No. 861,772. PATENTED JULY 30, 1907.

V. I. SMART.

SIGNAL CONTROLLING MECHANISM.

APPLICATION FILED JULY 13, 1906.

3 SHEETS—SHEET 1.

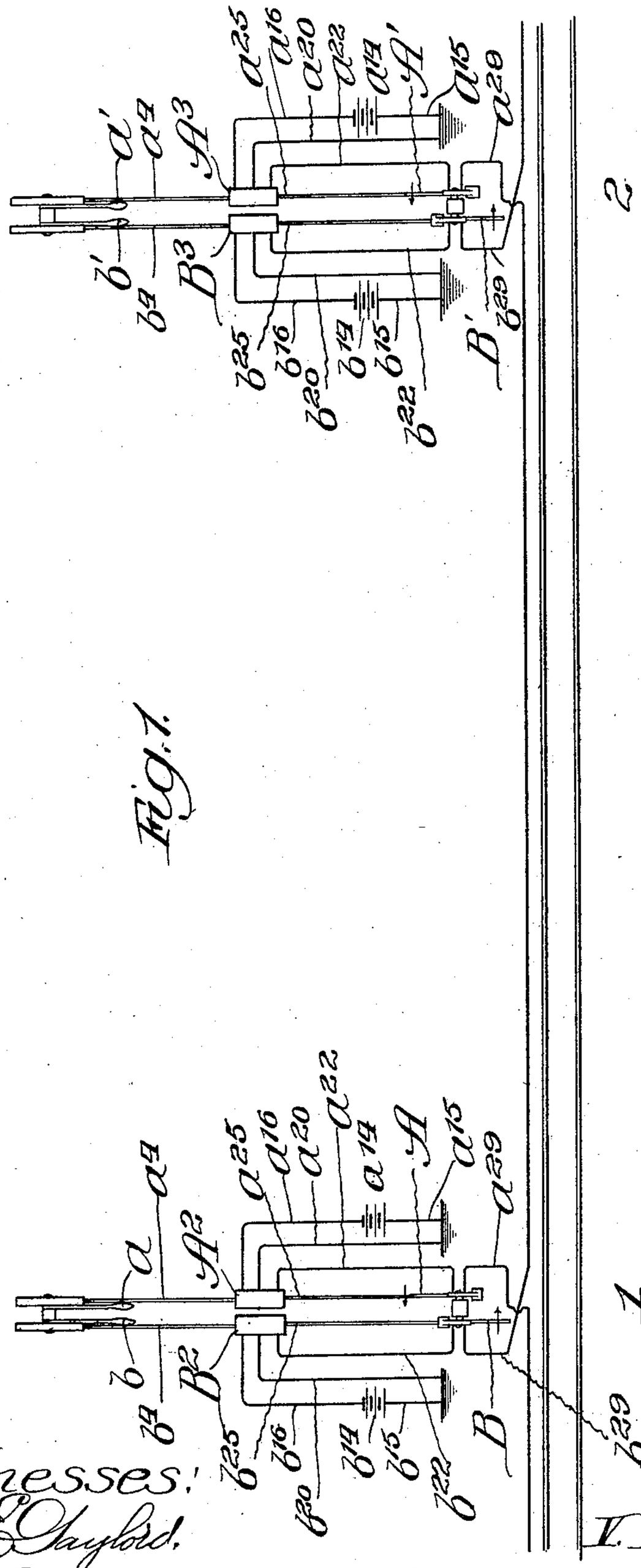


FIG. 1.

Witnesses:
Chas. E. Gaylord.
John Enders.

Inventor:
V. Irving Smart
By Dyrenforth, Dyrenforth, Lee & Wiles,
Attys.

No. 861,772. PATENTED JULY 30, 1907.

