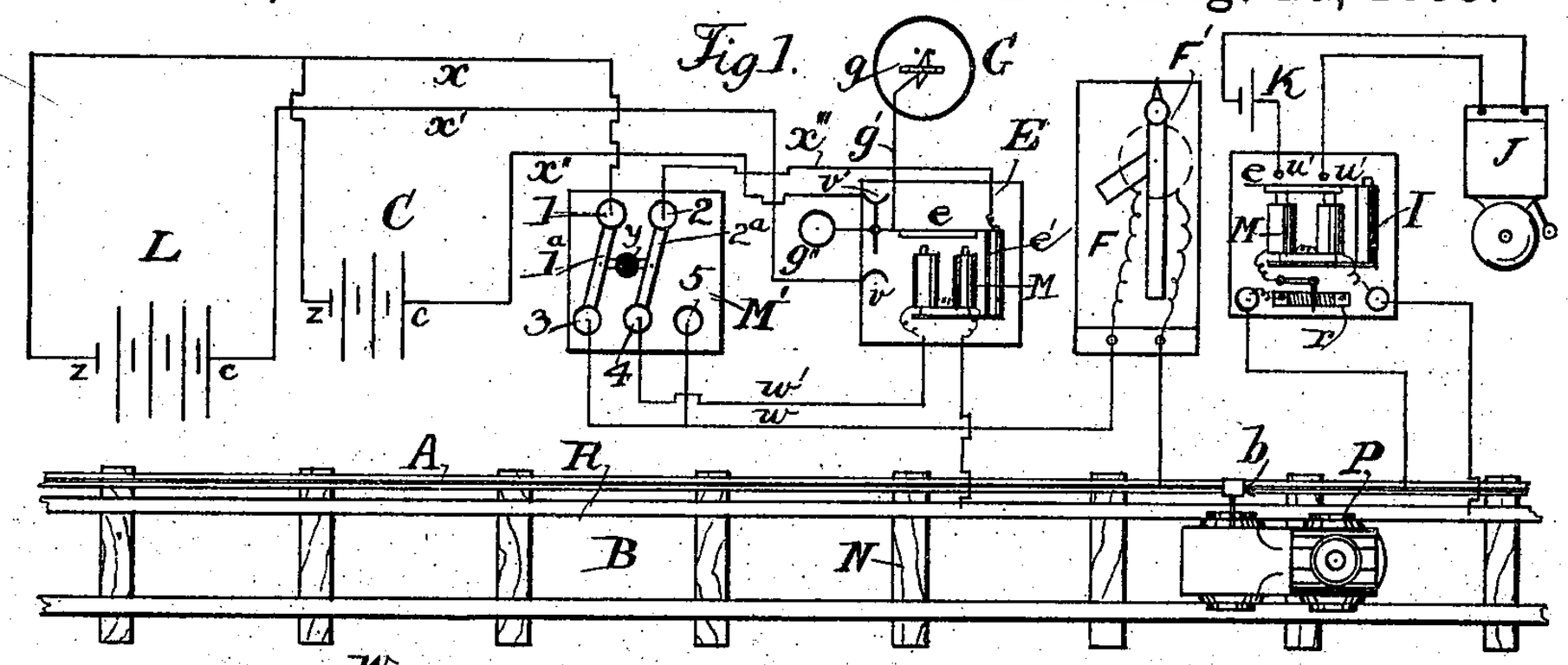
(No Model.)

J. ORME.

SIGNALING APPARATUS FOR RAILWAYS.

No. 503,981. Patented Aug. 29, 1893.

Fig 1.



