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G. THOMPSON.
ELECTROMAGNETIC BLOCK SYSTEM.

APPLICATION FILED MAY 16, 1901.

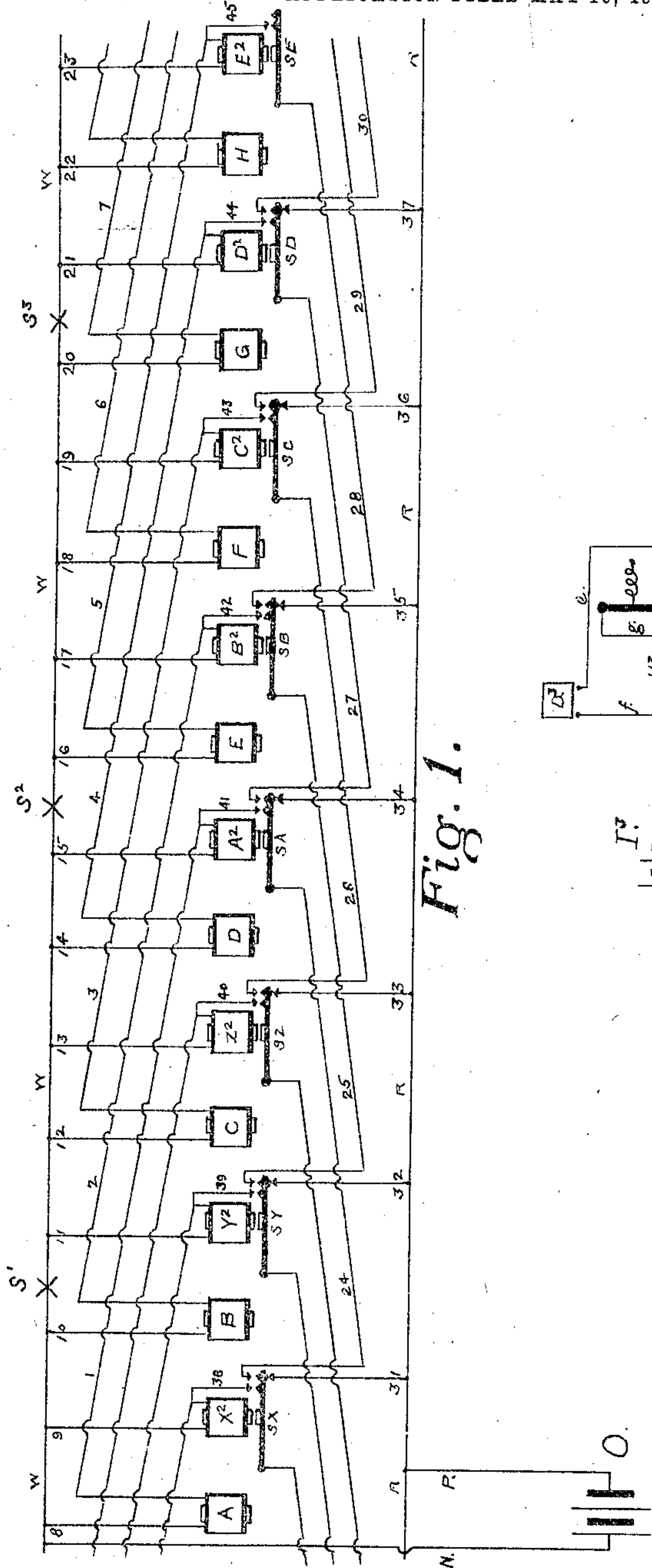


Fig. 1.

