No. 828,691. PATENTED AUG. 14, 1906.

E. W. VOGEL.

ELECTRICAL SIGNAL CIRCUIT.

APPLICATION FILED JULY 10, 1901.

4 SHEETS—SHEET 1.

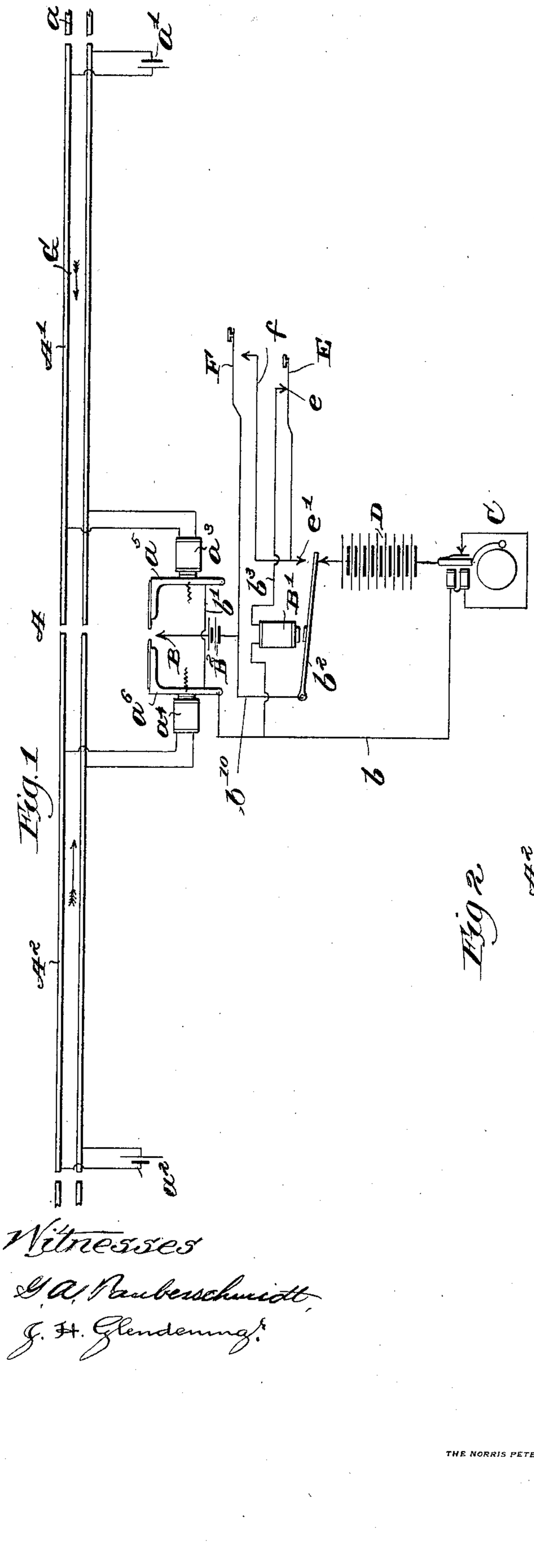


Fig. 1

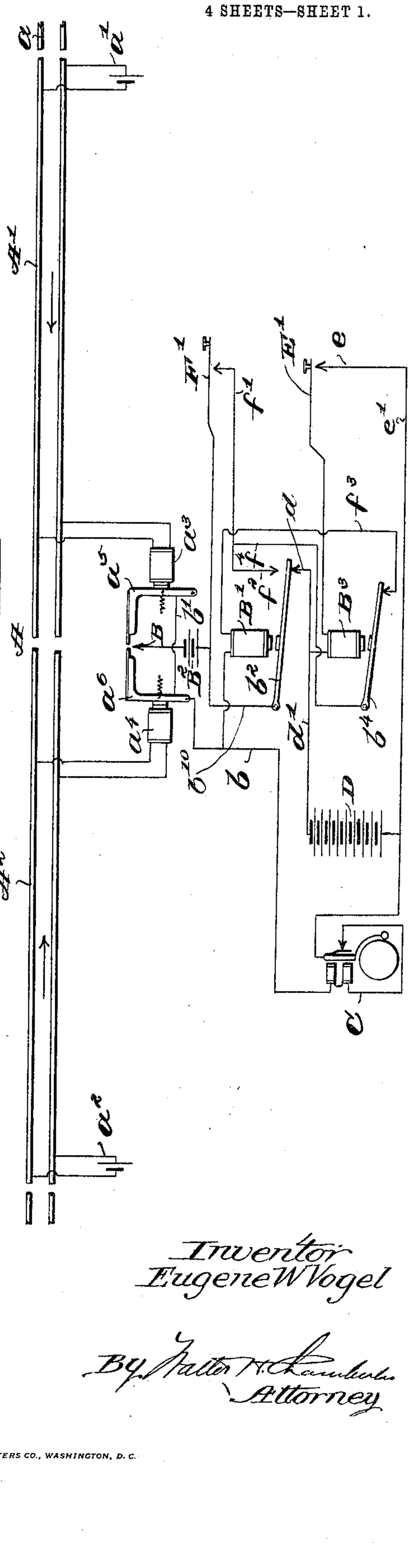


Fig. 2

Witnesses
G. A. Rauberschmidt
J. H. Glendenning.

Inventor
Eugene W. Vogel

By Walter H. Lamberton
Attorney

No. 828,691. PATENTED AUG. 14, 1906.

E. W. VOGEL.

ELECTRICAL SIGNAL CIRCUIT.

APPLICATION FILED JULY 10, 1901.

