

No. 791,972.

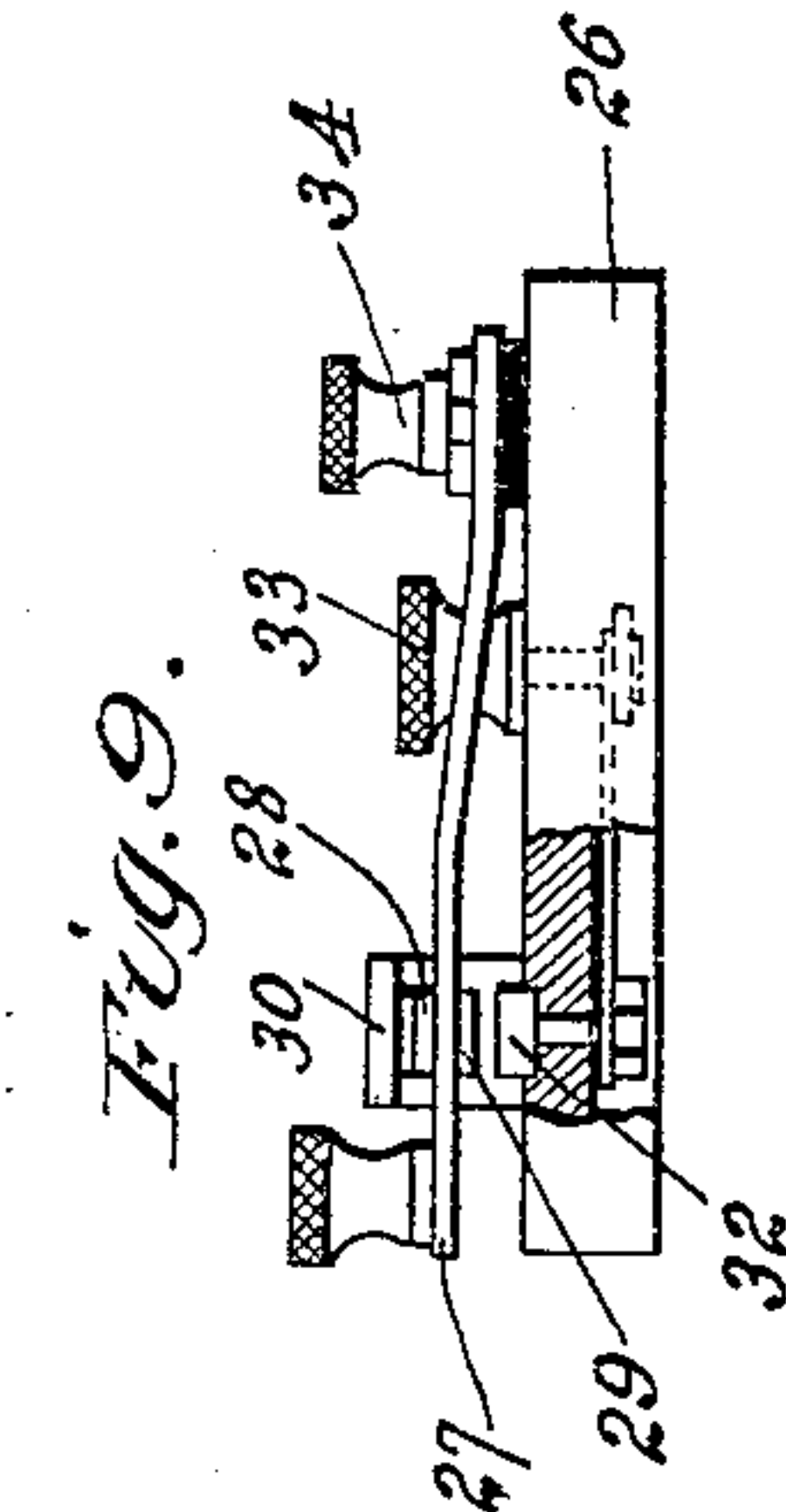