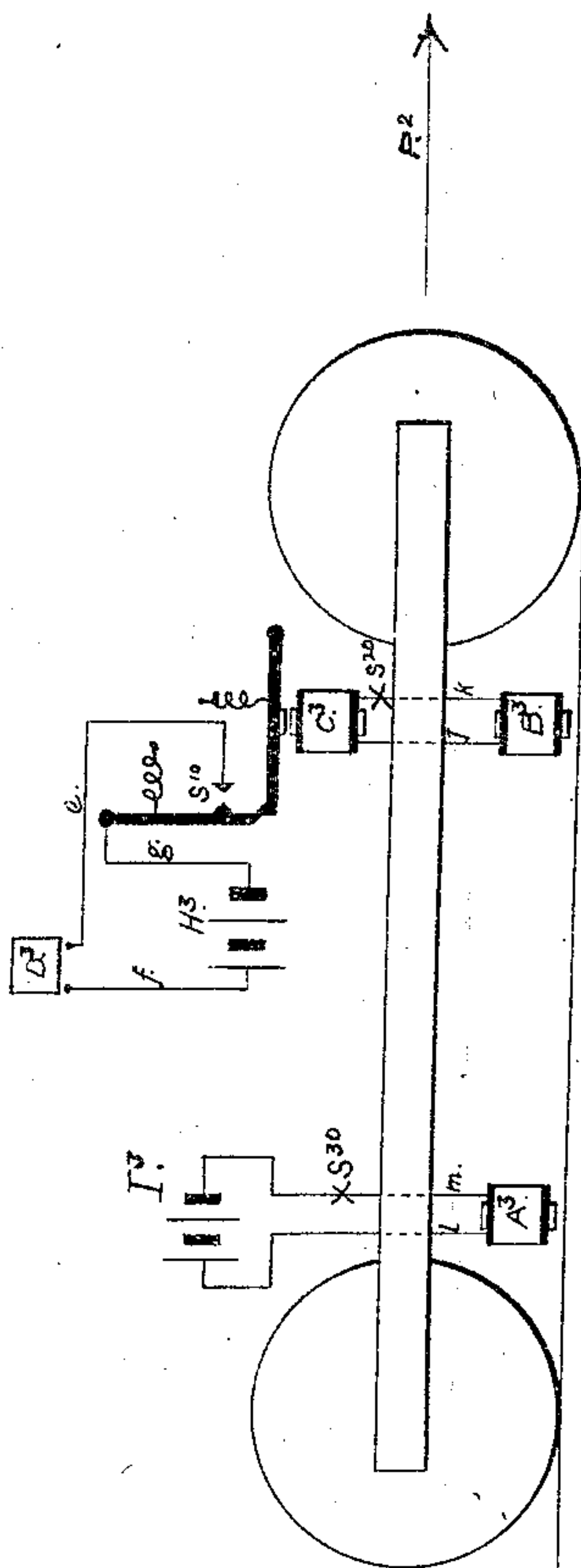


Fig. 2.

Witnesses

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ELECTROMAGNETIC BLOCK SYSTEM.

SPECIFICATION forming part of Letters Patent No. 785,446, dated March 21, 1905.

Application filed May 16, 1901. Serial No. 60,427.

To all whom it may concern:

Be it known that I, GUION THOMPSON, a citizen of the United States, residing at Duluth, in the county of St. Louis and State of Minnesota, have invented new and useful Improvements in Electromagnetic Block Systems, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to make and use the same.

My invention relates to electromagnetic block systems, and has for its object the provision of means for progressively establishing and dissolving spheres of magnetic influence at intervals along a predetermined route.

It consists of a series of normally open primary electric circuits, each including a source of electricity, the coil of an electromagnet, a normally open circuit-controlling contact adapted to be closed by the said magnet when energized, a normally closed circuit-controlling contact adapted to be opened by the magnet when energized of another of said circuits, and a series of normally open secondary electric circuits, each including a source of electricity, an electromagnet, a normally open circuit-controlling contact governed thereby, the first said normally open contact, and said normally closed contact.

It also consists of certain other constructions, combinations, and arrangements of parts, as will be hereinafter more particularly described and claimed.

In the drawings, Figure 1 is a diagram of my said invention. Fig. 2 is a diagram of a conveyance, showing for the purpose of illustrating the utility of said invention certain means adapted to initiate the operation of said invention and certain other means adapted to be operated by said invention.

