O. M. FELIX & G. GRAY.

BLOCK SIGNALING SYSTEM FOR RAILROADS.

APPLICATION FILED DEC. 19, 1908.

946,426.

Patented Jan. 11, 1910.

2 SHEETS—SHEET 1.

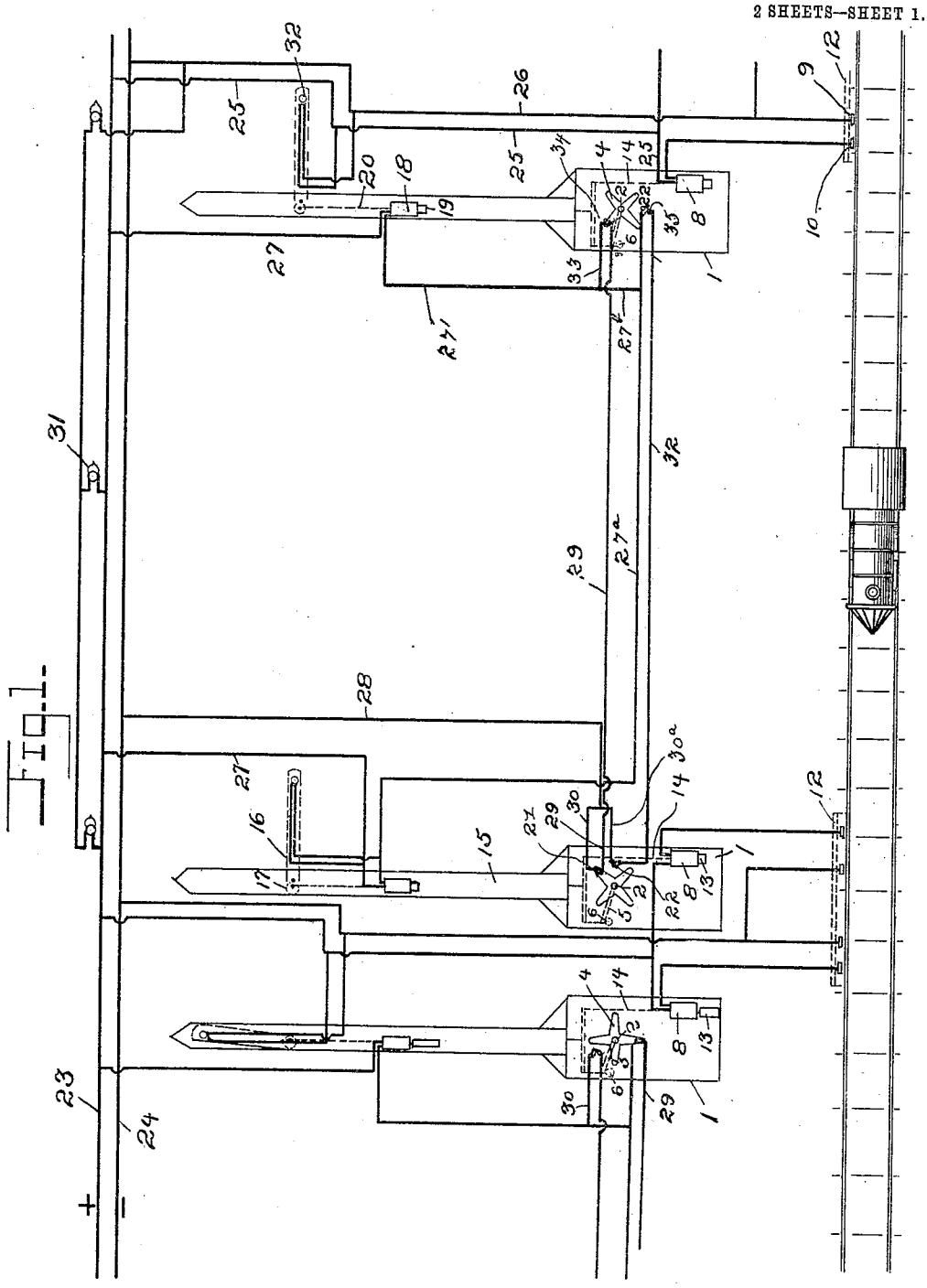

Fig. 1.