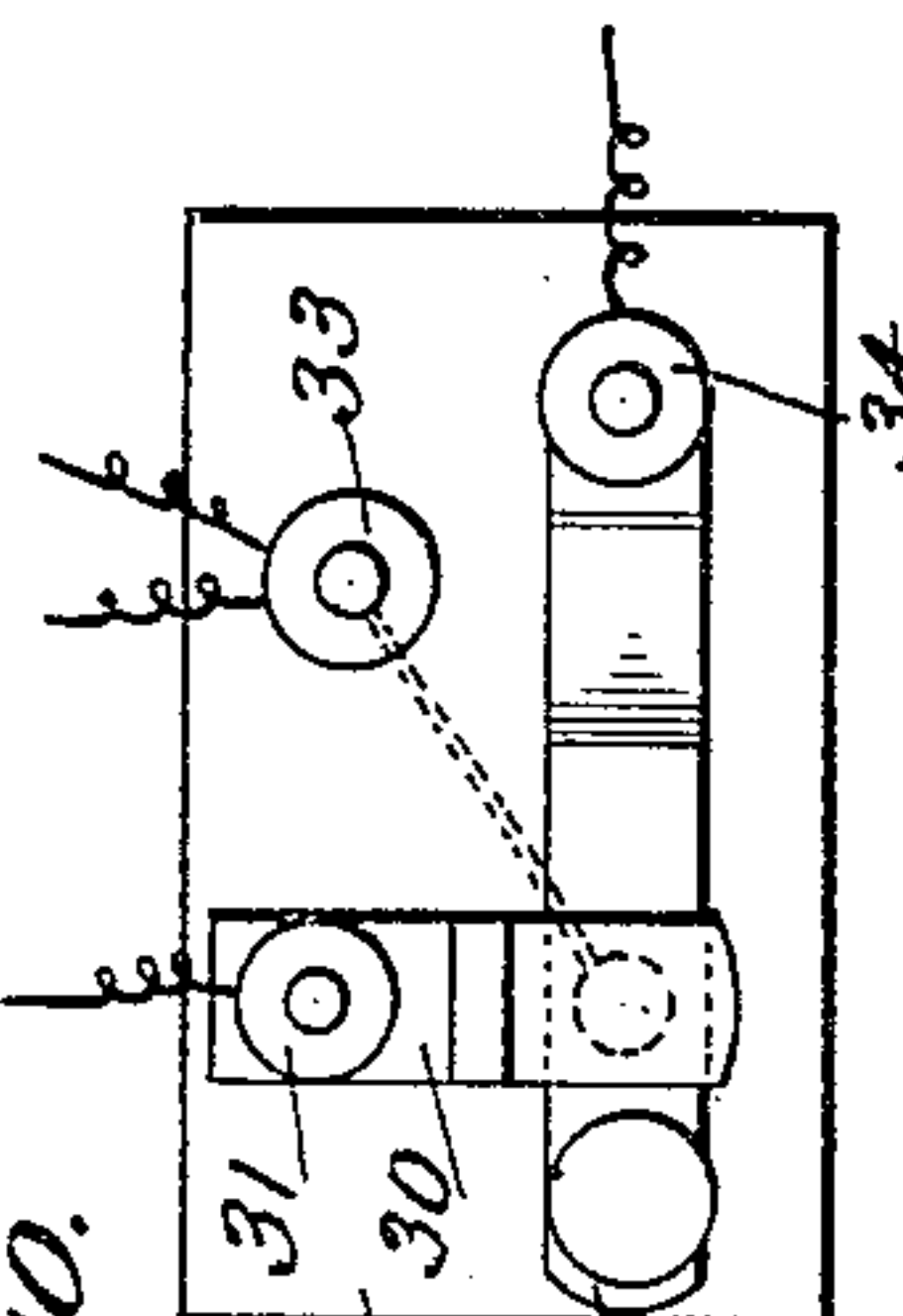
