(No Model.)

J. V. YOUNG.

ELECTRIC SIGNAL CIRCUIT.

No. 488,138. Patented Dec. 13, 1892.

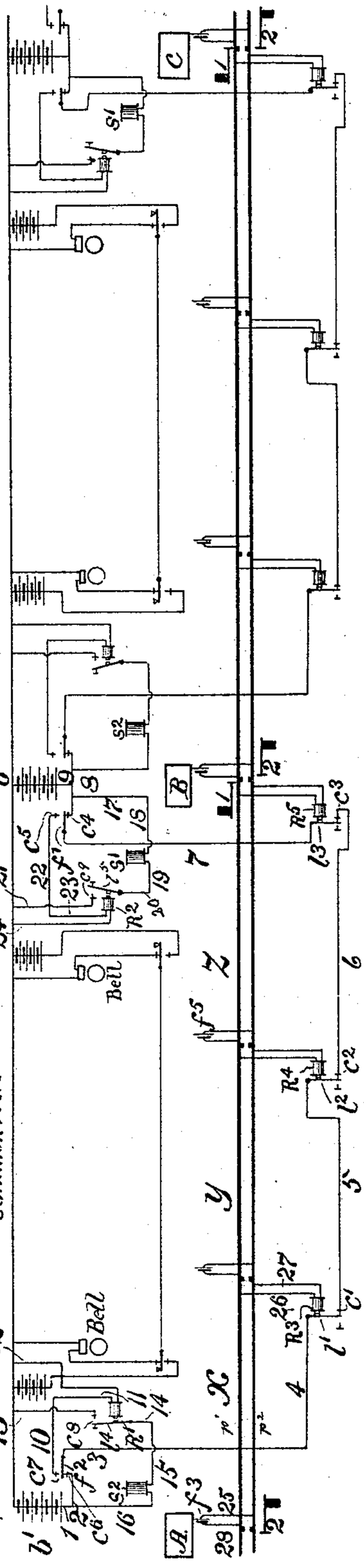

FIG. 1.

