

No. 880,218.

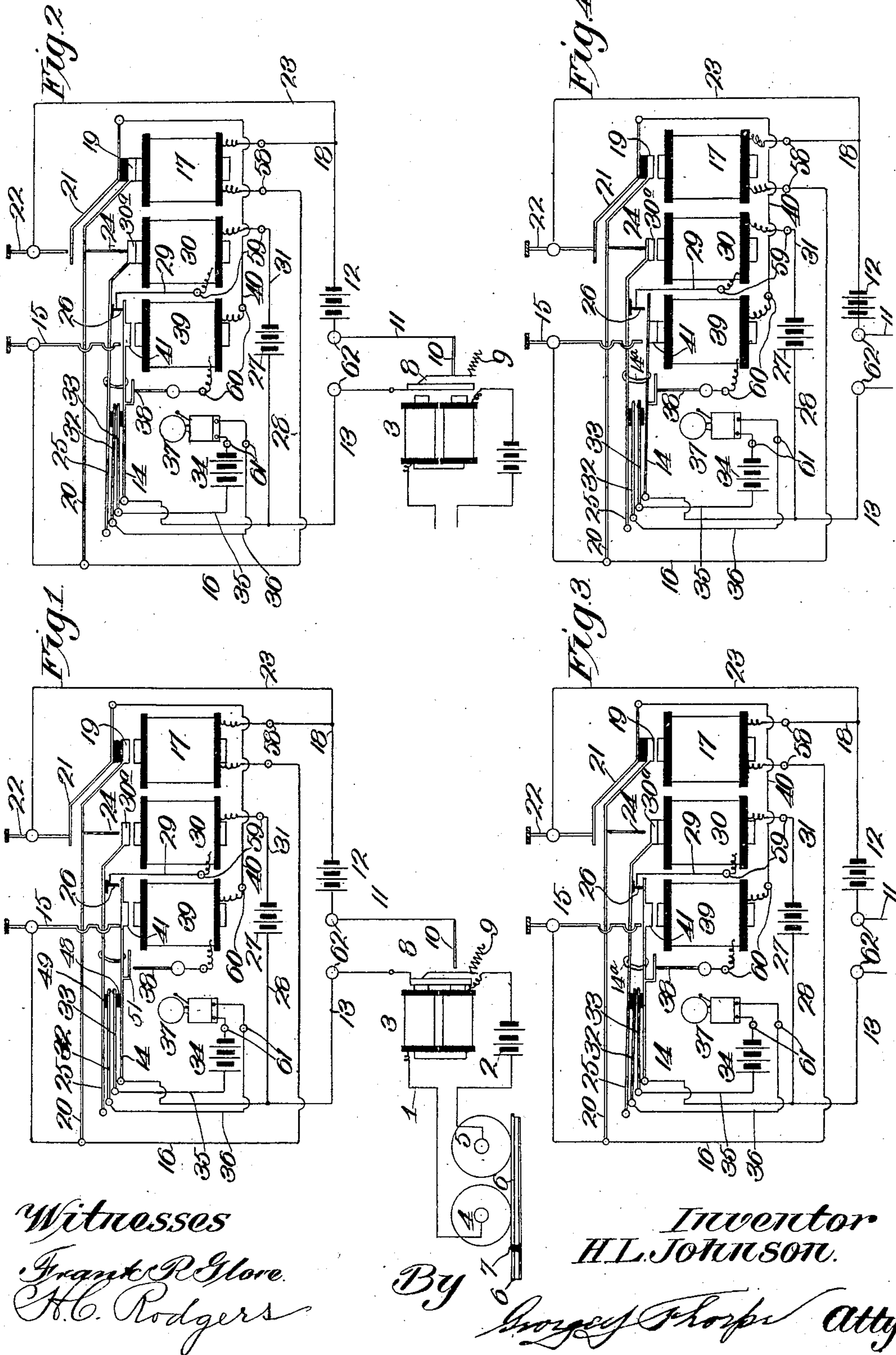
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H. L. JOHNSON.

SIGNAL MECHANISM FOR BLOCK SIGNAL SYSTEMS.

APPLICATION FILED APR. 2, 1907.