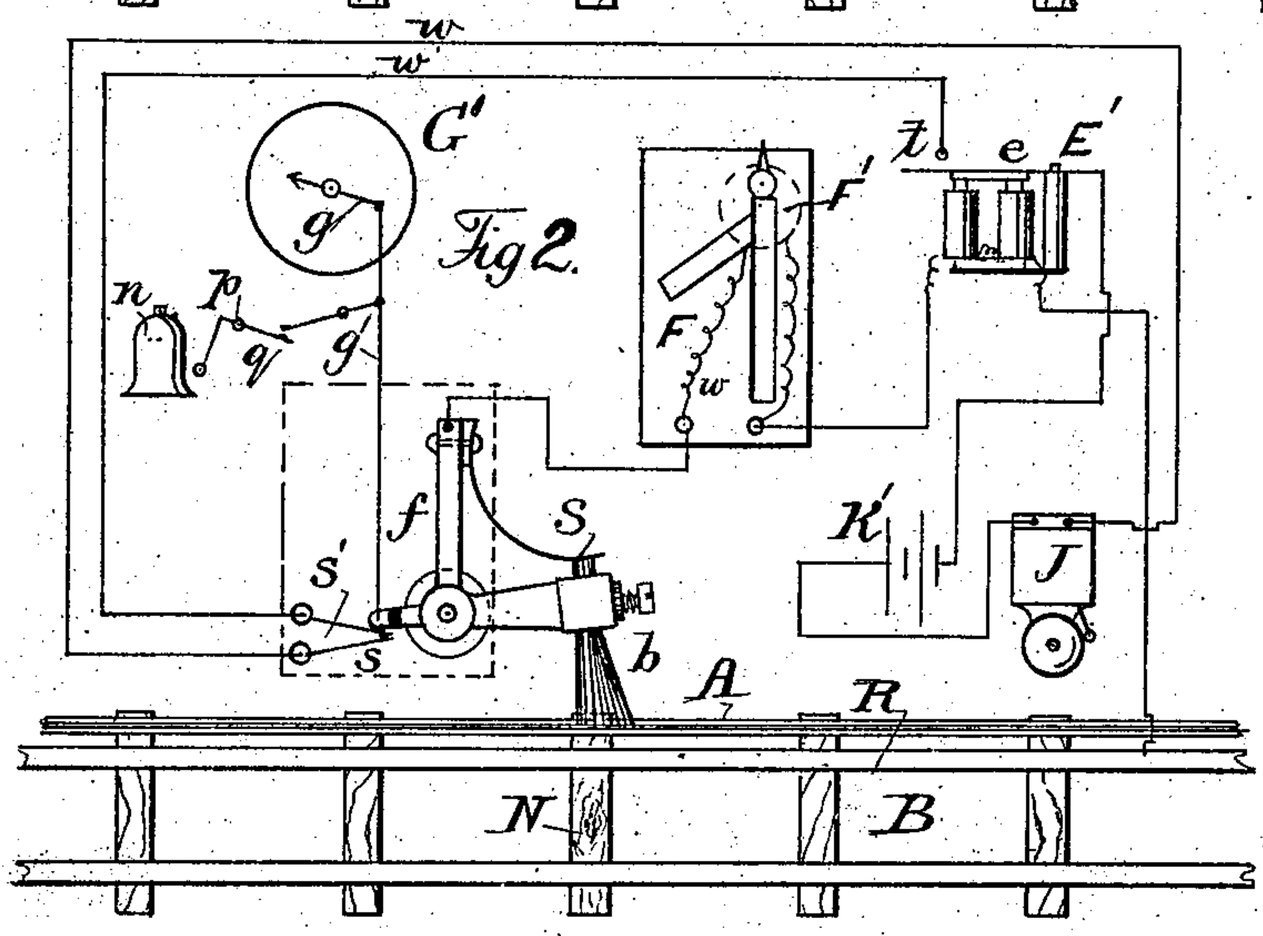


Fig 2.