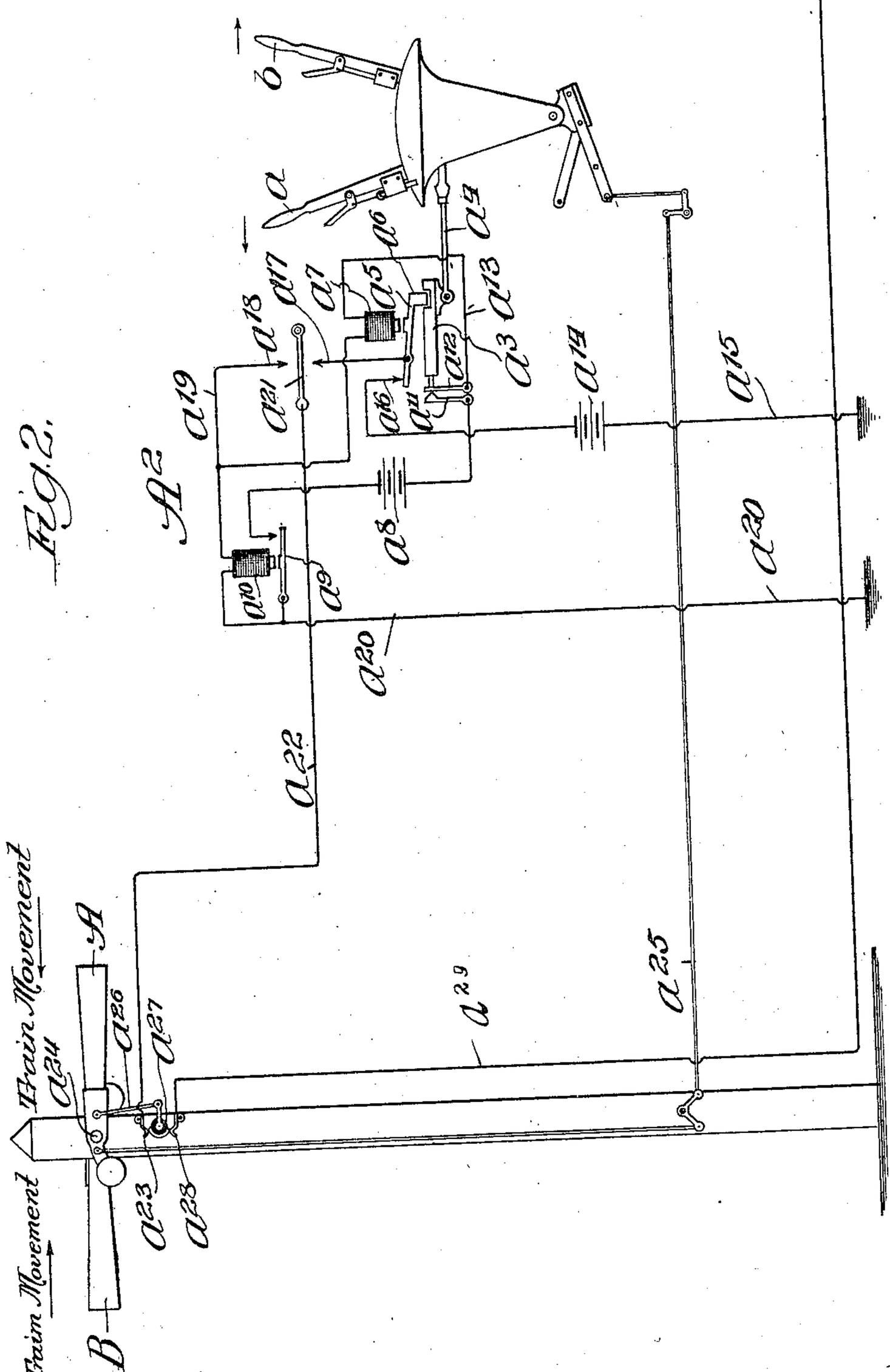
V. I. SMART.

SIGNAL CONTROLLING MECHANISM.

APPLICATION FILED JULY 13, 1906.

3 SHEETS—SHEET 2

Fig. 2.



Witnesses:
Carl C. Gaylord.
John Enders.

Inventor:
V. Irving Smart,
By Dyrenforth, Dyrenforth, Lee & Wiles.
Attys.

No. 861,772. PATENTED JULY 30, 1907.