2 SHEETS—SHEET 1.



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Fig.5

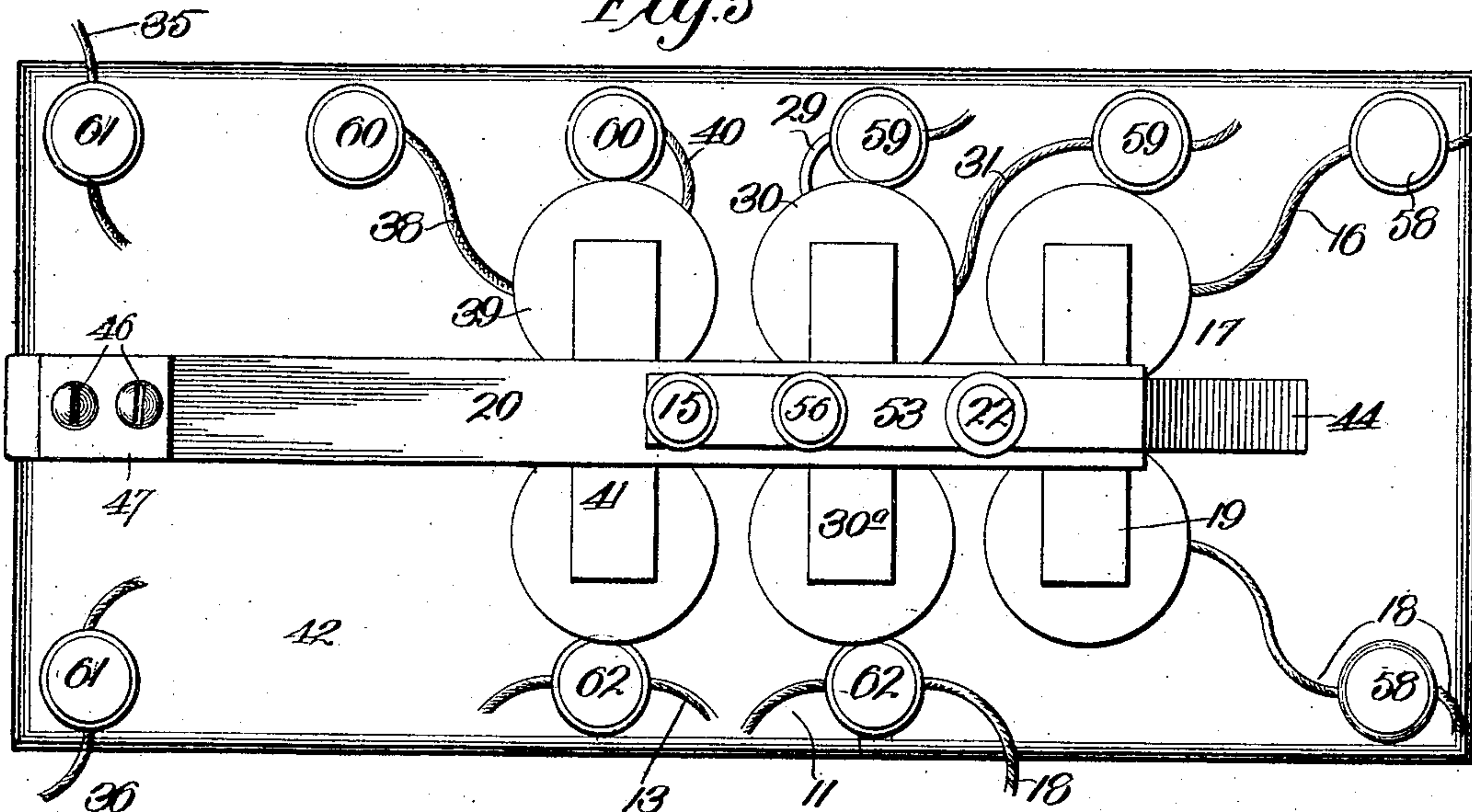
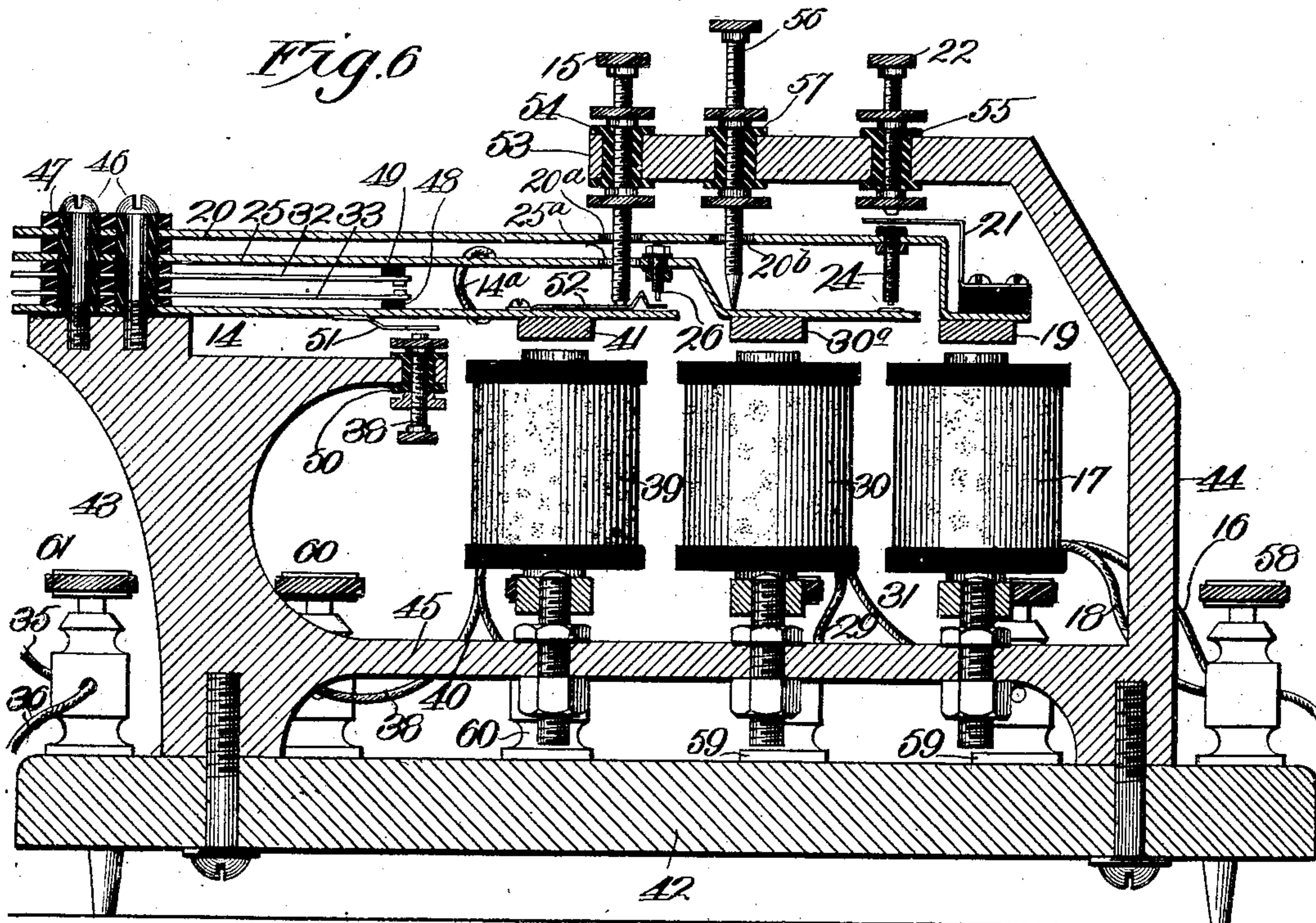