4 SHEETS—SHEET 2.

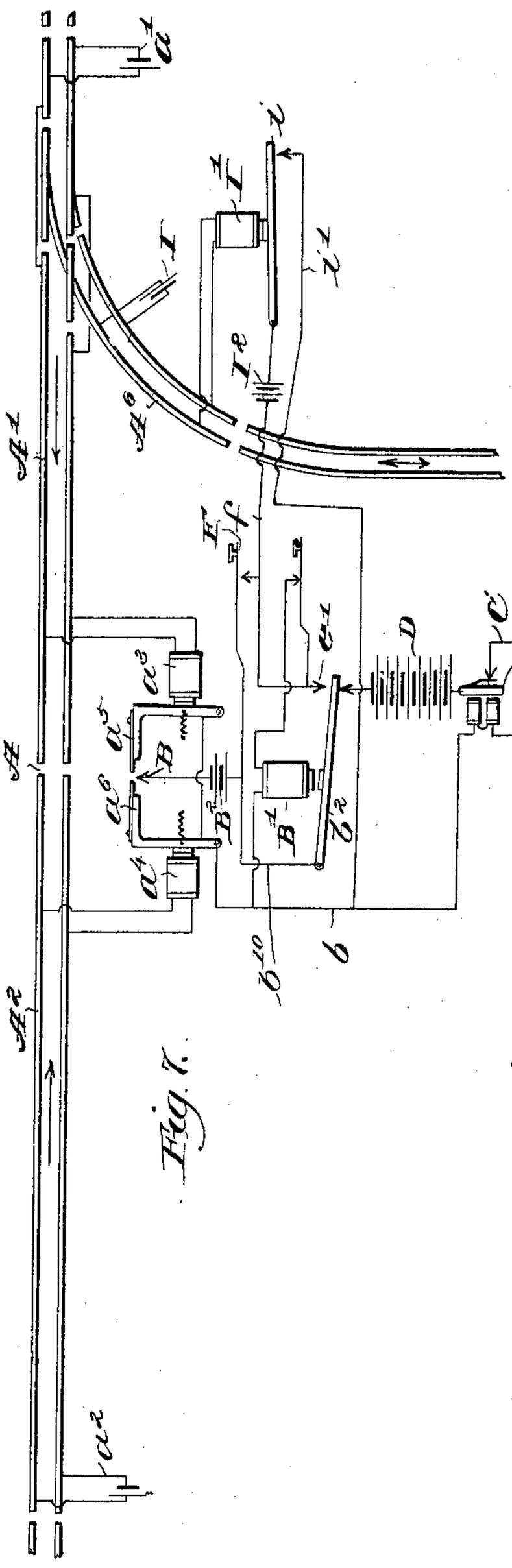


Fig. 1.

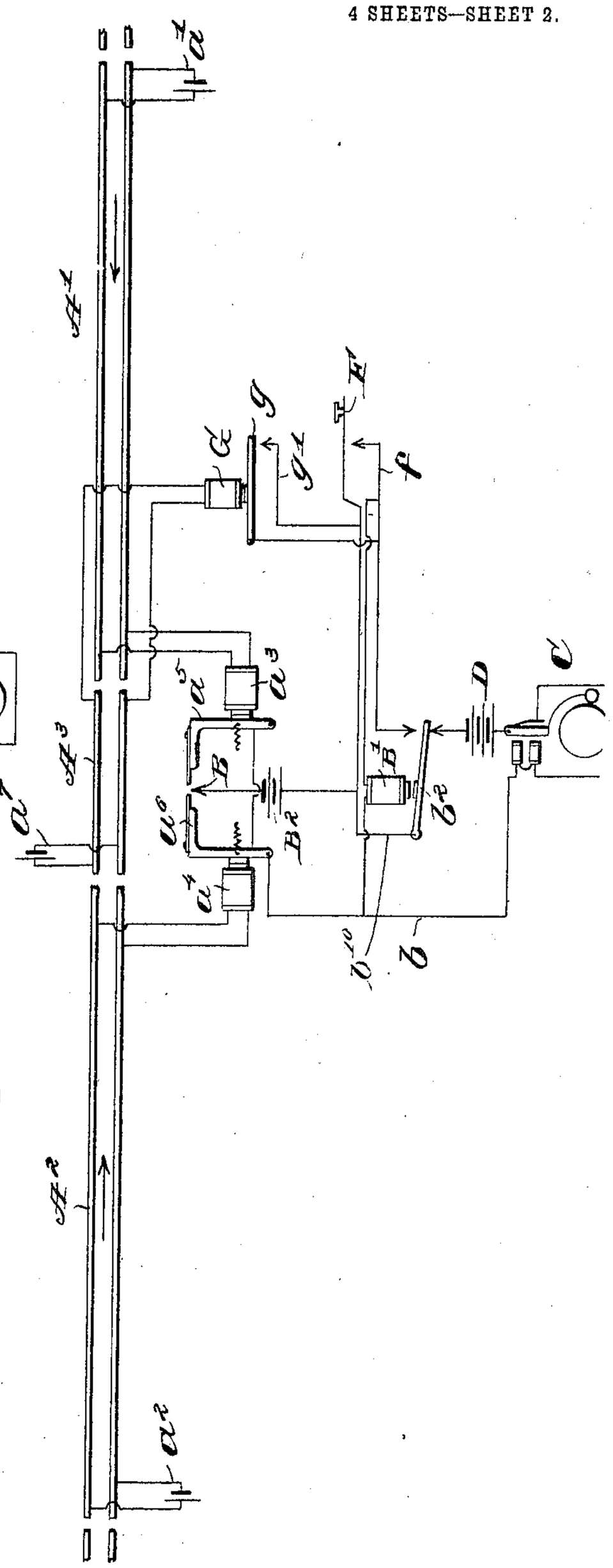


Fig. 3.

Witnesses
G. W. Paulbeschmidt
J. H. Glendenning Jr.