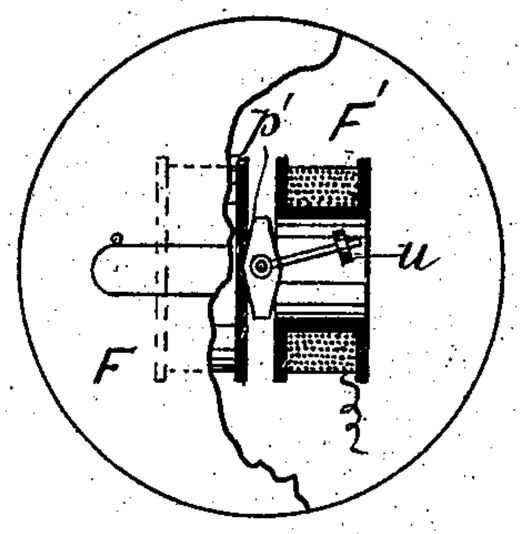


Fig 4.

Fig 3.

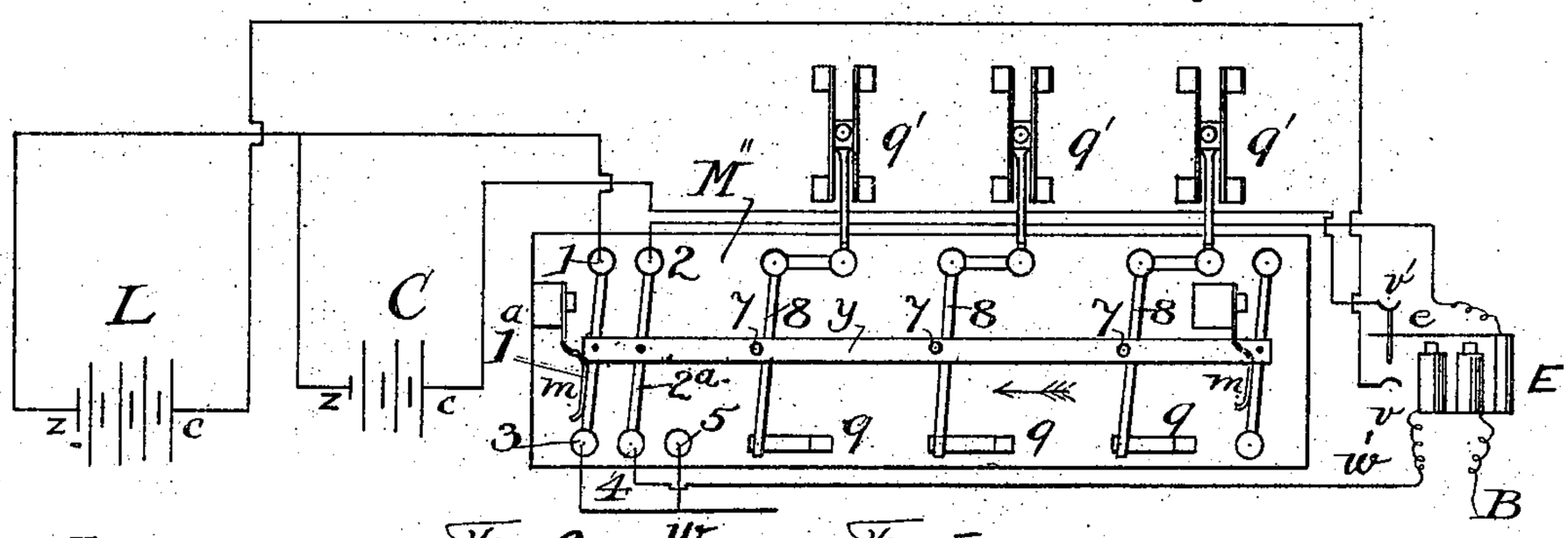
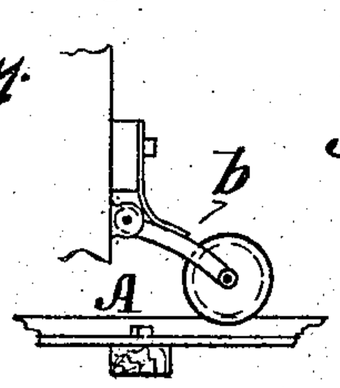
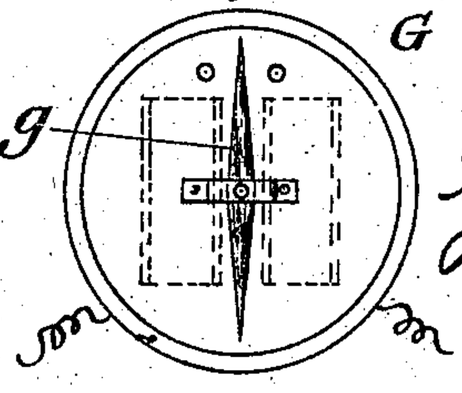