In the drawings, A, B, C, D, E, F, G, and H are electromagnets the coils of which are included in derived circuits each having two branches and shunted, respectively, onto the coils of electromagnets A², B², C², and E², as shown, and corresponding electromagnets farther along said route and not shown in any suitable manner or by any suitable means adapted to eliminate each of the first said magnets from any said circuit except the circuit

including only the coil of said magnet and the coil of the individual magnet upon which it is shunted. The coils of the electromagnets X², Y², Z², A², B², C², D², and E² are also included in a series of normally open primary, and secondary electric circuits each including a source of electricity, as a battery O, the electrical resistance of each of which normally open circuits is relatively less than the resistance of the derived circuits. Each of said normally open circuits also includes, as respectively at 38, 39, 40, 41, 42, 43, 44, and 45, a normally open circuit-controlling contact adapted to be closed by the magnet when energized of its respective circuit by means of an armature and armature-lever, as respectively at SX, SY, SZ, SA, SB, SC, SD, and SE, governed by said magnet and supporting an opposite contact adapted to establish when said armature is operated by said magnet a communication between said open contact and a contiguous terminal contact of an intermediate conductor, as respectively 24, 25, 26, 27, 28, 29, and 30, shown, and a corresponding terminal contact farther along said route, but not shown, and each of said primary circuits further includes a normally closed circuit-controlling contact between the opposite end of said intermediate conductor and the free end of a conductor, as respectively 34, 35, 36, and 37, shown, and corresponding conductors farther along said route and not shown, which conductor is connected at its opposite end to a mutual conductor R, connected to one of the poles P of said battery, each of which normally closed contacts is adapted to be opened by the electromagnet when energized of another of said circuits, as respectively A², B², C², D², and E², shown, and corresponding electromagnets farther along said route and not shown. Each of said secondary circuits includes, in addition to the intermediate conductor of the corresponding primary circuits, as 27, a preceding intermediate conductor, as 24, which preceding conductor under other circumstances forms the intermediate conductor of another primary circuit. Said preceding conductor is provided at its opposite ends with nor-

mally open contacts, one of which is adapted to be closed by the magnet, as A^2 , which establishes the primary circuit, and the other of which is adapted to be closed by the magnet, as X^2 , which establishes the secondary circuit. Said secondary circuit also includes the coil of the magnet, as X^2 , which establishes the secondary circuit, and a source of electricity and the conductors, as 37 and R, leading to the opposite pole of said source of electricity. Conductors 9, 11, 13, 15, 17, 19, 21, and 25 are connected, respectively, to the coils of said electromagnets included in said normally open circuits and to a mutual conductor W, leading to the opposite pole N of said battery. 1 and 8, 2 and 10, 3 and 12, 4 and 14, 5 and 16, 6 and 18, 7 and 20, 8 (not designated on the drawings) and 22 are pairs of conductors included, respectively, with the coils of said electromagnets A, B, C, D, E, F, G, and H in said derived circuits shunted, as aforesaid, upon the coils of said respective electromagnets A^2 , B^2 , C^2 , D^2 , and E^2 , as shown, and corresponding electromagnets farther along said route and not shown.

For the purpose of illustrating the utility of my invention I have shown in Fig. 2 a conveyance-carrying means adapted to initiate the operation of my said invention and comprising an electromagnet A^3 , depending from said conveyance and connected by conductors l and m , respectively, with the opposite poles of a battery I^3 , upon which conveyance is also shown means which may, under circumstances hereinafter described, be operated by my said invention and comprising normally inert tandem electromagnets B^3 and C^3 , the coils of which are connected together by conductors j and k , which magnet C^3 is provided with an armature normally retracted from said magnet by a spring and adapted in retracted position to engage the free end of a lever electrically connected by a conductor g with one of the poles of a battery H^3 , the opposite pole of which battery is connected, through an electric-bell mechanism D^3 and a normally open circuit-controlling contact s^{10} , by conductors f and e , with the opposite end of said lever. A coiled spring is secured at one end to said lever and at its opposite end to a suitable anchorage and is adapted when said lever is released from engagement with said armature to cause said lever to close said normally open contact s^{10} , whereby the circuit from said battery H^3 is completed through said bell, causing it to sound. Said conveyance is adapted to pass in the direction indicated by the arrow P^2 along the route upon which my invention is laid and to bring the electromagnets B^3 and A^3 successively over said electromagnets A, X^2 , B, Y^2 , C, Z^2 , D, A^2 , E, B^2 , F, C^2 , G, D^2 , H, and E^2 , as shown, and other similar magnets farther along said route and not shown. When the electromagnet A^3 passes over said magnet A, said magnet A is energized by induction from