Inventor
Eugene W Vogel
By Walter N Chamberlin
Attorney.

No. 828,691. PATENTED AUG. 14, 1906.

E. W. VOGEL.

ELECTRICAL SIGNAL CIRCUIT.

APPLICATION FILED JULY 10, 1901.

4 SHEETS—SHEET 3.

Fig. 4.

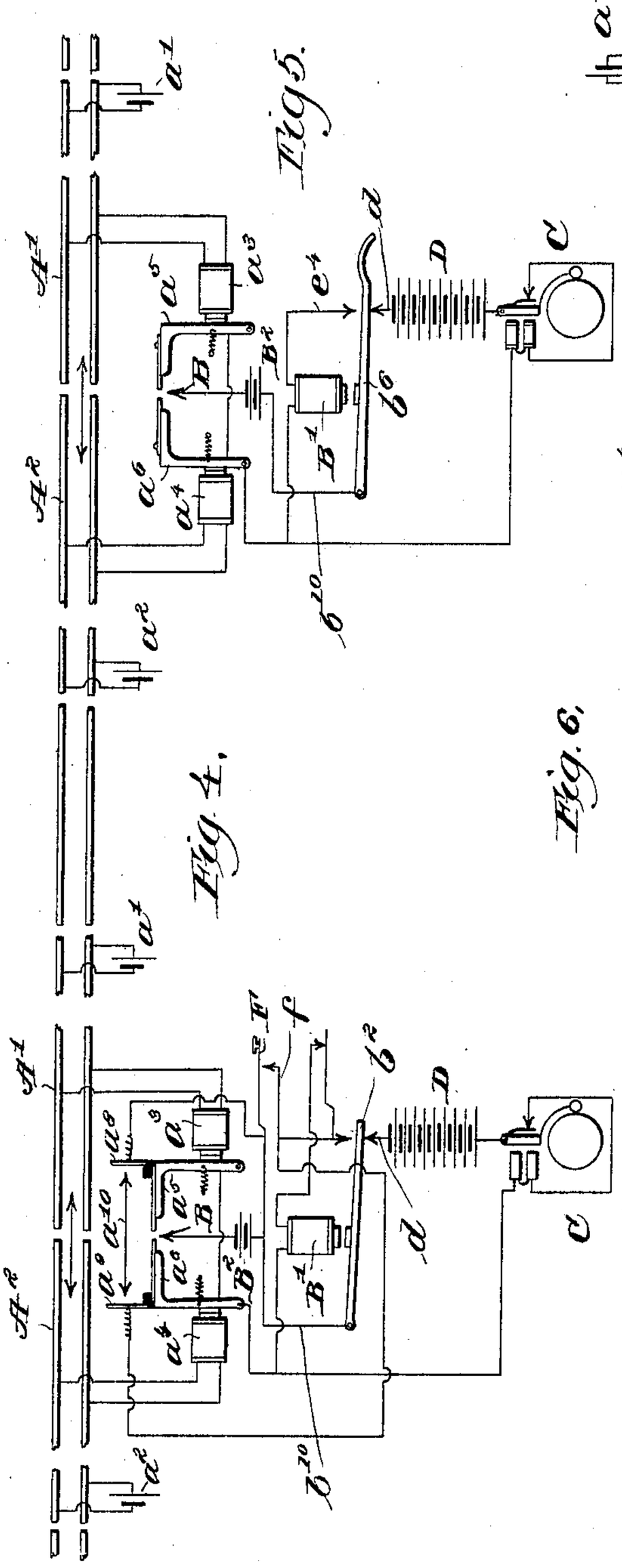
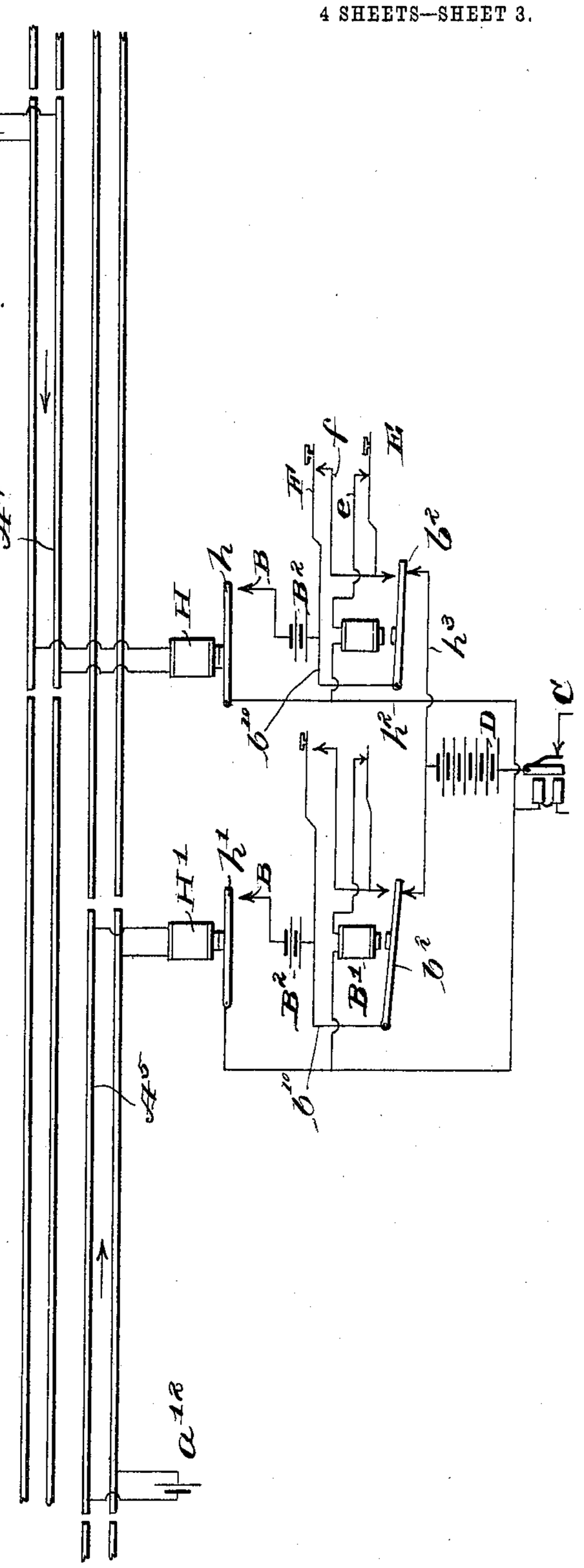


Fig. 5.