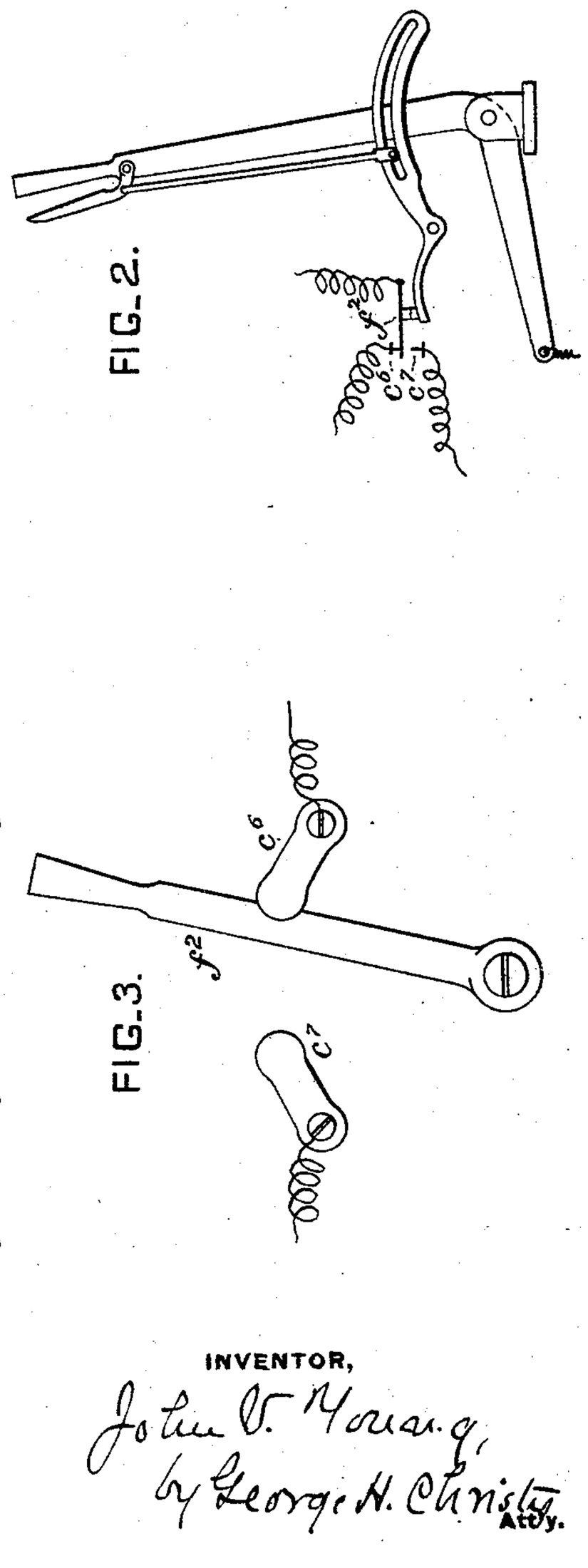

FIG. 2.

FIG. 3.

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ELECTRIC SIGNAL-CIRCUIT.

SPECIFICATION forming part of Letters Patent No. 488,138, dated December 13, 1892.

Application filed June 29, 1892. Serial No. 438,378. (No model.)

To all whom it may concern:

Be it known that I, JOHN V. YOUNG, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented or discovered certain new and useful Improvements in Electric Signal-Circuits, of which improvements the following is a specification.

The invention described herein relates to certain improvements in electric circuits for railway block-stations, and has for its object such an arrangement of circuits, electric generators, and signal mechanism as will prevent the accidental display of signals at one station being primarily under the control of the operator at an adjacent station and dependent upon the position of the signal at such adjacent station.

In the accompanying drawings, forming a part of this specification, Figure 1 is a diagrammatic view showing the arrangement of circuits and electric generators for several adjacent track-sections and stations. Fig. 2 is a detail view of the lever of an interlocking-machine, showing its electric switch and electric-slot connections; and Fig. 3 is a detail view showing a form of switch employed when electrically-operated signals are used.

In the practice of my invention the signals are to be operated by operators or station agents located in signal-cabins or other suitable places along the railroad at a proper distance apart to facilitate the handling of the traffic.

The apparatus used at each station A, B, and C consists of a signal for warning the engineer, a lever for operating the signal, an electric slot—such as is described and shown in Letters Patent No. 308,494, granted November 25, 1884, to James T. Hambay—to make the connection between the signal and the lever, batteries or other suitable generators for operating the circuits with suitable relays, and circuits connecting the stations for the purpose of controlling the slot or signals.

On each signal-lever is a circuit-controller consisting of a spring or moving part and two contacts arranged so that the spring or moving part can be in contact with but one contact-point at a time and will be operated by the catch-rod or some suitable part of the lever. This circuit-controller is so arranged that when the lever or catch-rod is in one position one circuit is closed and another is broken and when the lever or catch-rod is reversed the first circuit is broken and the second closed.

The different circuits are described as follows:

Circuit No. 1.—Starting at the battery b^2, wire 9, wire 8, contact c^4, circuit-closing switch f', wire 7, armature-lever l^3, contact c^3, wire 6, contact c^2, armature-lever l^2, wire 5, contact c', armature-lever l', wire 4, wire 3, circuit-closing switch f^2, contact c^7, wire 10, wire 11, magnets of relay R′, wire 12, common wire to battery b^2.

Circuit No. 2.—Starting at battery b', wire 1, wire 2, contact c^6, circuit-closing switch f^2, wire 3, wire 4, armature-lever l', contact c', wire 5, armature-lever l^2, contact c^2, wire 6, contact c^3, armature-lever l^3, wire 7, circuit-closing switch f', contact c^5, wire 22, wire 23, magnets of relay R^2, wire 24, common wire to battery b'.

Circuit No. 3.—Starting at battery b', wire 1, wire 16, magnets of electric slot s^2, wire 15, wire 14, armature-lever l^4, contact c^8, wire 13, common wire to battery b'.

Circuit No. 4.—Starting at battery b^2, wire 9, wire 8, wire 17, wire 18, magnets of electric slot s', wire 19, wire 20, armature-lever l^5, contact c^9, wire 21, common wire to battery b^2.