Fig 6

Fig 5.





Witnesses:
W. Harvey Muzzy.
Wm. R. Davis

Inventor.
John Orme
by Wm. H. Babcock
Atty.

UNITED STATES PATENT OFFICE.

JOHN ORME, OF LONDON, ENGLAND.

SIGNALING APPARATUS FOR RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 503,981, dated August 29, 1893.

Application filed December 6, 1892. Serial No. 454,269. (No model.)

To all whom it may concern:

Be it known that I, JOHN ORME, residing at No. 65 Barbican Street, London, England, have invented new and useful Improvements in Signaling Apparatus for Railways, of which the following is a specification.

The object of my invention is to operate by means of a closed electric circuit of alternate direction the particular apparatus hereinafter described and shown in the drawings for the purpose of advising the signalman controlling a section of railway, as well as the engine driver entering the same of the state of the road.

Figure 1. is a diagrammatic view showing the apparatus employed at ordinary signal stations. Fig. 2. is a diagrammatic view showing the apparatus mounted upon the locomotive and the connections thereto. Fig. 3. is a diagrammatic view of the apparatus employed at junctions. Fig. 4. is an enlarged view of cabin or engine semaphore. Fig. 5. is an enlarged view of ordinary single needle dial. Fig. 6. is an enlarged view of roller, replacing brush.

In the drawings L, is the main battery which may be of any constant type. The negative pole *z*, is connected by wire *x*, to the pivot 1, of commutator bar 1^a. The positive pole *c*, is connected by wire *x'*, to the lower spring contact *v*, of relay E.

C, is a battery of smaller size than L, the negative pole *z*, being connected to return wire *x*, common to both L, and C, the positive pole C, being connected by wire *x''* to spring contact V', of relay E. A wire *x'''* also connects the pillar *e'* of relay E, with the pivot 2 of commutator bar 2^a. The contact plates 3, 5, of the commutator M', are connected to wire *w*, an extension of which encircles the coil F', of cabin semaphore instrument F, the other end of this wire being connected to the insulated conductor A, which is mounted upon sleepers N. Contact plate 4, is connected by wire *w'* with one end of the insulated coil M, of relay E, the other end being connected to the rails R, forming part of the permanent way B. The spring tongue *e*, fastened to pillar *e'* of relay E, moves between the spring contacts *v*, *v'*, always resting against one or the other as the case may be; the position of this tongue may be conveniently shown by means of the dial G, the needle upon which *g*, is moved up or down by a connecting wire or cord *g'*, fastened to tongue *e*, or said position may be shown by equivalent means such for instance as a disk *g''*, fastened to the end of tongue *e*, beyond the contact points *v*, *v'*.

J, is an electric bell operated by a local battery K, the circuit of which is closed by tongue *e*, of resistance relay I. One end of the insulated wire surrounding the coils of the magnet M, of this relay is connected to the insulated conductor A, the other to the rail R. I prefer to include within the circuit of the relay a variable resistance *r*, whereby its magnetic sensibility may be adjusted. The above described instruments constitute the apparatus in an ordinary signal cabin.