Fig. 6.



Witnesses

G. W. Paulenschmidt,

J. H. Glendenning.

Inventor

Eugene W. Vogel

By Walter H. Chamberlin

Attorney

No. 828,691. PATENTED AUG. 14, 1906.

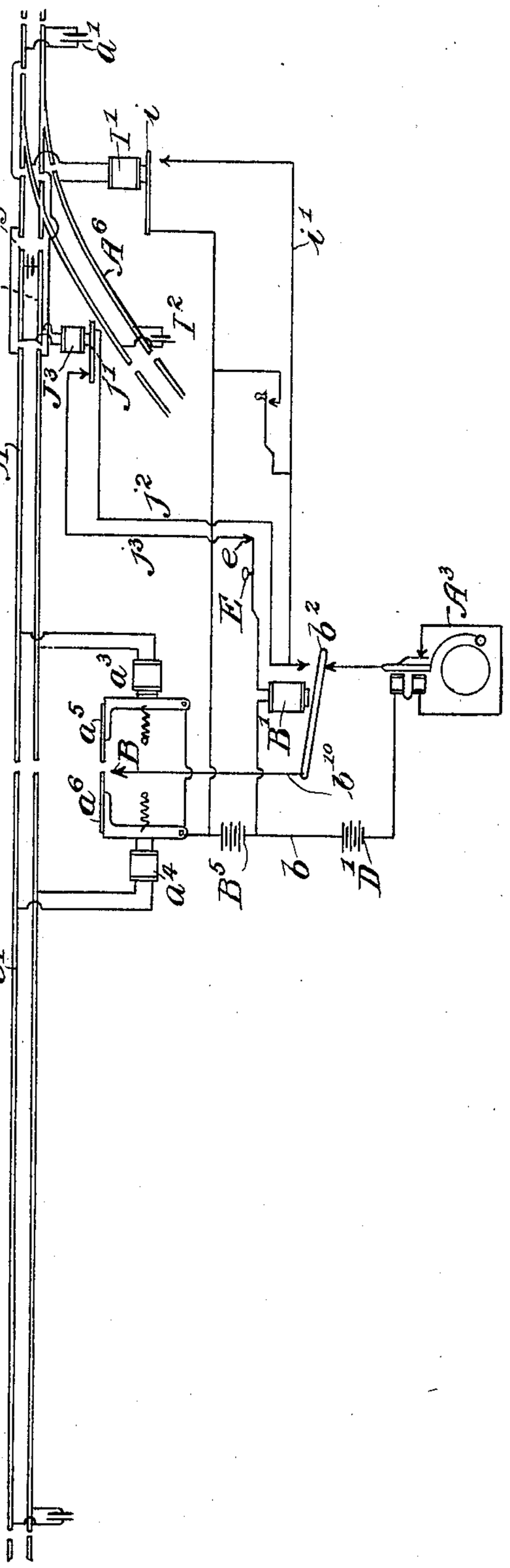
E. W. VOGEL.

ELECTRICAL SIGNAL CIRCUIT.

APPLICATION FILED JULY 10, 1901.

4 SHEETS—SHEET 4.

Fig. 8.



Witnesses:

J. H. Glendening Jr.

H. S. Gaither,

Inventor:

Eugene W. Vogel.

By Yates N. Chamberlin

Atty.

UNITED STATES PATENT OFFICE.

EUGENE W. VOGEL, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE RAILROAD SUPPLY COMPANY, A CORPORATION OF ILLINOIS.

ELECTRICAL SIGNAL-CIRCUIT.

No. 828,691. Specification of Letters Patent. Patented Aug. 14, 1906.

Application filed July 10, 1901. Serial No. 67,800.

To all whom it may concern:

Be it known that I, EUGENE W. VOGEL, a citizen of the United States, and a resident of Chicago, Cook county, Illinois, have invented certain new and useful Improvements in Electrical Signal-Circuits; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in electrical signal-circuits and is shown more particularly as adapted for railway-signals or the like.

Heretofore it has been customary in the use of crossing alarm-bells or like signals for said signal or bell to work as long as the train stands on the circuits. This is frequently undesirable—as, for instance, when a train is required to remain on the circuit for a considerable length of time doing local work. Considerable expense may be incurred in the consumption of battery, as well as annoyance, because of the continuous and useless sounding of the bell or other signaling device.

The object of this invention is to provide simple and reliable means whereby the bell may be silenced or other signal discontinued while a train occupies a track-circuit, yet insuring the return of the parts automatically to normal position as soon as the train pulls out of the circuit, thereby enabling the signal to operate for another train entering the track-circuit. It also provides means whereby the signal, having been discontinued, may again be caused to operate by the operator while the train is on the circuit, whereby said signal, though automatic, is yet at all times under the control of an operator.

The invention consists of the matters hereinafter described, and more fully pointed out and defined in the appended claims.