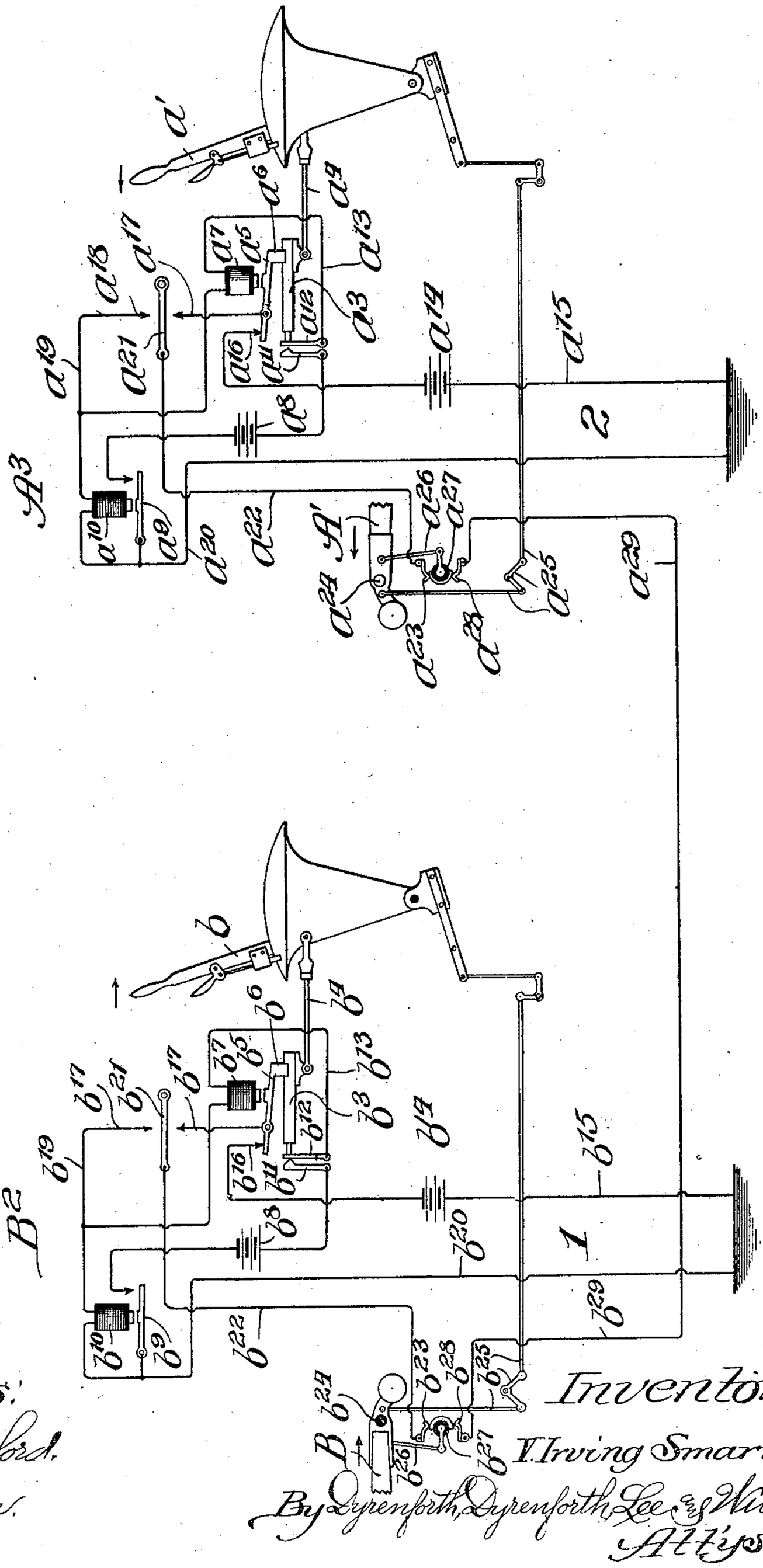
V. I. SMART.

SIGNAL CONTROLLING MECHANISM.

APPLICATION FILED JULY 13, 1906.

3 SHEETS—SHEET 3.

Fig. 3.



Witnesses:
Geo. E. Gaylord.
John Endres.

Inventor:
V. Irving Smart,
By Dyrenforth, Dyrenforth, Lee & Wiles,
Attys.

UNITED STATES PATENT OFFICE.

VALENTINE IRVING SMART, OF CHICAGO, ILLINOIS, ASSIGNOR TO UNION SWITCH AND SIGNAL COMPANY, OF SWISSVALE, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

SIGNAL-CONTROLLING MECHANISM.

No. 861,772. Specification of Letters Patent. Patented July 30, 1907.

Application filed July 13, 1906. Serial No. 326,004.

To all whom it may concern:

Be it known that I, VALENTINE IRVING SMART, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Signal-Controlling Mechanism, of which the following is a specification.

My invention relates particularly to the control of track signals in block systems; and my primary object is to provide simple and effective mechanism whereby the signals at the several stations are controlled by two or more operators located at different stations, so that an operator at one station cannot give a safety signal at that station, except with the coöperation of the operator at the succeeding station.

My invention is illustrated in its preferred embodiment in the accompanying drawings, in which—

Figure 1 represents a section of a railway track with signals adjacent thereto controlled by my improved mechanism, the view being diagrammatic in its nature; Fig. 2, a view illustrating more in detail the mechanism at one of the stations, the view being diagrammatic in its nature; and Fig. 3, a diagrammatic view illustrating the manner in which the mechanisms of two adjacent stations are electrically connected.