said magnet A^3 , and a current of electricity is created in the derived circuit including the coil of said magnet A and the coil of said magnet A^2 , thereby energizing the magnet A^2 , causing it to attract its armature SA and to close the normally open circuit-controlling contact 41, thereby establishing a closed primary circuit from battery O, through conductors W 15, the coil of magnet A^2 , the conductors 27, 37, and R to said battery, thus maintaining the magnetic energy of said magnet A^2 , the magnet A becoming again inert as soon as the magnet A^3 has passed out of inductive distance from it. When said magnet A^3 passes over said magnet X^2 , said magnet X^2 is energized by induction from said magnet A^3 , and thereupon attracts its armature SX, causing it to close the normally open contact 38, thereby establishing a closed secondary circuit from battery O, through conductors W, 9, the coil of said magnet X^2 , the conductors 24, 27, 37, R to said battery, thereby maintaining the magnetic energy of the magnet X^2 . In like manner the magnet A^3 as the conveyance proceeds acts upon the other members of said series. It is obvious, however, that when said magnet A^3 comes over the magnet D and initiates an operation of the magnet D^2 in the manner described the primary circuit, including the magnet A^2 , and the secondary circuit, including the magnet X^2 , will be broken by the opening of the contact between the conductors 27 and 37, whereupon the magnets A^2 and X^2 will drop their armatures and become inert. It will thus be seen that as said conveyance proceeds spheres of magnetic influence are progressively established and dissolved both ahead and behind it. If now a second conveyance similarly equipped following the first one come to the magnet X^2 before the first conveyance reaches the magnet D the tandem magnet $B^3 + C^3$ will be energized by induction from said magnet X^2 and will thereupon attract its armature, thus releasing said lever, which will be drawn forward by said spring and close the normally open circuit-controlling contact s^{10} , thereby establishing the circuit from the battery H^3 through said bell mechanism D^3 , causing said bell to sound an alarm.

While I have described such means as are shown in Fig. 2 to illustrate the utility of my said invention, it is obvious that such means may be radically altered or means of a totally different character may be employed both to initiate the operation of the magnets laid on said route and to be operated by my said invention. I do not, therefore, desire to limit myself to any such particular means, but regard my invention, exclusive of the means shown on said conveyance, as a complete mechanism or tool capable of performing certain operations when properly governed—as, by analogy, a boiler is a complete mechanism or tool, but capable of performing certain services only when filled with water and

subjected to a suitable degree of heat. It is also obvious that the exact construction of said electromagnets, armatures, contacts, conductors, or source of electricity may within the scope of my invention be modified or altered provided the circuits and operations claimed are preserved.

Having now described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In means for the purposes described, the combination of a series of normally open electric circuits each including a source of electricity the coil of an electromagnet, a normally open circuit-controlling contact adapted to be closed by said electromagnet when said electromagnet is energized, a normally closed circuit-controlling contact adapted to be opened by the magnet, when energized, of another of said circuits, and a derived circuit including an electromagnet shunted onto the coil of the first said electromagnet, substantially as described.