The track is insulated and divided into such lengths as will give the best working results. On the plan I have shown the track between A and B divided into three sections to illustrate the manner of connecting them up and marked them "Sec. X," "Sec. Y," and "Sec. Z." It is understood that the number of sections so insulated will depend in practice upon the distance between A and B. Each of these sections has at one end a battery with one pole connected to one rail and the other pole connected to the other rail. At the other end of the section there is a relay with one side of the magnet connected to one rail and the other side of the magnet connected to the other rail. By this it will be seen that so long as the circuit of the battery connected to the rails is not interrupted the

relay will be charged and its armature attracted, causing the lever to press against the contact-point and close any circuit at that point which might be caused to flow through the lever and contact-point of the relay.

The description of the circuit of a relay and battery connected with an insulated section of track is so well known that the description of one section will answer for all.

The circuit of the relay connected with section X is as follows: Starting at battery b^3, wire 28, rail r', wire 26, magnets of relay R^3, wire 27, rail r^2, wire 25 to battery b^3. The presence of a pair of wheels in a section will form a new circuit for the battery through the car wheels and axle, which being shorter and of less resistance than through the magnets of the relay the relay-magnets will be discharged, allowing the armature-lever to drop back and away from the contact-point, thereby breaking any circuit which might have been flowing through the armature-lever and contact-point of said relay. As shown in the drawings, the signals are at "danger" and the levers are in their normal or "danger" position. Battery b' is flowing through wire 1, wire 2, contact c^6, switch f^2, wire 3, wire 4, lever l', contact c', wire 5 toward battery b^2, and battery b^2 is flowing through wire 9, wire 8, contact c^4, switch f', wire 7, lever l^3, contact c^3, wire 6 toward battery b', the effect being that they neutralize each other and there is no work done.

The operation of this signal circuit or system is as follows: A asks B over the bell-code (which is shown on plan, but not described, as it is a common circuit well known to any one versed in the electric art) for permission to send a train to him. This being granted, A grasps the catch-rod of his lever, which operates signal 2 (the signal the engineer is to observe) and releases the lever. The act of moving the catch-rod has the effect of changing the position of switch f^2, so that it is moved away from contact c^6 and touches contact c^7. Switch f^2 being moved away from contact c^6, battery b' ceases to flow toward battery b^2 and to neutralize the same. Switch f^2 being pressed against contact c^7, circuit No. 1 is made good or completed, thereby charging the magnet of relay R', causing the armature-lever l^4 to be attracted and press against contact c^8, thereby closing circuit No. 3 at that point and causing it to be made good. Circuit No. 3 being made good, the magnet of slot S^2 is magnetized, so that the union is complete in the wire connecting the lever and signal 2, as described in Letters Patent No. 308,494. By pulling the lever over from its normal position signal 2 will be caused to assume the "safety" position and the train can proceed, the engineer having the assurance that there is no train between A and B and that the signal 1 at B to allow trains to proceed to A is at "danger," for unless the signal at B is at "danger," and so closing circuit 1 at c^4, the signal-man at A cannot set his signal to "safety." The train starts on its journey, and as soon as the forward wheels enter section X battery b^3 is short-circuited and relay R^3 is discharged, thereby breaking circuit No. 1 at contact-point c'. This will cause relay R' to be discharged and break circuit No. 3 at contact-point c^8. Circuit No. 3 being broken at contact c^8, the magnet of slot S^2 is discharged, thereby breaking the connection in the wire connecting the lever to signal 2, and the signal is caused to assume the "danger" position by its counterweights, which are arranged for that purpose. While the train is in this or either of the other sections circuit No. 1 will continue to be broken and the signals will be caused to remain at "danger." Should the operator desire to give the signal to a following train, he must first put the lever to the normal or "danger" position to allow the slot to be in the proper position to make good again the connection in the wire from the signal to the lever. Before the connection can be made again it is necessary for the first train to be entirely out of sections X, Y, and Z, in order that circuit No. 1 will be good at contact-points c', c^2, and c^3. When these are all right A, can again clear his signal in the manner before described, provided B still has his signal 1 at "danger."