Fig. 2, shows the apparatus mounted upon a convenient part of the engine, guards, van or other part of the train. This consists of a miniature semaphore indicator F, or an ordinary or transparent galvanometer dial, G', fitted with coil and needle *g*, as shown in Fig. 5, may be used, either form employed being so placed as to be clearly seen by the driver or other official in charge. The dial may be illuminated by a light placed behind it, or thrown upon the face of it by night; one end of the wire *w*, surrounding the coil operating the needle or equivalent, is connected to a brush *b*, pivoted upon an insulated support *f*, attached to the engine or other part of the train, through the contact spring S. This brush when out of contact with the insulated conductor A, which extends for a suitable distance on one side or other of the station, junction, or other place it is desired to protect, is in the horizontal position; the circuit of the semaphore and the train alarm bell J, being then interrupted; upon encountering the conductor A, the brush *b*, is tilted as shown in Fig 2, thereby closing the circuit of the semaphore coil through the relay E', the engine or train wheels P, rails R, and earth. In connection with the brush *b*, is a contact breaker consisting of two springs *s*, *s'* which may be mounted upon an insulated support *f*. These springs are connected by wires *w*, with a separate local battery K' and electric bell J, and form a distinct circuit; one of the wires is led up to contact *t*, which engages with the spring tongue *e*, of relay E', this re-

lay being so arranged as that when a current is passing through its coils, the spring armature *e*, is held down, and the current from battery K′ prevented from actuating the bell J. The engine bell circuit is interrupted at two points, viz: at the contact springs *s*, *s′* which are closed only when the brush *b*, is tilted as shown, and by the tongue *e*, of relay E′. The alarm bell circuit can thus never be completed unless the brush *b*, is raised, and at the same time the spring armature *e*, touches the contact *t*, by reason of absence of current in the semaphore circuit. The object of this particular device is to give warning to the driver or other official in charge of the train, in case the flow of current from the signal cabin along conductor A, is interrupted. When the brush *b*, encounters the conductor A, it is raised and closes the contact springs *s*, *s′* but at the same moment, the current from the cabin traverses the coils of the relay E′, drawing away the spring tongue *e*, from the contact *t*, and breaking the circuit of the bell, which will only ring when no current is flowing from the cabin.

I sometimes employ a mechanical signal upon the engine, which may consist of a dial G, and pointer *g*, operated by a rod *g′*, attached to the insulated tail of brush *b*. A gong or bell *n*, may be suspended so as to be struck by a pivoted hammer *p*, operated by lever *q*, attached to rod *g′*. Thus if the brush *b* should slip from the conductor A it would be immediately announced in the engine by the ascent of rod *g′* and consequent operation of the gong *n*. The lever attached to the rod *g′* when in its normal position has its outer end below the lever *q* and when the brush *b* strikes the conductor A, the rod *g′* descends and the bell is thus operated.

As shown in Fig. 2 the lever attached to rod *g′* is not in its normal position but above lever *q*, so that, when the brush reaches the end of conductor A, the spring *s* will actuate it to turn on its pivot, and rod *g′* will consequently be raised, thus lowering the outer ends of the pivoted indicating levers attached thereto. A cord could be used in place of rod *g′*, in which case the pivoted indicating levers would be made heavier on the outer side of the pivotal point so as to drop by gravity when the cord is slackened.

The operation of my invention as described under Figs. 1, and 2, is as follows:—A current is always flowing from the smaller battery C, through the commutator or reverser M′, the relay E, the semaphore F, and relay I, and the insulated conductor A, and rails R, connecting with earth. The relay I, is so balanced by means of the sliding resistance coil *r*, as that a current passing through it from battery C, shall have sufficient power to hold down its armature, but insufficient to hold down the armature of relay E, the consequence being that the bell circuit J, is interrupted, while the spring armature of relay E, by its upward tension, is pressed against the contact *v′*, connecting it with battery C, thus completing the semaphore circuit through conductor A, and earth, or the rails R. When a train arrives upon a circuit thus arranged, having the apparatus described under Fig. 2, mounted upon the engine or other vehicle, (see Fig. 1,) it short circuits battery *c*, through the brush *b*, the semaphore F, mounted upon it, and the wheels P, connecting with the rails R, and relay E, cutting out the resistance of relay I, and by this means enabling the current flowing from battery C, to hold down the tongue *e*, against contact *v*, which puts the more powerful battery L, into circuit, and operates the controlling instruments upon the train. The tongue of relay I, being no longer held down, closes the bell circuit J, by touching the terminal stops *u′*, *u′*, and warns the signalman that a train has entered his section. Since the indicating instruments are so constructed as to vary their position, if the direction of the current be altered, it is obvious that by shifting the position of the signal cabin commutator to the left or right by means of knob *y*, the direction of the current can be reversed so that, line clear, or blocked, may be conveyed to the driver or other official in the manner well understood. It is also obvious that should the constant current fail from any cause, the fact will be at once notified in the signal cabin, by the ringing of the bell J, the circuit of which is closed by the re-action of the spring of relay I, and upon the engine by relay E, which closes the circuit of the local battery K′, when no current flows through its coils.