In the drawings, Figure 1 is a diagrammatic view of an arrangement of circuits and devices embodying my invention. Fig. 2 is a similar view showing another form of my invention. Fig. 3 is a diagrammatic view of a form of my invention whereby the front truck of the engine or car as it approaches crossing silences the signal. Fig. 4 is a diagrammatic view of another form of my invention, in which an extension is provided on each armature of the relays and which operates to stop the bell. Fig. 5 is a diagrammatic view of another form of my invention, in which the operator-keys are entirely omitted. Fig. 6 illustrates my invention applied to a double track and operating a single bell. Fig. 7 illustrates my invention applied to a main track and switch. Fig. 8 is a slightly-modified arrangement of the circuits securing the same results as in Fig. 7.

In said drawings, referring first to Fig. 1, A indicates a highway-crossing provided with a device embodying my invention. A' A^2 indicate insulated track-sections on each side of the crossing. a indicates the main track. a' a^2, respectively, indicate track-batteries connected with the respective insulated sections A' A^2. a^3 a^4 indicate electromagnets of an interlocking or interfering relay having armatures a^5 a^6. Said relay, as shown, is of the type indicated in the Letters Patent No. 552,181 issued to H. J. Hovey on the 31st day of December, 1895. Obviously, however, any interlocking or interfering relay may be used. Said electromagnets are connected, respectively, with the insulated sections A' and A^2 and are respectively operated by the track-batteries a' a^2. B indicates a contact-point located between the armatures a^5 a^6 of the relay and designed to support the same when the respective electromagnets are deënergized. Said armatures are connected by the wire b'. A wire b leads from the armature a^6 to the electromagnetic bell C of any desired form. B^2 indicates a battery of one or more cells connected with the contact-point B, the other conductor of which is connected with the pivoted armature b^2 of the electromagnet B'. D indicates the main battery connected with the bell C and one of the conductors of which extends into position to be engaged by the armature B^2 when the electromagnet B' is deënergized. One of the conductors of the electromagnet is connected with the conductor-wires b. The other of said conductor-wires b^3 leads to a contact-point e normally in contact with the key E, which is connected with the contact e', located in position to be engaged by the armature b^2 when supported by the electromagnet B'. F indicates a push-key of any

desired type which is connected with the conductor b^{10}, leading from the battery B^2 to the armature b^2. A conductor f connects with the conductor for the key E and contact-point e' and extends into position to be engaged by said key F when depressed. The operation of this form of my invention is as follows: The train G, entering the circuit A′, short-circuits battery a', deënergizes the electromagnet a^3, and permits the armature a^5 to drop upon the contact-point B. This completes the circuit through the battery B^2, the armature b^2, the battery D, the bell C, the conductors b b', and the armature a^5 to said contact-point. The bell is now ringing and must continue to ring until the train reaches the crossing and passes beyond the same. The moment the front truck of the engine or car passes over the crossing the battery a^2 is short-circuited and the electromagnet a^4 deënergized. The armature a^6 now falls not on the contact-point, however, but on the armature a^5. When the last truck of the car or train has passed the crossing, the electromagnet a^3 is energized and the armature a^5 lifted from the contact-point, supporting thereon the armature a^6, which under the action of its spring inclines inwardly. The bell-circuit is now broken, and the bell ceases ringing and does not operate while the train is running out of the circuit A^2. Immediately the train leaves the circuit A^2 the magnet a^4 is energized, the armature drawn back to normal, and the device is again set to announce a train entering either section. Should the train enter the circuit A^2 moving toward the crossing the device operates as before described, with the exception that the armature a^6 falls upon the contact-point B. Frequently it is necessary to remain some length of time upon the circuit or at the station doing local work or for other reasons, and it may be desirable to silence the bell or other signal. For this purpose the key F may be depressed into contact with the conductor f, forming a circuit through the key F, battery B^2, contact-point B, armature a^5 or a^6, conductor b to the magnet B′, thence through b^3 to the key E, thence through f to the key F, energizing said magnet B′ and lifting the armature b^2 into contact with the point e'. After said magnet is once energized and the armature drawn up into contact with the point e' the current continues to flow through the contact B, the battery B^2, and conductor b^{10}, thence to the armature b^2, the contact-point e', through the key E and conductor b^3 through the electromagnet B′ to the conductor b, thence to the armature a^5 or a^6. The armature b^2 is thus sustained and the bell or other signal silenced. When the train is about to start toward the crossing, it may be desirable to again start the signal, and for this purpose the contact by the key E with the conductor b^3 may be broken by depressing said key. This deënergizes the electromagnet B′ and permits the armature b^2 to drop, thereby permitting the current again to flow to the bell, whereupon the signal will be produced as before.

In the form of my invention illustrated in Fig. 2 the track-sections are arranged as described in Fig. 1 and provided with batteries a' a^2, and the electromagnets a^3 a^4 of the relay are likewise connected in the respective track-circuits, as before described. In this form of my invention an additional electromagnet B^3 and an armature b^4 are provided. The key F′, the office of which is similar to the key F, is provided with a conductor which leads to the conductor b^{10}. A conductor f' is adapted for contact with the key F′ and provided with a contact-point f^2, adapted to engage the armature b^2 when lifted by the electromagnet B′. At other times said armature rests upon the contact d, the conductor d' of which leads to the main battery D, connected with the bell, and also to the electromagnet B^3. A key E′, similar in function to the key E, Fig. 1, is connected with the electromagnet B^3, and a conductor e', provided with a contact-piece e, adapted for contact with the key E′, also leads to said battery D and bell. A conductor f^3, provided with a contact point in position to be engaged by the armature b^4 when the magnet B^3 is deënergized leads to the electromagnet B′, and a conductor f^4, permanently connected with the armature b^4, leads therefrom to the conductor f'. This form of my device operates as follows: The train, entering either of the insulated sections—as, for instance, A^2—short-circuits the same, and the armature a^6 drops upon the contact-point B. The current now flows through the armature a^6 and the conductor b to the bell, through the battery D, conductor d', the armature b^2, the battery B^2, and contact-point B, thus completing the circuit. When the train reaches the crossing, the first trucks of the train striking section A′, the electromagnet a^3 is deënergized in the same manner, and its armature falls on the armature a^6, and as the train passes entirely into the section A′ and the electromagnet a^4 is again energized, the armature lifted, carrying therewith the armature a^5 and breaking the contact with B, thus silencing the bell as the train passes on out of the section A′. Should it be desired to discontinue the signal while the train remains on the circuit, the key F′ is depressed into contact with f'. The current of the battery B^2 now flows through the key F′, the conductor f', thence through the conductor f^4 to the armature b^4, thence to the conductor f^3 and electromagnet B′, thence to the conductor b and back to the armature a^6, thus completing the circuit and lifting the armature b^2 into contact with the contact f^2. The key being released, the current now flows