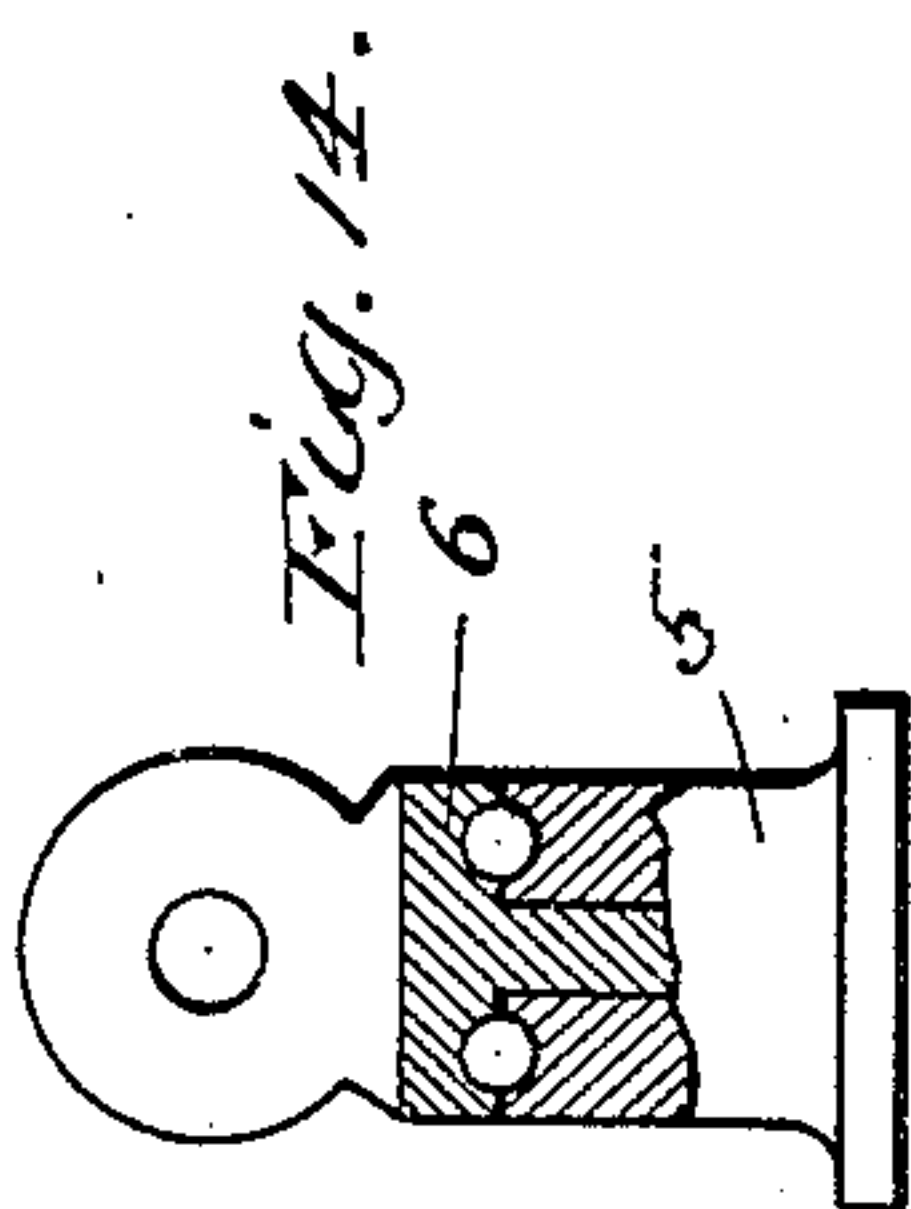
PATENTED JUNE 6, 1905.