Fig. 6



Witnesses

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UNITED STATES PATENT OFFICE.

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SIGNAL MECHANISM FOR BLOCK-SIGNAL SYSTEMS.

No. 880,218.

Specification of Letters Patent.

Patented Feb. 25, 1908.

Application filed April 2, 1907. Serial No. 366,059.

To all whom it may concern:

Be it known that I, HARRY L. JOHNSON, a citizen of the United States, residing at Topeka, in the county of Shawnee and State of Kansas, have invented certain new and useful Improvements in Signal Mechanisms for Block-Signal Systems, of which the following is a specification.

This invention relates to signal mechanism for electric block signal systems and my object is to produce a signal mechanism having a main battery to alternately energize primary or main and secondary electro-magnets; a local battery and a local electro-magnet, a local signal circuit, and connections whereby the making of the circuit through the main battery shall complete the local and signal circuits successively.

A further object is to produce mechanism of the character described whereby the breaking of the circuit from the main battery shall not break or affect the local or signal circuits.

A further object is to produce mechanism of the character described whereby the second completion or remaking of the circuit from the main battery shall result in energizing the secondary electro-magnet and cause the same by the attraction of its armature to break the local and bell circuits.

With these objects in view and others as hereinafter appear the invention consists in certain novel and peculiar features of construction and organization as hereinafter described and claimed; and in order that it may be fully understood reference is to be had to the accompanying drawings, in which—

Figures 1, 2, 3, and 4 are diagrammatic plan views of the mechanism, showing the parts in different positions and relations. Fig. 5, is a plan view of the triple magnet relay. Fig. 6, is a central vertical longitudinal section of the same.

In the said drawings, 1 indicates a conductor in which is located battery 2, and an electro magnet 3, the opposite ends of said conductors being connected to the wheels 4 and 5 of a train, said wheels being adapted normally to be connected through the track 6 and at other times broken by insulation 7, or otherwise, in said track.

8 is the armature of the magnet adapted to be retracted by a spring 9.

10 is a contact post connected by conductor 11 to the main battery 12.

13 is a conductor leading from armature 8

to the spring contact 14 held yieldingly in contact normally with contact post 15 connected by conductor 16 to electro magnet 17 connected by conductor 18 to the opposite pole of battery 12.

When the magnet 3 is deenergized by breaking the circuit between wheels 4 and 5, spring 9 forces armature 8 into engagement with contact post 10 and the circuit is substantially as follows:—From battery 12, through conductor 11, post 10, armature 8, conductor 13, spring contact 14, contact post 15, conductor 16, electro magnet 17 and conductor 18 back to the battery. As a result of this circuit magnet 17 is energized and attracts its armature 19 carried by spring contact 20 electrically connected to conductor 16 and also carrying but insulated from spring contact 21. The spring contact 21 by the attraction of armature 19 is thus withdrawn from contact post 22 electrically connected by conductor 23 with conductor 18 and the battery. By the attraction of said armature 19 contact pin 24 is caused to bear against spring contact 25 and move the latter so as to cause its insulated contact pin 26 to engage spring contact 14 and establish a circuit from battery 27 through conductor 28 to conductor 13, then through spring contact 14, contact pin 26, conductor 29 to a second electro-magnet 30 and from the latter through the conductor 31 to local battery 27, and in this connection it will be noticed that spring contacts 14 and 25 are connected by a bridge wire 14^a for a purpose which hereinafter appears. The establishment or closing of this circuit results in the attraction of armature 30^a and consequently moves spring contact 25 carrying the same, this movement of spring contact 25 resulting in forcing spring contact 32 into engagement with spring contact 33 and thus establishing the bell circuit, the same comprising battery 34, conductors 35 and 36 connecting the opposite poles of such battery to conductors 33 and 32, an electro-magnetic bell 37 of any wellknown type being located in said circuit. It will thus be seen that the making of the circuit through battery 12 results in completing a circuit through batteries 27 and 34 successively, and that as soon as the circuit through battery 12 is made the operation of the signal, viz. the bell or its equivalent, occurs.

The establishment of the local circuit and incidentally the bell circuit through the mag-

net 30 results in making connection between contact 14 and contact post 38 and in breaking the connection between spring contact 14 and post 15 but the connection between
 5 spring contact 14 and contact post 38 does not result in energizing electro-magnet 39 because the current from battery 12 passes from spring contact 14 through bridge wire 14^a, spring contact 25, contact post 24,
 10 spring contact 20, conductor 16, electro magnet 17, and conductor 18 back to the battery. As a result of this circuit the armature 19 of the magnet 17 is not released, as otherwise the connection between contact 21 and post
 15 22 would be reestablished and magnet 39 energized by the current from battery 12 passing over the previously described course to contact 14 (and its spring arm 51), 38, 39, 40, 21, 22, 23, and 18 back to battery. Such
 20 energization of magnet 39 would attract its armature 41 and break the local and bell circuits by drawing contact 14 away from contact pin 26. It will thus be seen that by providing another path for the current from
 25 battery 12 at the time the original path is broken, the operation of the bell is not affected, it being undesirable to stop such operation until the circuit from battery 12 is broken by the separation of contacts 10 and 8
 30 by one of the wheels 4 or 5 passing another or second insulation 7 in the trackway, the second insulation being preferably spaced a considerable distance from the first in order to insure a prolonged ringing of the bell and
 35 thus avoid any chance of failure to attract the engineer's attention and inform him that the track is clear or not as the case may be. As soon as both wheels pass said second insulation the circuit is reestablished by the
 40 reengagement of contacts 10 and 8 to complete a circuit from battery 12 as follows:— 11, 10, 8, 13, 14 (and its spring arm 51) 38, 39, 40, 21, 22, 23 and 18 back to the battery, the energization of magnet 39 attracting
 45 armature 41 (spring arm 51 yielding to accommodate this action) and breaking the local circuit between 14 and 26. As such circuit is thus broken the spring contacts 25, 32 and 33 resume their normal positions, spring con-
 50 tact 14 not reassuming its original position until the circuit through the magnet 39 is broken by the separation or disengagements of contacts 10 and 8, when all of the parts will occupy the position shown in Fig. 1.