from battery B^2 through armature b^2, conductor f^2, conductor f^4, armature b^4, conductor f^3 back to the electromagnet B′, conductor b, and armature a^6. If desired to actuate the signal at any time while train is on circuit, the key E′ is depressed, thereby completing circuit with the battery D, the conductor d', the electromagnet B^3, key E′, and conductor e', thus lifting the armature b^4 and breaking the current flowing to the electromagnet B′, whereupon the armature b^2 drops upon the contact d, when the current flows as at first described.

In the form of my invention illustrated in Fig. 3 I have shown means for silencing the bell by the front truck of the train as it approaches the crossing. This result is secured by placing between the insulated track-sections A′ and A^2 an approximately-short insulated section A^3 at the crossing. A track-battery a^7 is connected with the rails of said insulated section, which are also wired to the electromagnet G, the armature g of which is connected with the conductor f, as shown in Fig. 1. When the magnet G is deënergized, said armature falls upon the contact-point g' and connects with the conductor from the key F. The circuit in all other respects is similar to that illustrated in Fig. 1. The operation is as follows: The train coming into either of said sections, the corresponding armature a^5 or a^6 drops upon the contact-point B, as before described, and the bell rings. The train progresses toward the crossing, and the moment the front trucks thereof strike the insulated section A^3 the electromagnet G is deënergized and the armature g drops upon the contact-point g'. This forms connection the same as through the key F and conductor f and has the same effect as depressing said key, as before described for Fig. 1. As shown in Fig. 4, the same result is attained by securing on each of the armatures an upwardly-projecting insulated contact-piece a^8 a^9, respectively, and providing a conductor a^{10} between the same in position to be engaged thereby when the armatures drop. Said contact-piece a^9 is electrically connected with the conductor f, and the arm or contact piece a^8 is electrically connected with the conductor of the key F. In all other respects the arrangement may be the same as that illustrated in Fig. 1. The operation of the same is as follows: The train, entering the circuit A′, causes the armature a^5 to drop on the contact B, thereby ringing the bell, as before described, bringing contact piece or arm a^8 into contact with the conductor a^{10}. When the front trucks of the train enter the section A^2, the armature A^6 is dropped upon the armature a^5, bringing the arm a^9 into contact with the other end of the conductor a^{10} and making a circuit through the magnet B′ and breaking the circuit to the bell. As the train passes out of the section A^2 the armature a^5 lifts, thereby lifting the armature a^6, breaking the contact with B and permitting the armature b^2 to fall again.

In the form illustrated in Fig. 5 the keys F and E are entirely omitted. The circuits are the same as those illustrated in Fig. 1, with the exception that the armature of the magnet B′ serves as a lift-key. The operation is as follows: The train, running into the section A^2 or A′, drops the corresponding armature a^6 or a^5, thereby forming the circuit to the bell and thereby causing the bell to ring. Should it be desired to stop the ringing of the bell, it is only necessary to lift the armature b^6 into contact with the conductor e^4, when a circuit is made through said armature and battery B^2, as before described. The armature remains supported and the bell is silenced. Should it be desirable to start the bell ringing again, it is only necessary to pull down the armature b^6 into contact with d, whereupon the circuit to the bell is again made.

Obviously in applying my invention to a double-track road the interfering relays may be omitted, inasmuch as the trains normally run in but one direction on a given track, and in lieu thereof a simple form of relay may be used. Also inasmuch as the trains run in but one direction it will be necessary to have an insulated track-section only on that side of the crossing from which the trains approach. Such sections are indicated by A^4 and A^5, Fig. 6, in their respective tracks. The same are provided with batteries a^{11} a^{12}, corresponding to the batteries a' and a^2 in Fig. 1. In the form illustrated in Fig. 6 two complete circuits (one for each track) are shown, each including the battery D and bell or other signal. The keys F and E for stopping or starting the ringing of the bell, connected as shown in Fig. 1, are provided for each circuit. The operation of this form of my invention is as follows: A train in coming toward the crossing on the track-circuit A^4 deënergizes the relay-magnet H and permits the armature h to drop upon the contact-point B. The circuit is thus formed through the armature h, the conductor h^2 to the bell, and then through the battery D and conductor h^3, armature b^2, battery B^2, and contact B to the armature h. If it is desired to stop the ringing of the bell, the same may be done by means of the key F, as described in Fig. 1. When it is desired to start the bell ringing again, the same may be done by means of the key E, as before described. Obviously if the armature b^2 is lifted by the operation of the key F to stop the bell ringing for a train on section A^4, a train entering the track-section A^5 will ring the bell, inasmuch as the circuits for each track, while having the battery D and bell in common, operate entirely independently of each other.