Witnesses

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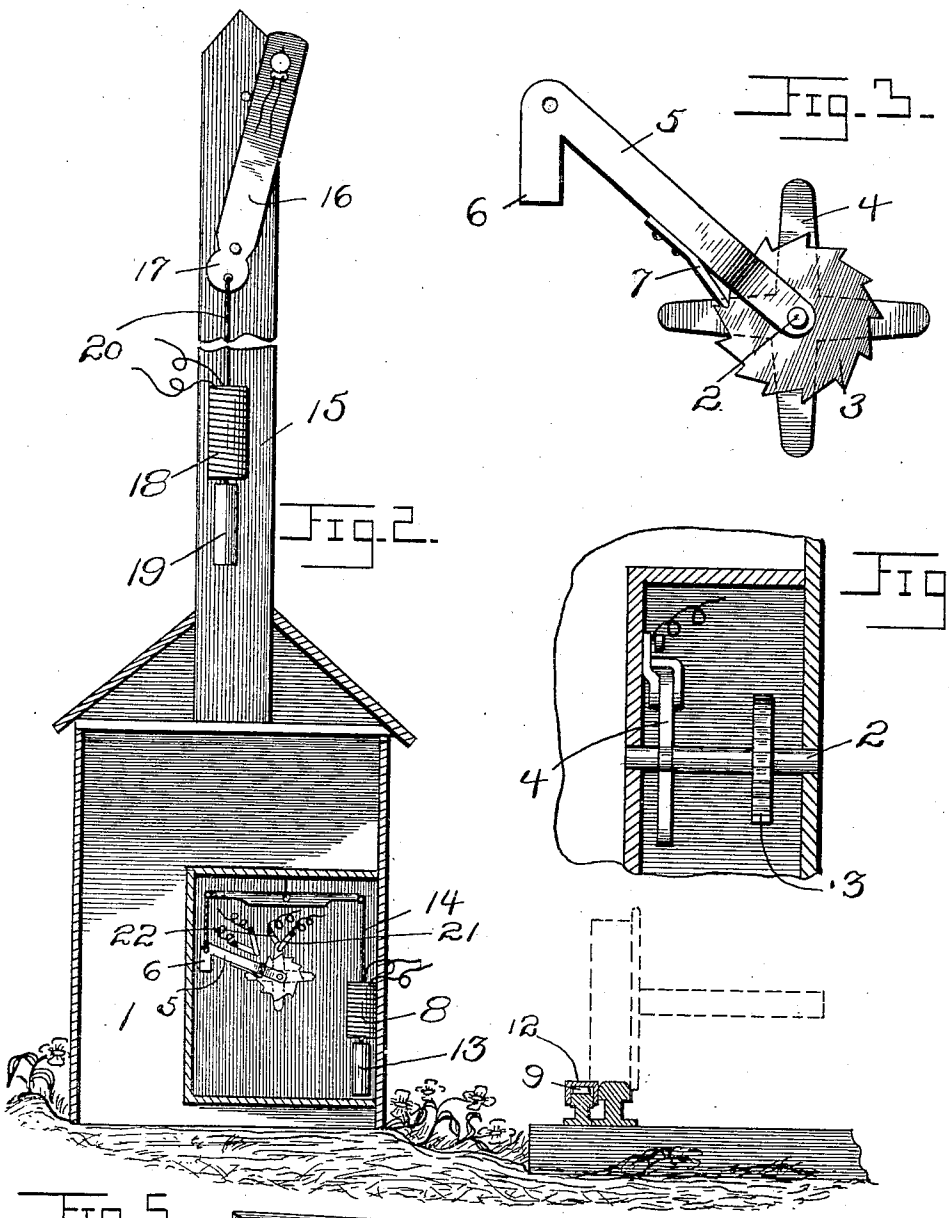

Fig. 2.

Fig. 3.

Fig. 4.

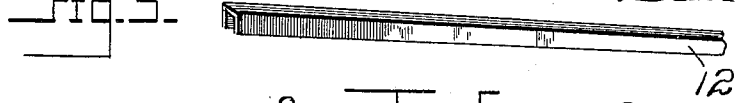

Fig. 5.

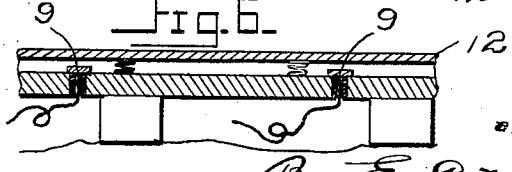

Fig. 6.

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UNITED STATES PATENT OFFICE.