55 It will be noticed in this connection that the provision of the second path or circuit for the current does not result in disturbing the physical connection between the contact 14 and contact post 38 because the energization
 60 of magnet 39 of the local circuit holds the spring arm 51 of said contact 14 against contact post 38, as shown in Fig. 3.

Referring now particularly to Figs. 5 and 6, disclosing the construction of the triple relay,
 65 42 indicates a base of suitable insulating

material. A bracket secured upon the base comprises end posts 43 and 44 connected by a longitudinal bridge-bar 45 on which is mounted the electro-magnets 17, 30 and 39. 46 indicates bolts secured to post 43 and
 70 clamping the spring contacts 14, 20, 25, 32, and 33 upon said post, insulation 47 being inserted between the said contacts and the post 43 and the bolts, insulation 48 being also inserted between spring contacts 14 and
 75 33 and carried by one of them and insulation 49 between and carried by one of the spring contacts 25 and 32. The contact post 38 is also carried by and adjustable in post 43 and is insulated therefrom as at 50, said contact
 80 post being adapted to engage a spring arm 51 of spring contact 14, the latter also having a second spring arm 52 which is normally in engagement with contact post 15 and adapted to be engaged at times by contact pin 26. 85
 Contact post 15 is carried by an extension 53 of bracket 44 and insulated therefrom as at 54 and extends through openings 20^a and 25^a of and without engagement with spring contacts 20 and 25 respectively. Contact
 90 post 22 is also carried by extension 53 and insulated therefrom as at 55. A stop pin 56 carried by and insulated as at 57 from extension 53, extends through opening 20^b of and without engagement with spring con- 95
 tact 20, and limits the movement of spring contact 25 away from magnet 30 and toward contact pin 24. The base is equipped with suitable binding posts 58—58 for conductors 16 and 18 leading to the magnet 17, 100
 binding posts 59—59 for conductors 29 and 31 leading to magnet 30, binding posts 60—60 for conductors 38 and 40 leading to magnet 39, and binding posts 61—61 for conductors 35 and 36 leading to the bell. 105
 Binding posts 62—62 are for connection with conductors 13 and 11 and 18.

The spring arm 51 of spring contact 14 is adapted to engage post 38 when the attraction of armature 30^a causes pin 26 to press
 110 contact 14 downward said arm offering a yielding resistance to the stationary post 38 when magnet 39 is energized to effect a further depression of spring contact 14. Spring arm 52 likewise is adapted when pressed
 115 downward by pin 26, to yield slightly before said pressure depresses contact 14 to break connection with posts 15. It will be understood of course that the spring arms 51 and 52 insure greater sensitiveness in the relay 120
 but that they are not indispensable elements thereof.

From the above description it will be apparent that I have produced a signal mechanism for block signal systems which upon
 125 the completion of a circuit through the main battery completes a local and a signal circuit and upon the breaking of the circuit through the main battery leaves the local and signal circuits intact and which upon the 130

remaking of a circuit through the main battery breaks said local and bell circuits, a second breaking of the circuit through the main battery resulting in the restoration of all of the parts of the mechanism to their original or normal positions and I wish it to be understood that I do not desire to be restricted to the exact details of construction shown and described as obvious modifications will suggest themselves to one skilled in the art.