D. C. WOLFE.

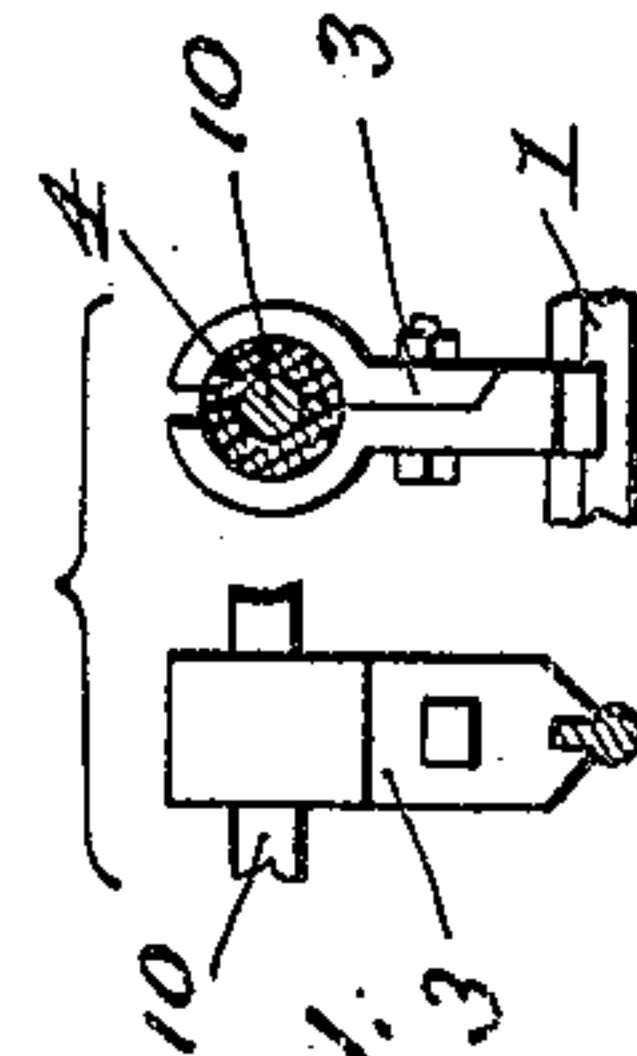
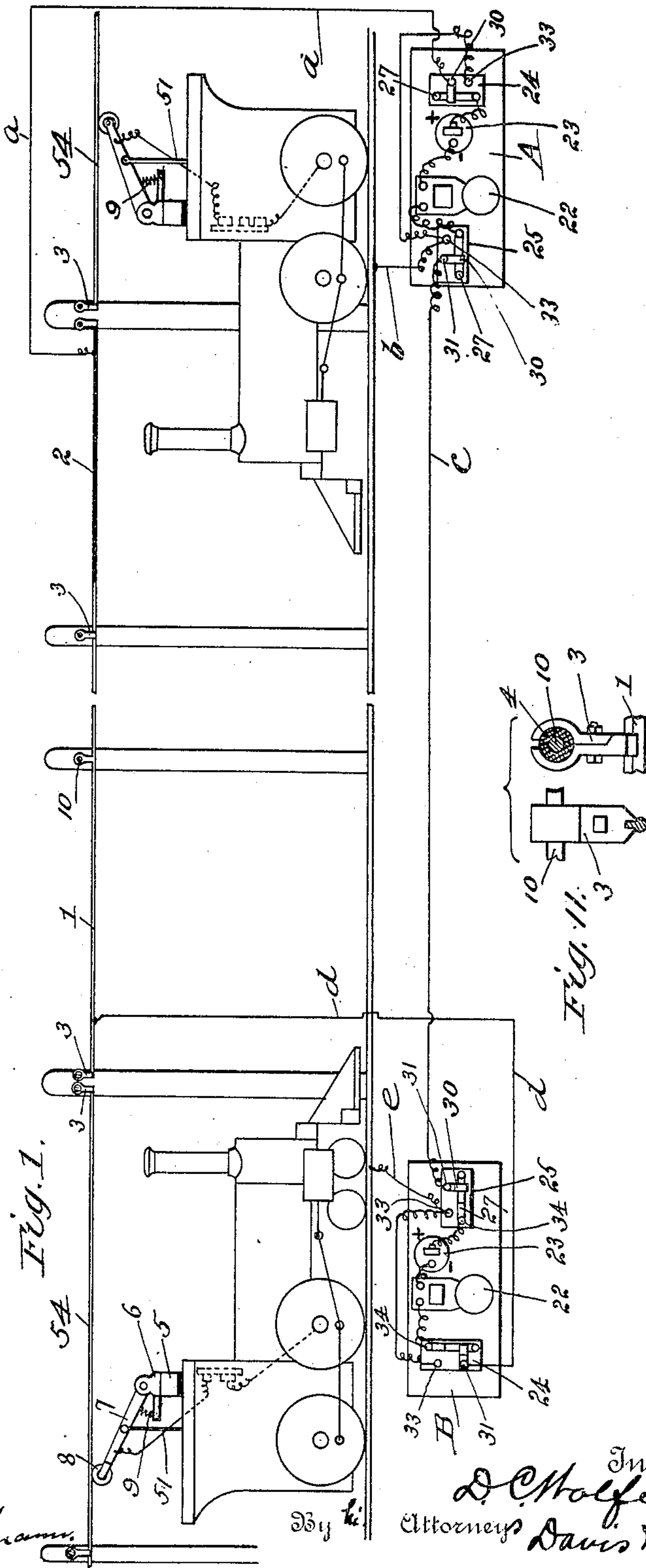
AUTOMATIC ELECTRIC SIGNALING SYSTEM FOR RAILWAYS.

APPLICATION FILED JAN. 5, 1905.