OLNEY M. FELIX AND GEORGE GRAY, OF OWENSBORO, KENTUCKY.

BLOCK-SIGNALING SYSTEM FOR RAILROADS.

946,426. Specification of Letters Patent. Patented Jan. 11, 1910.

Application filed December 19, 1908. Serial No. 468,368.

To all whom it may concern:

Be it known that we, OLNEY M. FELIX and GEORGE GRAY, citizens of the United States, residing at Owensboro, in the county of Daviess and State of Kentucky, have invented certain new and useful Improvements in Block-Signaling Systems for Railroads, of which the following is a specification, reference being had therein to the accompanying drawing.

Our invention relates to an electric signaling apparatus for railways, adapted to be operated by the trains themselves for automatically actuating signals for the guidance of those who may be in control of the trains.

The principal object of the invention is to provide safe, simple, and economical signaling means whereby trains may be controlled in their operation so as to avoid collision between two or more trains running either in the same or opposite directions upon the same track, or between a moving train and one at rest.

Another object contemplated by the invention is the provision of means whereby various signals will be automatically operated to indicate that a given portion of railway-track, commonly known as a "block", is entirely clear of trains, that a train is traversing the same, or that two trains are approaching each other on the same track and within the block.

A further object is to provide signaling devices and a system for operation in connection with the devices which will be so easily understood, and so clear as to remove all possibility of collision when operating in conformity therewith, allowance being made for the possibility of failure of even the most perfect mechanisms as well as faulty judgment of operatives.

To the accomplishment of the recited objects, and others coördinate therewith, the preferred embodiment of our invention resides in that construction and arrangement of parts hereinafter described, illustrated in the accompanying drawings, and embraced within the scope of the appended claims.

In said drawings:—Figure 1 is a plan view of the invention, showing open and closed blocks. Fig. 2 is an elevation of the housing, and the semaphore post positioned in proximity to the tracks, the latter together with the housings being in section. Fig. 3 is a detail side elevation of the ratchet operating mechanism removed from the housing. Fig. 4 is a transverse sectional view of a portion of the housing, showing the contact plates, circuit closers and ratchet wheel. Fig. 5 is a detail perspective view of the auxiliary contact rail, and Fig. 6 is a longitudinal sectional view of the auxiliary rail and contact plates.

Similar numerals of reference are employed to designate corresponding parts throughout.

In carrying out the invention, we arrange to one side of the rails, and extending parallel with the same, what will subsequently be termed an auxiliary rail, and at a suitable distance from the latter, so as to be clear of the traffic, is disposed a housing from the top of which rises a suitable standard, to which is pivoted, in a well known manner, a semaphore. The latter, at the end remote from its pivotal connection with the standard, is provided with a colored incandescent lamp, and at the terminal adjacent its pivotal point is equipped with a weight which is a trifle less in mass, than what would be required to balance the arm. Located on the standard is an auxiliary electromagnet, the poles of which are connected with an electric circuit governed by the auxiliary rail. The armature of the said electromagnet is weighted sufficiently to overcome, with the addition of the weight on the semaphore, the weight on that part of the latter disposed remote from the weighted end, so that when the magnet is energized and its weighted armature attracted, the force exerted by the latter on the semaphore will be removed by virtue of a flexible connection between the said armature and semaphore, with the result that the latter will gravitate to danger position when the circuit has been closed by the car wheels bearing on the auxiliary rail which closes the circuit.

In order to accomplish the deënergization of the magnet when the train has passed into the next block so as to return the semaphore to safe position the following mechanism is employed: Disposed within the housing (1) is a shaft (2) journaled in suitable bearings and keyed to this shaft in spaced relation is a ratchet (3), and a circuit closer (4). The latter is provided with four or more arms and is substantially star shaped in contour. A lever (5), bifurcated at one end, is loosely mounted on the shaft (2) so as to straddle the ratchet wheel (3), and the free end of this lever is provided with an integral weight