To allow a train to go from B to A, the requirements and operation are similar. A must have signal 2 at "danger" and the track-sections clear of all trains or car-wheels, so that B can make circuit 2 good by starting his catch-rod and causing switch f' to press against contact c^5. This will cause relay R^2 to become charged and cause circuit No. 4 to be closed at contact c^9, thereby magnetizing the magnet of slot S' and making the connection good between the lever and signal 1, so that the operator can clear the same. A train entering section Z will short-circuit battery b^5 and cause relay R^5 to be discharged, thereby breaking circuit No. 2 at contact c^3. Circuit No. 2 being broken, relay R^2 will be discharged, thereby releasing the armature-lever l^5 and causing circuit No. 4 to be broken at contact c^9. Circuit No. 4 being broken, the magnet of slot S' will be discharged and the connection in the wire between signal No. 1 and the lever will be broken and allow the signal No. 1 to go to "danger." Before B can allow a second train to follow the first he must put the signal-lever back to the normal or "danger" position to allow the slot to be in the proper position to make good again the connection in the wire from the signal to the lever. Before the connection can be made good again it is necessary for the entire train to be out of sections X, Y, and Z and A have his signal 2 in the "danger" position. The handling of trains between B and C is done in the same manner as between A and B.

From the above description it will be seen that with this circuit or system in order to allow a train to proceed from one location to

another under a clear-signal it is necessary for the signal at the far end of the block for controlling the movement of the trains running in the opposite direction to be at "danger" and the track clear of all trains. As the battery used to operate the relay is obtained from the extreme or far end of the section at all times, any cross or break which may be in the line-wire will prevent the relay being charged, which might possibly occur if the battery at the end where the relay is located was used. This will insure giving a clear-signal only when everything is in its proper working order. As this same circuit can be used to control electric signals instead of electric slotted mechanical signals by simply connecting in the magnets of the electric signals in place of the magnets of the electric slots, as shown, and using a two-button circuit-closing switch, as shown in Fig. 3, I claim the operation of electric signals in that manner as a part of my invention.

I claim herein as my invention—

1. The combination of a signal operating or controlling circuit arranged at or near the entrance end of a signal-section, a signal-circuit extending along said section and controlling through a relay or other device the signal-operating circuit, and a battery and a circuit-controller included in the signal-circuit at or near the exit end of the signal-section, the circuit-controller being so connected to the signal at the exit end of the signal-section as to require the signal to be at "danger" before the signal-circuit can be closed to permit of the closing of the signal-operating circuit at the entrance of the section, substantially as set forth.

2. The combination of a signal operating or controlling circuit arranged at or near the entrance end of a signal-section, a series of one or more track-circuits, each having a relay, a signal-circuit looping through the contact-points of the track-circuit relays and controlling through a relay or other device the signal-operating circuit, and a battery and circuit-controller included in the signal-circuit at or near the exit end of the signal-section, the circuit-controller being so connected to the signal at the exit end of the signal-section as to require the signal to be at "danger" before the signal-circuit can be closed, and thereby close the signal-operating circuit at the entrance end of the section, substantially as set forth.

3. The combination of signal operating or controlling circuits arranged at or near the end of a signal-section and looping through contact-points of relays included in a signal-circuit extending along the signal-section, and batteries and circuit-controllers arranged at or near the ends of the signal-section and included in the signal-circuit, said controllers being so connected to the signals at the ends of the section that when said signals are at "danger" the batteries will neutralize each other, substantially as set forth.

4. The combination of batteries located at or near each end of a signal-section, signal controlling or operating circuits connected to said batteries and looping through contact-points of relays included in a signal-circuit also connected to said batteries and extending along the signal-section, and circuit-controllers so constructed that when shifted to break the signal-circuit they will complete the signal-operating circuit, substantially as set forth.

In testimony whereof I have hereunto set my hand.

JOHN V. YOUNG.

Witnesses:
HENRY J. BOWEN,
GEO. A. BLOOM.