Having thus described the invention what I claim as new and desire to secure by Letters-Patent, is:—

1. In a signal mechanism for block signal systems, a source of electric current supply, an electro-magnet in circuit therewith, a yieldingly retracted armature for the magnet, a pin movable with the armature and in circuit with the magnet, a local battery, a magnet in circuit therewith, a yieldingly retracted armature therefor, a pin movable with the armature and in circuit with the last-named magnet, a contact electrically connected to the local battery, a pair of contacts electrically connected to the source of electric current supply and to the contacts connected to the local battery and adapted when in engagement to complete the circuit through the source of current supply and energize the connected magnet and cause the pin movable with the armature of such magnet to move the pin movable with the armature of the local battery magnet into engagement with the contact connected to the local battery and thus complete a circuit through said local battery magnet.

2. In a signal mechanism for block signal systems, a source of electric current supply, an electro-magnet in circuit therewith, a yieldingly retracted armature for the magnet, a pin movable with the armature and in circuit with the magnet, a local battery, a magnet in circuit therewith, a yieldingly retracted armature therefor, a pin movable with the armature and in circuit with the last-named magnet, a contact electrically connected to the local battery, a pair of contacts electrically connected to the source of current supply and to the contact connected to the local battery and adapted when in engagement to complete the circuit through the source of current supply and energize the connected magnet and cause the pin movable with the armature of such magnet to move the pin movable with the armature of the local battery magnet into engagement with the contact connected to the local battery, in combination with a second local battery, a pair of conductors connected to opposite ends of the same, a signal mechanism on one of said conductors and a pair of contacts connected to the ends of said conductors, one of said contacts being moved into engagement with the other by the armature of the

magnet of the first-named local circuit when the latter is completed.

3. In a signal mechanism for block signal systems, a source of electric current supply, an electro-magnet in circuit therewith, a yieldingly retracted armature for the magnet, a pin movable with the armature and in circuit with the magnet, a contact in circuit with the source of current supply and the magnet in circuit therewith, a local battery, a magnet in circuit therewith, a yieldingly retracted armature therefor, a pin in circuit with the last-named magnet and movable with the armature therefor, a contact in permanent circuit with the battery and in contact with the first-named contact, a pair of contacts electrically connected to the source of current supply and to the contact in permanent circuit with the local battery and adapted when in engagement to complete the circuit from said source of current supply and energize its connected magnet to cause the pin movable with its armature to move the pin movable with the armature of the local magnet into engagement with the contact in permanent circuit with said local battery and thus complete a circuit through said local magnet and also move said last-named contact out of engagement with said first-named contact, and a bridge wire establishing electrical connection between the contact in permanent circuit with the local battery and the first-named pin when the armature movable with the latter is attracted.

4. In a signal mechanism for block signal systems, a source of electric current supply, an electro-magnet in circuit therewith, a yieldingly retracted armature for the magnet, a pin movable with the armature and in circuit with the magnet, a contact movable with and insulated from said pin and in circuit with the source of current supply, a second contact in circuit with the source of current supply and also in circuit with said magnet, a local battery, a magnet in circuit therewith, a yieldingly retracted armature therefor, a pin in circuit with the last-named magnet and movable with the armature therefor, a third contact in circuit with the battery, and in contact with said second contact, a pair of contacts electrically connected to the source of current supply and to the contact in permanent circuit with the local battery and adapted when in engagement to complete the circuit from said source of electric current supply and energize the connected or first-named magnet to cause the pin movable with its armature to move the pin movable with the armature of the local magnet into engagement with the contact in permanent circuit with the local battery and thus complete a circuit through said local battery magnet and also cause said last-named contact to move out of engagement with said second contact, a secondary mag-

net in circuit with the contact movable with and insulated from the pin movable with the armature of the first-named magnet and adapted to be energized by the second completion of the circuit from said source of current supply—viz. by the reengagement of said “pair of contacts”—, and an armature to be attracted by the energized secondary magnet to move the said third contact out of engagement with the pin in circuit with the local battery magnet and thus break the local circuit.