(6), the function of which will appear later. A flat spring pawl (7) having one end secured to the lever has its opposite end positioned to engage the ratchet teeth when the lever moves in one direction, and to override said teeth when the lever moves in the opposite direction, as will appear later. A primary electromagnet (8) is disposed within the housing (1), below the circuit closer and lever, and has its poles connected with an electric circuit, which terminates in two contact plates (9) and (10), supported by suitable insulated posts within the auxiliary rail member, as before stated, the latter being disposed to one side of the rails and so positioned above the horizontal plane of the latter, that the car wheels will bear upon its upper surface. The type of auxiliary rail employed consists of a single piece of metal (12), longitudinally grooved or channeled so as to form a housing for a number of springs disposed on the ties and which support its flat base slightly above the tread of the rail as shown in Fig. 2, so that the wheels of a car will, when passing, depress it so that its flat base will be coincident with the tread of the rail. The auxiliary rail, of course, should be long enough so as to be at all times engaged by the wheels of a coach or train passing by the signal tower. In other words, the auxiliary rail should be at least as long as the distance between two trucks of one coach or the distance between the rear truck of one coach and the first truck of the next coach. As before stated the contact plates (9) and (10) are housed within the auxiliary rail, similar to the supporting springs, so that when the auxiliary rail is depressed by the car wheel it will bear on the contact plates (9) and (10) and close the circuit leading to the primary electromagnet (8). An auxiliary lever is pivoted upon the support and weight or core 13 is suspended from one end thereof by means of a cable 14.

The opposite end of the auxiliary lever is connected by means of a cable to the weighted end of the lever (5), so that when the magnet is energized by the closing of the circuit by the auxiliary rail (12), the armature will move upwardly to the coils which will cause the cord or cable (14) to slacken. The lever (5) which is normally in a substantially horizontal position will now, owing to its weighted end (6), gravitate for a distance equal to the distance through which the armature traveled to the poles, and during the downward movement of the lever the spring pawl (7) will engage the teeth of the ratchet and rotate the latter and of the circuit closer (4) on the shaft (2). Each of the arms of the circuit closer is so positioned, that during its rotation on the shaft (2), it will operate to close a circuit leading to the electromagnet on the signal standard which the train is then passing, and by its movement to close the said circuit it will have opened the circuit to the electromagnet on the signal standard at the lower block whereby the latter will return to safety as will presently appear. As before stated, the signal standard (15) rises from the top of the housing (1), and at its upper end is provided with the usual pivoted semaphore (16).

Within electromagnet (18) disposed on the signal standard (15) beneath the semaphore is adapted to work a weighted armature (19) arranged to move within the coils, and connection between the armature and end 17 of the semaphore is established by means of a flexible cord or cable (20), so that when the magent is energized to attract its armature. and the latter moves upwardly, the end (17) of the semaphore will move likewise, whereby the latter will fall to a horizontal or danger position.

By referring now to Fig. 1, it will be seen that two pairs of circuit ends are disposed within each of the housings (1), and are so arranged with respect to the arms of the circuit closer that one of the arms of the latter will at all times bear on one set of the contact plates, whereby the circuit at one block will be closed and that at the other opened. By referring again to Fig. 1 it can be seen that electric connection between the feed wires (23) and (24) is such that through the negative wiring (26) negative connection is established through the electromagnet (8) with the contact plates (9) housed within the auxiliary rail (12), and similar positive connection is made through the electromagnet (8) from the positive feed wire (23), by means of the positive wiring (25) with the opposite or positive contact plate (10). Thus it will be seen when the auxiliary rail (12) is depressed and through it the circuit closed, the electromagnet will attract its armature and operate the circuit closer (4) as before explained.

When a train enters in the extreme right of the block and causes the contact member 4 to swing to the position shown in the drawing, so as to form a contact with the contact points 34, the magnets 18 will be energized and the signal at each end of the block caused to fall to an operative position, thereby preventing a train from entering either end of the block. When the contact member 4 forms a contact with the contact points 34 and the contact member 4 in the far signal forms a contact with the contact points 21 the current will then flow down from the positive conductor 23, through the conductor 27 at the left hand end of the block, energizing the magnet 18 in the far signal and through the conductor 27^a, up through the lead 27^b and through the lead 33 to the contact points 34. The current will also flow