In the drawings, the stations shown are designated 1 and 2; the semaphore arms or blades controlling the train movement in one direction are designated A, A^1, and the levers controlling said blades are designated a a^1; and the semaphore arms controlling the movement in the other direction are designated B, B^1, and the levers controlling the same are designated b, b^1. The levers a, a^1 are controlled by electrically controlled locking mechanism A^2, A^3; and the levers b, b^1 are controlled by electrically controlled locking mechanisms B^2, B^3. The arrows at the semaphore arms indicate the direction of train movement controlled by said arms; and the arrows at the operating levers indicate the direction of train movement controlled by said levers through the medium of the semaphore arms.

The locking mechanism of the B series at any given station is connected with the locking mechanism of the A series at the next station. In other words, the locking mechanism controlling the train movement in one direction at any given station is connected with the locking mechanism controlling the train movement in the other direction at the next station. This more clearly appears from Fig. 3.

Each locking mechanism A^2, A^3 comprises a slide a^3 connected by a rod a^4 with the corresponding operating lever, as shown in Fig. 3; a pivoted locking member a^5 having a lug a^6 normally engaging a recess with which the slide is provided; mechanism a^7 in the circuit of a relay-battery a^8 and controlling the locking member a^5; a contact member a^9 controlling the circuit of the relay battery a^8; a relay-magnet a^{10} controlling the member a^9; contact members a^{11}, a^{12} in the circuit a^{13} of the relay-battery a^8; a relay operating battery a^{14} joined by a conductor a^{15} to the earth and having a contact point a^{16} coöperating with the pivoted locking member a^5; a contact member a^{17} connected with the locking member a^5; a contact member a^{18} connected with a conductor a^{19} leading to the solenoid of the magnet a^{10} from which a conductor a^{21} leads to the earth; and a spring key a^{21} located between the contact points a^{17}, a^{18} and adapted to be brought into contact with either one of said contact points, said key having connected therewith a conductor a^{22} which leads to a contact member a^{23} adjacent to the corresponding semaphore arm of the A series. Each semaphore of the A series is supported on a pivot a^{24} and has its short arm joined by connections a^{25} to the corresponding operating lever of the A series. Connected with the semaphore arm by a rod a^{26} is a rotary contact member a^{27} adapted, when the semaphore arm is raised, to make connection between the contact member a^{23} and a contact member a^{28} joined to a conductor a^{29} which connects with an adjacent station.

Each of the locking mechanisms B^2 B^3 comprises parts corresponding with the parts of the mechanisms A^2 A^3, the parts of the mechanisms B^2 B^3 being indicated by the reference letter b with index numerals corresponding with those of the corresponding parts of the a series of letters. The conductors a^{29}, b^{29} are joined together or they may constitute a single conductor connecting two adjacent stations.

In practice, the operators at two adjacent stations are in telegraphic or telephonic communication. Assume, therefore, that the operator at station 1 desires to clear the signal B and permit a train to pass toward station 2. This cannot safely be done, unless the semaphore A^1 at station 2 is at danger, so that a train at station 2 cannot approach station 1. With the semaphores at the danger position, which is their normal position, the operator at station 1 may raise his key b^{21}, thereby closing the circuit of the magnet b^{10} at station 1, and the operator at station 2, if conditions permit, will depress his key a^{21}, whereby the circuit is established through the conductor a^{29}, contact members a^{23}, a^{28}, conductor a^{22}, contact a^{17}, locking member a^5, contact a^{16}, battery a^{14}, conductor a^{15} to earth, thence back through the earth to conductor b^{20}, through magnet b^{10} and conductor b^{19} to key b^{21}. Thereupon, the magnet b^{10} is energized and the relay-circuit of the battery b^8 closed, energizing the magnet b^7 and lifting the locking member b^5, which permits the operating lever b of the semaphore to be actuated. Upon the actuation of the lever, the slide b^3 is retracted, withdrawing the contact member b^{12} from the contact member b^{11} and breaking the circuit of the relay-battery b^8, thereby deënergizing the magnet b^7 and