5. In a signal mechanism for block signal systems, a source of electric current supply, an electro magnet in circuit therewith, a yielding retracted armature for the magnet, a pin movable with the armature and in circuit with the magnet, a contact movable with and insulated from said pin and in circuit with the source of current supply, a second contact in circuit with the source of current supply and also in circuit with said magnet, a local battery, a magnet in circuit therewith, a yielding retracted armature therefor, a pin in circuit with the last-named magnet and movable with the armature thereof, a third contact in permanent circuit with the battery and in contact with said second contact, a pair of contacts electrically connected to the source of electric current supply, and to the contact in permanent circuit with the local battery and adapted when in engagement to complete the circuit from said source of electric current supply and energize the connected or first-named magnet to cause the pin movable with its armature to move the pin movable with the armature of the local magnet into engagement with the contact in permanent circuit with the local battery and thus complete a circuit through the local battery magnet and also cause said last-named or third contact to move out of engagement with said second contact, a secondary magnet in circuit with the contact movable with and insulated from the pin movable with the armature of the first-named magnet and adapted to be energized by the second completion of the circuit from said source of current supply—viz. by the reengagement of said “pair of contacts”—, an armature to be attracted by the energized secondary magnet to move the said third contact out of engagement with the pin in circuit with the local battery magnet and thus break the local circuit, a signal battery, a signal in circuit therewith, contacts connected to opposite poles of said battery and means, actuated by the movement of the armature of the local battery toward its magnet to cause said last-named contacts to engage and complete the signal circuit and to separate said contacts and thus break the signal circuit when the local circuit is broken by the energization of the secondary magnet.

6. In a signal mechanism for block signal systems, a source of electric current supply, a contact and a magnet in circuit with said source, a yielding retracted armature therefor, a movable contact movable by said armature when attracted into engagement with the first-named contact, a local source of current supply, a magnet in circuit therewith and with said movable contact, a yielding retracted armature therefor, a contact movable with but insulated from the last-named armature and in engagement with the movable contact when the local circuit is completed, a pair of contacts, and means to electrically connect the same to complete the circuit from the first-named source of current supply and energize the first-named magnet to cause the latter to attract its armature and move the movable contact out of engagement with the contact movable with but insulated from the armature of the second magnet and thus break the circuit therethrough.

7. In a signal mechanism for block signal systems, a source of electric current supply, a contact and a magnet in circuit with said source, a yielding retracted armature therefor, a movable contact movable by said armature when attracted into engagement with the first-named contact, a local source of current supply, a magnet in circuit therewith and with said movable contact, a yielding retracted armature therefor, a contact movable with but insulated from the last-named armature and in engagement with the movable contact when the local circuit is completed, a signal battery, and electromagnetic signal in circuit therewith, a pair of contacts held yielding apart and in circuit with the opposite poles of said signal battery and insulated from but caused by the attracted movement of the armature of the local circuit magnet, to engage and complete the signal circuit, a pair of contacts, and means to electrically connect the same to complete the circuit from the first-named source of current supply and energize the first-named magnet to cause the latter to attract its armature and move the movable contact out of engagement with the contact movable with but insulated from the armature of the second magnet and thus break the circuit therethrough to permit its armature to be retracted and effect the breaking of the signal through the pair of contacts connected to opposite poles of the signal battery.

8. In a signal mechanism for block signal systems, a source of electric current supply, a contact and a magnet in circuit with said source, a yielding retracted armature therefor, a movable contact movable by said armature when attracted into engagement with the first-named contact, a local source of current supply, a magnet in circuit therewith

and with said movable contact, a yielding-
retracted armature therefor, a contact mov-
able with but insulated from the last-
named armature and in engagement with
5 the movable contact when the local circuit
is completed, a signal battery and electro-
magnetic signal in circuit therewith, a pair
of contacts held yieldingly apart and in cir-
cuit with the opposite poles of said signal
10 battery and insulated from but caused by
the attracted movement of the armature of
the local circuit magnet, to engage and com-
plete the signal circuit, a pair of contacts,
means to electrically connect the same to
15 complete the circuit from the first-named
source of current supply and energize the
first-named magnet to cause the latter to
attract its armature and move the movable

contact out of engagement with the contact
movable with but insulated from the arma- 20
ture of the second magnet and thus break
the circuit therethrough to permit its arma-
ture to be retracted and effect the breaking
of the signal through the pair of contacts
connected to the opposite poles of the signal 25
battery, and means to break the circuit
through the first-named source of current
supply by separating the said pair of con-
tacts in such circuit.

In testimony whereof I affix my signature, 30
in the presence of two witnesses.

HARRY L. JOHNSON.

Witnesses:

O. F. SWANSON,
GUSS JAHNSON.