When a switch is connected in one of the insulated sections, as shown in Fig. 7, it is de-

sirable that the bell be prevented from ringing when a train from the switch passes upon the insulated section and continues on its way from the crossing. To secure this result, an insulated track-section A^6 of any desired length and provided with a battery I is constructed in the switch terminating at the insulated section A′. An electromagnet I′ is also connected in said section, and the armature *i* thereof is electrically connected through a battery I^2 with the conductor *f*, and a conductor *i′* leads from the conductor *b* into position for contact with said armature. The main-track circuits for convenience in description are those illustrated in Fig. 1. In operation a train running out of the switch drops the armature *i*, when it strikes the section A^6 upon the conductor *i′*, thereby closing the circuit through said armature and battery I^2, conductor *f*, electromagnet B′, conductor *b*, and conductor *i′*, and lifting the armature b^2. As the train passes upon the section A′ the armature a^5 falls; but the bell cannot ring, owing to the break between armature b^2 and battery D. When the train is clear of section A^6 and still on section A′, the armature *i* picks up; but the armature b^2 does not fall, inasmuch as the current from battery B^2 flows through the electromagnet B′ until the train is entirely off the section A′ and the circuit is broken by the picking up of the armature a^5.

In the form illustrated in Fig. 8 the insulated track-sections A′ and A^2 and the insulated switch-section A^6 are shown, as before described, and an additional insulated section A^7 is inserted in the insulated track-section A′ between the crossing and the switch. The arrangement of the circuits is substantially the same as that shown in Fig. 1 with the exception that the batteries are differently located, the battery B^2 being omitted from the conductor B and the battery B^5 substituted in the conductor *b*. The battery D′ may be substituted for D and connected in said conductor instead of as shown in Fig. 1. A conductor leads from the armature *i* to and is connected with the conductor *b* on one side of said battery B^5, and the conductor *i′*, upon which said armature drops when its magnet is deënergized, is connected through the electromagnet B′ with said conductor *b* on the other side of the battery B^5. Said insulated track-section A^7 is provided with a track-battery *j* and an electromagnet J^3, the armature *j′* of which is connected with a conductor j^2, which is connected with the conductor *i′*. A conductor j^3 is connected through the contact-point *e* with the magnet B′ and conductor *b*. A contact-point is provided thereon which normally engages the armature *j′*. The operation of this form of my invention is as follows: The train moving out of the switch passes off the section A^6, but fails to ring the bell, as explained in the description of Fig. 7, and should the train continue from the crossing on the main track the bell would not ring at all. Should, however, the train, after leaving the switch, move toward the crossing, the first truck engaging in the insulated section A^7 short-circuits the battery *j*, deënergizes the magnet J^3, and the armature *j′* drops, thereby breaking the circuit and having the same effect as opening the key E in Fig. 1—that is to say, it permits the armature b^2 to drop, causing the bell to ring.

As shown, all track-circuits are closed circuits, inasmuch as this insures that the signal goes immediately to "danger" in the event of any accident happening or an imperfection contained in any of the circuits or apparatus. Obviously, however, the invention is operative where all circuits are open circuits, it being only necessary in that event to so arrange the circuits that the contacts are provided when the armatures are attracted instead of repulsed. It is also obvious that the batteries may be differently arranged or used, if preferred. It is objectionable, however, to employ one battery only, inasmuch as said battery is thus working all the time when in circuit, thereby involving a large and unnecessary expense. Obviously either two or a greater or less number of operating-keys may be employed for opening or for closing any of the circuits. So too, if preferred, one or more track instruments of any preferred form may be employed to make or break any of said circuits, thereby actuating the signal or stopping the same.

Obviously many details of construction may be modified without departing from the principle of my invention.

I claim as my invention—

1. In a railroad signaling system an electrical circuit, a signaling device and a main and an auxiliary battery therein, automatic means for controlling the circuit and producing and discontinuing the signal, electrically-actuated means connected in said circuit adapted to be manually controlled for cutting the main battery and signal out of the circuit, said automatic means automatically cutting said main battery and said signal in.

2. In a signaling device the combination with an electrical circuit and a main and an auxiliary battery connected therein of electrically-operated means for closing and opening said circuit and means acting to cut the main battery and signal out of said circuit and means operated by said auxiliary battery acting to hold said main battery and signal cut out of the circuit and means adapted to be manually operated for cutting said main battery and signal into the circuit.

3. In a signaling device, the combination with an electrical circuit, a signaling device and a main and an auxiliary battery connected therein of electrically-operated means

for closing and opening said circuit thereby actuating and discontinuing the signal and electrically-operated means whereby the auxiliary battery acts to cut the main battery and signal out of said circuit, said main battery and signal being automatically restored to the circuit by said first electrically-operated means.

4. In a signaling device, a circuit, a main and an auxiliary battery and a signaling device connected therein, means operated from either side of the signal for closing and for opening said circuit, means operated manually or automatically for cutting the main battery and signal out of said circuit, the main battery and signal being automatically cut into said circuit by the said means operated from either side of the signal.

5. In a signaling device, an electrical normally open circuit, a main and an auxiliary battery and a signal therein, electrically-operated means acting to close said circuit and to open the same, track-circuits controlled by a train approaching the signal for actuating said electrically-operated means to close said circuit means for cutting the main battery and signal out of the circuit when closed and restoring the same into the circuit when the circuit is open.

6. In a crossing-signal for railways, the combination with an electrical circuit of a main and an auxiliary battery and a signal connected therein, means operated by the movement of a train toward the crossing for electrically actuating the signal, means for manually cutting out the main battery and signal and electrically-operated means for cutting the same in again operated as the train recedes from the crossing.

