on trolley-wire T via conductor 6, wire 9, magnet $r$, armature 29, stop $y$, wire 12, and conductor 7 to ground, and the magnet $r$ being energized attracts its armature and the semaphore drops and the terminal 26 comes into contact with the terminal 30, and as the contact between the terminal 20 and terminal 23 is severed the current is diverted from the right-hand lamp $p^2$ and continues by wire 18, lamp H, wire 25, ring 22, wire 16, switch $s^5$, which has been previously closed to ground-conductor 7, and the lamp H shows as a signal. The switches $s^5$ are closed at night and opened in the morning in order that the lamps $p$ may be lighted as night-signals to indicate that the line is clear. When the switches $s^2$ and $s^5$ are closed, conversation can take place between the conductor of a car and the central-station operator. It will be understood that the usual automatic hook-switches in practice will take the places of the switches shown and that the common apparatus will be used. It will be readily seen that if post-station 2 or 3 or any other number within the limit of the index-disk should be selected the key $k$ would be pushed in the number of times corresponding to the numeral, the cam would be rotated until its slot was under the armature 29 of the magnet $q$, and when the key was pulled out the semaphore would be dropped and the signal-lamp H lighted at the selected station.

Figs. 2 and 3 are front views with the cover removed and a sectional view of a modification of a signal-box. In this case only two magnets are used, $o^2$ and $q^2$, the former to operate the ratchet-wheel 52 and the latter to close the circuit with the stop $y$ and also to trip the semaphore, and all the lamps are lighted all the time when the switch $s^5$ is closed. 40 40 are rods secured to the upper part of the box and are provided with stops 42. The semaphore consists of a frame 41, extending across the box, and has two holes in the top part, through which the rods 40 extend. The top has an extension 43, adapted to be held upon a pin 48, extending from the armature 49 of the magnet $q^2$. Depending from the sides of the frame 41 are plates to which are attached the oblong shutters 44 of some opaque material, in the center of which is a disk 40 of material adapted to show a red color. Ordinarily the semaphore is suspended from the pin 48, as shown in dotted lines; but when the ratchet-wheel has been stepped

around, so that the slot in the cam is opposite the end of the armature 49, and current is passed through the magnet $q^2$ the armature is attracted and the semaphore falls into the full-line position and the lamps are dimmed; but a disk of red light is seen through the part 46. The semaphore is reset by the pull cord or chain L, as is the other semaphore in Fig. 1.

I claim as my invention—

1. In a signaling system for electric railroads, a plurality of signal-stations, at each of which is a series of electric lamps in a branch circuit from the trolley-wire, adapted to be opened and closed by a manual switch, a signal, a selective device, and telephones; electric circuits extending to each station and to a central station, adapted for signaling and conversational purposes between the signal-stations and the central station; with telephones at the central station, and means for sending selective electric impulses to the signal-stations to operate the selective device at any one signal-station and to set the signal, as set forth.

2. In a signaling system for electric railroads, a plurality of signal-boxes, each secured to a support, each box containing a series of electric lamps in a branch circuit from the trolley-wire adapted to be opened and closed by a manual switch, a semaphore-signal, a selective device, and telephones; electric circuits extending to each signal-box and to a central station, adapted for signaling and conversational purposes between the signal-boxes; with telephones at the central station, and means for sending selective impulses to the signal-boxes to operate the selective device at any one signal-box, and to set the semaphore-signal, as set forth.

3. In a signaling system for electric railroads, a plurality of signal-stations at each of which is a series of electric lamps adapted to be lighted by current from a trolley-wire by a manual switch, a signal, and a selective device; telephone apparatus at all of the stations; electric circuits connecting each signal-station with a central station, adapted for signaling and for conversation; with means at the central station for sending selective electric impulses to the signal-stations to operate the selective device at any desired signal-station, and to set the signal, as set forth.

4. In a signaling system for electric railroads, a plurality of signal-stations, at each of which is a series of electric lamps; a signal held undisplayed by the armature of an electromagnet, the helices of which are in a normally open circuit; a selective device consisting of two electromagnets, the armature of one magnet adapted when attracted to close the said normally open circuit, but restrained therefrom by a slotted disk, the armature of the second magnet adapted to rotate the slotted disk; electric circuits uniting the signal-stations and a central station; means at the central station for sending selective electric impulses to the said second magnets at all of the signal-stations, and for sending impulses to the circuit-closing magnets to close the said normally open circuit at one signal-station only and effect the operation of the signal-magnet, and the setting of the signal, as set forth.

5. In a signaling system for electric railroads, a plurality of signal-stations, at each of which is a series of electric lamps; a signal held undisplayed by the armature of an electromagnet, the helices of which are in a normally open circuit, a selective device consisting of two electromagnets, the armature of one magnet adapted when attracted to close the said normally open circuit but restrained therefrom by a slotted disk, the armature of the second magnet adapted to rotate the slotted disk; telephone apparatus at all of the stations; electric circuits connecting each signal-station with a central station, adapted for signaling and for conversation; with means at the central station for sending selective electric impulses to the said second magnets at all of the signal-stations, and for sending impulses to the circuit-closing magnets to close the said normally open circuit at one signal-station only, and effect the operation of the signal-magnet and the setting of the signal, as set forth.

6. In a signaling system for electric railroads, a plurality of signal-stations along the line of the railroad, there being at each station a series of electric lamps, a signal normally held locked and undisplayed, and a device for selectively unlocking the signal and setting the same consisting of an electromagnet whose armature locks the signal; an electromagnet whose armature is locked by a slotted disk, adapted when unlocked to close a circuit through the signal-locking magnet; and a second electromagnet adapted to rotate the said slotted disk and also an index-disk; electric circuits uniting the signal-stations and a central station, switching means at the central station adapted to send selective electric impulses to the said second magnets at all the signal-stations and rotate the slotted disks, and index-disks, at all of the signal-stations, and an index-disk at the central station, and for sending an impulse to the circuit-closing magnet at the selected signal-station to unlock its armature and permit it to close the circuit through the signal-locking magnet, as set forth.

7. A signal-box provided with openings or windows in two opposite sides, electric lamps within the box, an opaque vertically-moving shutter or dimmer having a portion of its area transparent, normally retained above the said windows by a locked detent, and a device for unlocking the detent, consisting of an electromagnet whose armature is adapted to move the detent, and which is normally inoperative, and a second electromagnet

adapted to control the movement of the said armature and remove from its path an obstructing abutment, as set forth.

8. In a signaling system for electric railroads, a plurality of signal-stations with signal-boxes, each provided with openings or windows in two opposite sides, electric lamps within the same, an opaque vertically-movable shutter or dimmer having a portion of its area transparent, normally retained above the said windows by a locked detent, and a device for selectively unlocking the detent, consisting of an electromagnet whose armature is adapted to move the detent, and which is normally inoperative, and a second electromagnet adapted to control the movement of the said armature; electric circuits uniting the signal-stations and a central station, switching means at the central station adapted to send selective electric impulses to the said second magnets at all of the signal-stations, and for sending an impulse to the first electromagnet at the selected signal-station, to unlock the said detent, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 16th day of February, 1901.

HARRY T. GIBBS.

Witnesses:
FRANK G. SWEENEY,
GEORGE B. ANTHONY.