2. In means for the purposes described, the combination of a series of normally open primary electric circuits each comprising a source of electricity, the coil of an electromagnet, a normally open circuit-controlling contact adapted to be closed by said electromagnet when energized, a normally closed circuit-controlling contact adapted to be opened by the electromagnet when energized of another of said circuits; a series of normally open secondary electric circuits each including a source of electricity, the said coil of the electromagnet of a third and preceding one of said primary circuits, a normally open contact governed thereby, the first said normally open contact, and said normally closed contact; and a derived circuit, including an electromagnet and shunted onto the coil of the first said electromagnet, substantially as described.

3. In means for the purposes described, the combination of a normally open electric circuit, comprising a source of electricity the coil of an electromagnet, a normally open circuit-controlling contact governed by said electromagnet and a normally closed circuit-controlling contact; means embodying an armature adapted in operation to open said normally closed contact; a derived circuit including an electromagnet shunted onto the coil of the first said electromagnet; a traveling magnet, or energized electromagnet, adapted in passage to energize said derived circuit and subsequently to operate said armature to open said normally closed contact, substantially as described.

4. In means for the purposes described the combination of a series of normally open primary electric circuits each including a source of electricity, an electromagnet, a normally open circuit-controlling contact governed by said electromagnet and a normally closed circuit-controlling contact governed by the electromagnet of another of said circuits, and a derived circuit including an electromagnet shunted onto the coil of the first said electromagnet, substantially as described.

circuit-controlling contact governed by the electromagnet of a relative second one of said circuits; a series of normally open secondary electric circuits, each comprising a source of electricity, the electromagnet of a relative third one of said primary circuits, a normally open contact governed thereby, the respective first said normally open contact and the respective said normally closed contact; a plural number of derived circuits, each including an electromagnet, respectively shunted onto the coils of corresponding said electromagnets of said primary circuits; a traveling magnet, or energized electromagnet, adapted in passage to first energize one of said derived circuits to close the normally open contact of the primary circuit, and subsequently to energize said relative third one of said electromagnets to close the normally open contact governed thereby to close the secondary circuit, and subsequently to energize the derived circuit shunted onto the magnet of said relative second one of said primary circuits to open said normally closed contact, substantially as described.

5. In means for the purposes described, the combination of a normally open electric circuit comprising a source of electricity an electromagnet, a normally open circuit-controlling contact governed by said electromagnet and a normally closed circuit-controlling contact; an induction electromagnet adapted when energized to open said normally closed contact; a secondary circuit comprising a source of electricity, an electromagnet, a normally open contact governed thereby, the first said normally open contact and said normally closed contact; a derived circuit including an electromagnet and having two branches shunted onto the coil of the first said electromagnet; a derived circuit including an electromagnet and having two branches shunted onto the coil of the second said electromagnet; a traveling magnet or energized electromagnet adapted in passage to energize the derived circuit shunted onto the coil of the first said electromagnet and subsequently to energize the third said electromagnet and subsequently to energize the derived circuit shunted onto the coil of the second said electromagnet, substantially as described.

6. In means for the purposes described, the combination of a normally open electric circuit comprising a source of electricity, an electromagnet, a normally open circuit-controlling contact governed by said electromagnet and a normally closed circuit-controlling contact; an electromagnet adapted when energized to open said normally closed contact; a secondary electric circuit comprising a source of electricity, a third electromagnet a normally open circuit-controlling contact governed thereby, the first said normally open contact and said normally closed contact; and traveling means adapted during its progress to en-

energize the first third and second said electromagnets in the order named, substantially as described.

7. In means for the purposes described, the
5 combination of a normally open primary electric circuit including a source of electricity, an electromagnet a normally open contact controlled by said electromagnet and a normally closed contact; a second electromagnet, adapted
10 when energized to open said normally closed contact; a secondary electric circuit including a source of electricity a third electromagnet a normally open circuit-controlling contact governed thereby, the first said normally open
15 contact and said normally closed contact; a

derived circuit of relatively high resistance and including an electromagnet shunted on the coil of the first said magnet; a second derived circuit of relative high resistance and including an electromagnet shunted on the coil of 20 the said second electromagnet, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GUION THOMPSON.

Witnesses:

JAMES T. WATSON,
PHINEAS AYER.