7. In a crossing-signal for railways, a circuit, a main and an auxiliary battery and a signal connected therein, means for opening and closing said circuit actuated from each side of said signal, said means operating automatically to actuate the signal as the train approaches the crossing and to discontinue the same as the train recedes therefrom, and means for cutting the signal out of the circuit when the same is operating and for restoring the same when the train recedes from the crossing.

8. In a crossing-signal for railways, a circuit, a main and an auxiliary battery and a signal connected therein, means for opening and closing said circuit operated by a track-circuit connected on each side of said signal, said track-circuit operating automatically to actuate the signal as the train approaches the crossing and to discontinue the same as the train recedes therefrom, and electrically-operated means for cutting the signal out of the circuit when the same is operating and for restoring the same when the train recedes from the crossing.

9. In a crossing-signal for railways, the combination with an electrical circuit of a main and an auxiliary battery and a signaling device connected therein, electrically-operated means for operating said circuit and actuating the signal as a train approaches the crossing and for discontinuing said signal as the train recedes from said crossing and electrically-operated means for cutting the signal and one of said batteries out of said circuit and for returning the same into the circuit automatically and at the will of an operator.

10. In a crossing-signal for railways, the combination with an electrical circuit, of a main, and an auxiliary battery and a signal connected therein, means operated by a train moving toward the crossing for actuating the circuit to operate the signal electrically-operated means actuated by the auxiliary battery for cutting the main battery and signal out of said circuit, said first means being operated by the train when it recedes from the crossing and acting to restore said cutting-out means to normal position.

11. In a crossing-signal for railways the combination with a circuit, a main, and an auxiliary battery and a signal connected therein, of means operated from each side of the signal acting to close and to open said circuit thereby affecting the signal oppositely and means for manually or automatically actuating and discontinuing said signal operated by means of said auxiliary battery.

12. In a device of the class described, the combination with an electric circuit of a main and an auxiliary battery and a signal connected therein, a relay, the armature thereof connected in said circuit and acting automatically to open or close the same, and an auxiliary relay also connected in said circuit and acting either automatically or manually to cut said main battery and signal out of the circuit and to restore the same thereto.

13. In a signaling device for railways, the combination with an electric circuit, of a main and an auxiliary battery and a signal connected therein, a relay operated from each side of the signal, a plurality of armatures therefor each connected in said circuit and acting automatically to open and close the same, an auxiliary relay the armature of which controls said circuit and adapted to be operated by said auxiliary battery and acting to cut said main battery and signal out of and into the circuit, the first-named relay acting to restore the circuit to normal when the said main battery and signal have been cut out.

14. In a signaling device for railways, a plurality of electromagnets operated from a track and on each side of a signal, oppositely-movable armatures therefor, a circuit in which said armatures are connected, a main and an auxiliary battery and a signal connected therein, means whereby each of said

armatures act automatically to make and to break said circuit thereby actuating or discontinuing the signal, and an auxiliary relay the armature of which controls the circuit and actuated by the auxiliary battery to cut the main battery and signal out of the circuit, manually-operated means for controlling the circuit through said auxiliary relay, the first-mentioned circuit being automatically restored to normal condition by said plurality of electromagnets.

15. In a device of the class described, the combination with insulated track-sections on each side of a crossing, batteries connected in each, a multiple relay having its electromagnets connected each with a track-section, oppositely-movable armatures for said relay, an electrical circuit in which said armatures are connected, a main and an auxiliary battery and a signal connected therein, an auxiliary relay the armature of which controls said electrical circuit, means for including said auxiliary relay in circuit with the auxiliary battery thereby actuating the armature thereof to cut said main battery and signal out of said circuit and hold the same out of said circuit until restored thereto manually or by the operation of said multiple relay.

16. In a railroad signal system, the combination with a signal, of means for automatically operating the signal when a train occupies a given position, of manually-controlled means for discontinuing the operation of the signal while the train occupies said given position, and means for automatically restoring said first-mentioned means to normal position, whereby it may be actuated by a subsequent train occupying the same given position, substantially as described.

17. In a railroad signal system, the combination with a signal-circuit, signal mechanism therein, means for controlling the signal-circuit and thereby operating the signal when a train occupies a given position, and manually-controlled means for changing the condition of the signal-circuit to discontinue the signal while the train occupies said given position, the signal-circuit being automatically restored to normal condition when the train ceases to occupy the given position, substantially as described.

18. In a railroad signal system, the combination with a signal-circuit, of signal mechanism therein, means controlling said signal-circuit to operate the signal mechanism, a circuit actuating said controlling means when a train occupies an insulated track-section, and manually-controlled means for changing the condition of the signal-circuit to render inoperative the signal when the train occupies said insulated track-section, the signal-circuit being automatically restored to normal condition when the train no longer occupies the said insulated track-section, substantially as described.

19. In a railroad signal system, the combination with a signal-circuit, of signal mechanism therein, means controlling said signal-circuit to operate the signal mechanism, a circuit actuating said controlling means when a train occupies an insulated track-section, manually-controlled means for changing the condition of the signal-circuit to render inoperative or operative said signal when the train occupies said insulated track-section, said manually-controlled means automatically restoring the signal-circuit to normal condition when the train no longer occupies said insulated track-section, substantially as described.

20. In a railroad signal system, the combination with a signal-circuit, signal mechanism therein, means automatically closing said signal-circuit to operate the signal mechanism when a train occupies an insulated track-section, a magnetic circuit-controller in said signal-circuit, means for actuating said magnetic controller to open or close said signal-circuit, and thereby render operative or inoperative the signal when a train occupies said insulated track-section, said signal-circuit being automatically restored to normal condition when the train ceases to occupy the insulated track-section, substantially as described.

In testimony whereof I have hereunto subscribed my name in the presence of two subscribing witnesses.

EUGENE W. VOGEL.

In presence of—

GEO. L. WILKINSON,

CLARA C. CUNNINGHAM.