permitting the locking member b^5 to drop upon the slide b^3 in position to reëngage the notch of the slide when the lever b is returned to its normal position to set the semaphore B at danger again. Should the operator at station 2 desire to clear the semaphore A^1 to permit a train to pass from station 2 toward station 1, he must have the coöperation of the operator at station 1 to secure the desired result, and the operator at station 1 will not coöperate in giving a safety signal at station 2 unless the semaphore B is at the danger position ready to prevent a train from passing from station 1 toward station 2. Upon reqquest from the operator at station 2, the operator at station 1 depresses his key b^{21}, if conditions permit, and the operator at station 2 raises his key a^{21}, whereupon the relay operating magnet a^{10} is energized by the battery b^{14}, throwing the relay-battery a^8 into operation, energizing the magnet a^7 and lifting the locking lever a^5, permitting the lever a^1 to be operated to drop the semaphore A^1 to the clear position. It is evident that by arranging two sets of locking mechanisms in connection with two sets of operating levers at every station, and connecting the locking mechanisms in the manner indicated, the system of control of the operating levers may be extended indefinitely.

It will be noted that the circuit connecting the locking mechanisms of two adjacent stations has a circuit maker and breaker operated directly by the semaphore arm, the purpose of this arrangement being to insure the proper condition of the circuit regardless of the failure of the connection between an operating lever and its semaphore.

The foregoing detailed description has been given for clearness of understanding only, and no undue limitation is to be understood therefrom.

What I regard as new, and desire to secure by Letters Patent, is—

1. The combination of semaphore arms located at different stations, an electric circuit connecting said semaphore arms and equipped with circuit making and breaking devices connected with the semaphore arms, operating means for the arms, and a locking member controlled by said circuit, said circuit being equipped at each station with a key, whereby the coöperation of two operators is required in operating a semaphore.

2. The combination with a railway track, of a series of semaphores controlling the train-movement in one direction, a series of semaphores controlling the train-movement in the other direction, a semaphore of each series being located at each of a series of stations, operating means for the semaphores of one series, operating means for the semaphores of the other series, and locking mechanisms for said operating means, the locking mechanism for the operating means of a semaphore of one series being connected with the locking mechanism for the operating means of a semaphore of the other series at an adjacent station, for the purpose set forth.

3. The combination with a railway track, of a series of semaphores controlling the train-movement in one direction, a series of semaphores controlling the train-movement in the other direction, a semaphore of each series being located at each of a series of stations, a circuit connecting a semaphore of one series at one station with a semaphore of the other series at an adjacent station and provided with circuit making and breaking devices operated by said last-named semaphores, operating means for the semaphores, locking members controlling said operating means, means controlling said locking members, and keys connected with said circuit and located at different stations and jointly controlling said locking members, for the purpose set forth.

4. The combination with a railway track, of a series of semaphores located at a series of stations and controlling the train-movement in one direction, a series of semaphores located at the same stations and controlling the train-movement in the other direction, conductors connecting the semaphores of different series at adjacent stations and equipped with circuit-breakers connected with said semaphores, a key at each station connected with each of said conductors, operating levers for the semaphores, locking members for said levers, relay magnets controlling said locking members and having circuits equipped with contact breakers, conductors equipped with relay-controlling magnets and provided with contact points co-acting with said keys, contact members connected with said locking members and co-acting with said keys, and batteries for the relay circuits and for the relay controlling circuits.

5. The combination with a railway track of semaphores located at different stations, semaphore-actuating means, locking mechanism for the semaphore-actuating means at each station, comprising a slide connected with the operating lever, a locking member co-acting with said slide, a relay-circuit having a magnet controlling said locking member and having a contact-breaker actuated by said slide, a second contact-breaker connected with the relay-circuit, a relay-controlling magnet controlling said last-named circuit-breaker, a conductor joining semaphores of adjacent stations and equipped with circuit-breakers actuated by the semaphores, keys connected with said conductor, conductors connected with the relay-controlling magnets and having contact-points co-acting with said keys, contact members connected with said locking-members and connected with said keys, and conductors connected with said locking-members and electrically connected together.

6. In signal-controlling mechanism, the combination with a semaphore-actuating lever, of a locking-member connected therewith, a co-acting locking-member, a relay-magnet controlling said second-named locking-member, a circuit for said relay-magnet provided with a battery, a circuit-breaker for said circuit controlled by said first-named locking-member, a second circuit-breaker for the relay-circuit, and an electro-magnet controlling said second-named circuit.

7. In signal-controlling mechanism, the combination of a semaphore-arm, an actuating lever therefor, connecting means joining the semaphore-arm and said actuating lever, a locking-member controlling said actuating lever, an electric circuit controlling said locking-member, and a circuit-breaker connected with said last-named circuit and actuated directly from said semaphore-arm, for the purpose set forth.

V. IRVING SMART.

In presence of—
L. HEISLAR,
J. H. LANDES.