The general construction of the miniature semaphore will be understood by the enlarged view shown in Fig. 4. The magnetic needle *p′*, is preferably so balanced by an adjustable weight *u*, as to show danger, should the controlling current fail from any cause. In junctions where two or more lines are controlled by one insulated conductor, I prefer to employ the apparatus described under Fig. 3, in place of the commutator shown in Fig. 1. This consists of a commutator M″, the bars 1^a, 2^a, of which, are coupled to a strip of insulating material *y*. Upon this strip is a series of pins 7, which engage with rocking bars 8, coupled to the ordinary semaphore levers 9′. The commutator bars 1^a, 2^a, move over three contact plates 3, 4, 5, connected as shown in Fig. 1. The rocking bars 8 whether operated by the cabin signal levers, or part of their connection, move between stops 9, and since the contact pins 7, are placed to the left, it follows that each lever when moved in the direction of the arrow, can place the commutator bars in the position shown. Unless, however, the whole of the levers are unlocked, the springs *m*, cannot force back the insulated bar *y*, so as to send a reverse current.

I do not specially confine myself to the particular form of instruments described; for instance, the miniature semaphore may be re-

placed both in the signal cabin and upon the engine, by an ordinary single needle dial similar to that shown at G, Fig. 5. Moreover, the brush employed for closing the circuit with the insulated conductor, may be replaced by a roller or equivalent device, as at Fig. 6, which shall produce the same result.

I lay no claim to the use of an intermittent current of direct or alternate direction, in connection with instruments such as I have described for controlling traffic, but

I claim—

1. In apparatus for signaling on railways, the combination of a commutator or pole changer "M′" with the relays "E I" and semaphores "F" upon the train and on the cabin operated by batteries "L. C." which transmit through a conductor "A" a constant current of varying direction substantially as set forth.

2. In apparatus for signaling on railways the combination of the relay "I" having a variable resistance coil "*r*," with battery "C," bell "J" and relay "E," the whole being arranged so that the two latter can only be operated when the current actuating relay "I" is short circuited by the brush "*b*" and engine wheels "P" substantially as set forth.

3. In apparatus for transmitting signals between the moving train and signal cabin, the combination of the bell "J" upon the engine with relay E′ operating said bell, the local battery "K′," in circuit with said bell, and springs "S S′," closing said bell circuit and controlled by brush "*b*," whereby failure of the constant current is notified to the driver or guard substantially as set forth.

4. In apparatus for signaling between the signal cabin and the moving train the combination of the commutator "M″," the bars of which 1^a 2^a are coupled to the non-conducting strip Y with the rocking bars 8, the levers 9′, connected thereto, and actuating the line semaphore signals, through the pins 7, the springs *m*, stops 9, and circuit connections to the batteries L C, for the purposes set forth.

In testimony whereof I have set my hand, in the presence of two witnesses, this 22d day of November, 1892.

JNO. ORME.

Witnesses:
J. M. BOULLON,
A. CRAWLEY,
Clerks to Messrs. Grain & Sons, Notaries, 46 *Lombard Street, London, E. C.*