down from the positive lead through the conductor 27 at the right hand end of the block and energize the magnet 18 in the near signal and down through the conductor 27′ to the conductor 33 and the contact points 34 and the circuit closer 4 and back through the conductor 29, through the contact points 21 and circuit closer 4, out through the conductor 30 and back through the conductor 28 to the negative conductor 24 thereby making a complete circuit and causing the magnet 18 to be energized. As the train passes on and leaves the block, the circuit closer 4 in the far end or left-hand end of the block will be rotated, so as to have one of the points come in contact with the contact points 22, releasing the contact points 21 and opening the circuit therethrough. When the circuit closer is released from the contact point 21, and the circuit is broken the magnets 18 will be deënergized for the reason that the current will have no way of escape from the conductor 29, which leads to the negative conductor 24 through the medium of the contact points 21. When this takes place, the signal will rise to its normal or safety position. When the circuit closer 4, at the left hand end of the block is released from the contact point 21 and the circuit broken, the circuit closer 4 will be brought into engagement with the contact points 22. As soon as an additional train enters the block to the right, causing the circuit closer 4 to rotate again, the circuit closer will be brought into contact with the contact points 35, upon the housing at the extreme right of the block. This will again close the circuit causing the current to flow from the conductor 23, through the conductors 27, magnets 18, through conductor 27^a, 27^b and 27′ through the contact points 35 and circuit closer 4, back through the conductor 32, through the contact points 22 and circuit closer 4, which will then be in contact with the contact portions 22, through the conductor 30^a and out through the conductor 28 to the negative lead 24, thereby causing the semaphores to be actuated at either end of the block, for the reason that both of the magnets 18 within the block will be energized at the same time. It will be obvious that the circuit closers 4 are only operated by means of the track instrument associated therewith, and when the train passes the respective signal towers or casing, for instance, the circuit closer at the right will only be operated when passed by the train, and the circuit closer at the left will only be operated when passed by the train. As the second train which enters the block passes on, the circuit closer 4 will be again rotated as the far or left-hand signal is passed, so as to form a contact through the contact points 21 thereby breaking the circuit and causing the magnets 18 to be deënergized. After the circuit is broken and a train enters the extreme left-hand side of the block the circuit closer will be again rotated and will form a contact through the points 22 thereby closing the circuit and causing the magnets 18 to be energized.

What we claim as new is:—

1. In an electrical signal system the combination with a support, a semaphore supported thereby and having a bias to the danger position, of a shaft journaled upon said support, rotatable circuit closing means carried by said shaft and comprising a substantially star-shaped body provided with a plurality of fingers, a rotatable ratchet wheel secured to said shaft, a lever rotatably mounted on said shaft, a flat spring pawl secured to said lever and adapted to engage said ratchet wheel for rotating the same in one direction, a primary and auxiliary electromagnet, means coöperating with said primary magnet for rotating said ratchet wheel and rotatable contact member through the lever and pawl, an electrical circuit connected with said auxiliary magnet, said circuit adapted to be closed by said rotatable contact member, a weight or core connected to said semaphore to draw said semaphore to the safety position and adapted to be drawn within said auxiliary magnet for allowing said semaphore to actuate or come to a danger position when the circuit is closed and the current passes through said magnet, circuit closing means, and a circuit connecting said last mentioned circuit closing means and said first mentioned or primary magnet for closing said electrical circuit and energizing said primary magnet.

2. In an electrical signal system the combination with a support, of a semaphore supported thereby and having a bias to the danger position, a shaft journaled upon said support, primary and auxiliary magnets carried by said support, a lever member rotatably mounted upon said shaft and provided with a weighted outer end, a ratchet wheel secured to said shaft, a contact member secured to said shaft, means carried by said lever member and adapted to engage said ratchet wheel for rotating the same in one direction, an auxiliary lever member carried by said support, a movable core secured to one end of said lever member and adapted to be drawn within said primary magnet when the same is energized, a cable connected to the other end of said auxiliary lever member and to the weighted end of said first mentioned lever member, said core adapted to normally counterbalance the weighted end of said first mentioned lever member for holding the first mentioned lever member against operation, said auxiliary lever member pivotally mounted upon said support and adapted to swing upon its pivot when said core is drawn within said primary magnet for allowing the weighted

end of said primary lever to drop and thereby cause the shaft and contact member to rotate, a weighted core connected to said semaphore to draw said semaphore to the safety position and adapted to be drawn within said auxiliary magnet, an electrical circuit connected with said auxiliary magnet and adapted to be closed by said contact member for energizing said magnet and drawing the core within the same for allowing the semaphore to come to the danger position, circuit closing means, and a circuit connecting said last mentioned circuit closing means and said primary magnet for closing said electrical circuit and energizing said primary magnet.

In testimony whereof we hereunto affix our signatures in presence of two witnesses.

OLNEY M. FELIX.
GEORGE GRAY.

Witnesses:
JESSE R. ESKRIDGE,
W. S. DEANE.