4 SHEETS—SHEET 1.



Witnesses
Edwin L. Yewell
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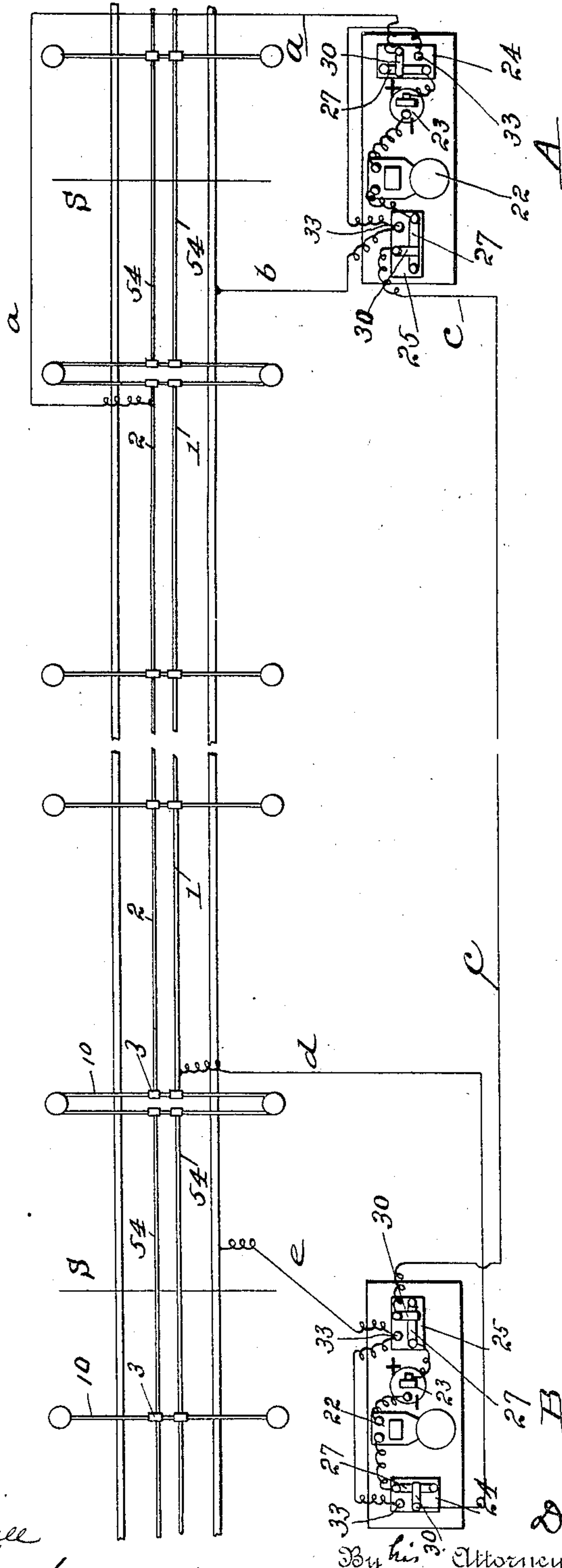
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4 SHEETS—SHEET 2.

Fig. 2.



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4 SHEETS—SHEET 3.

Fig. 12.

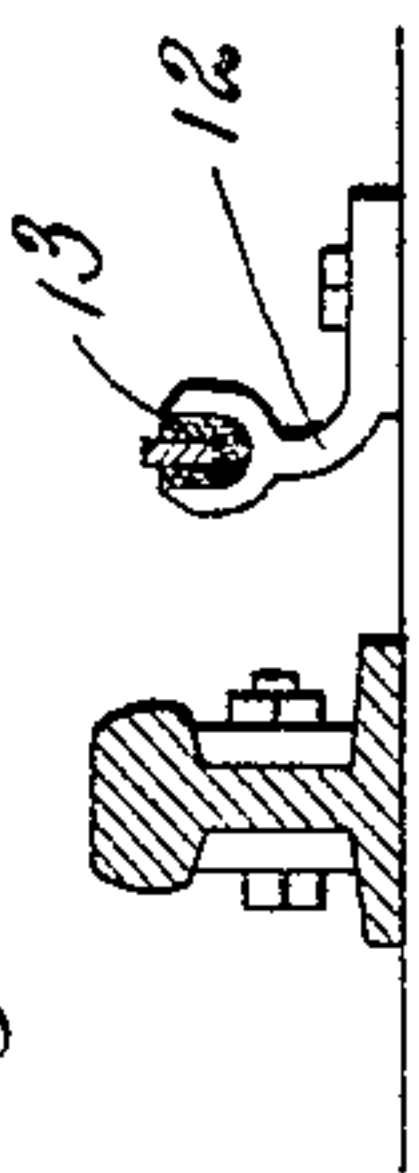


Fig. 3.

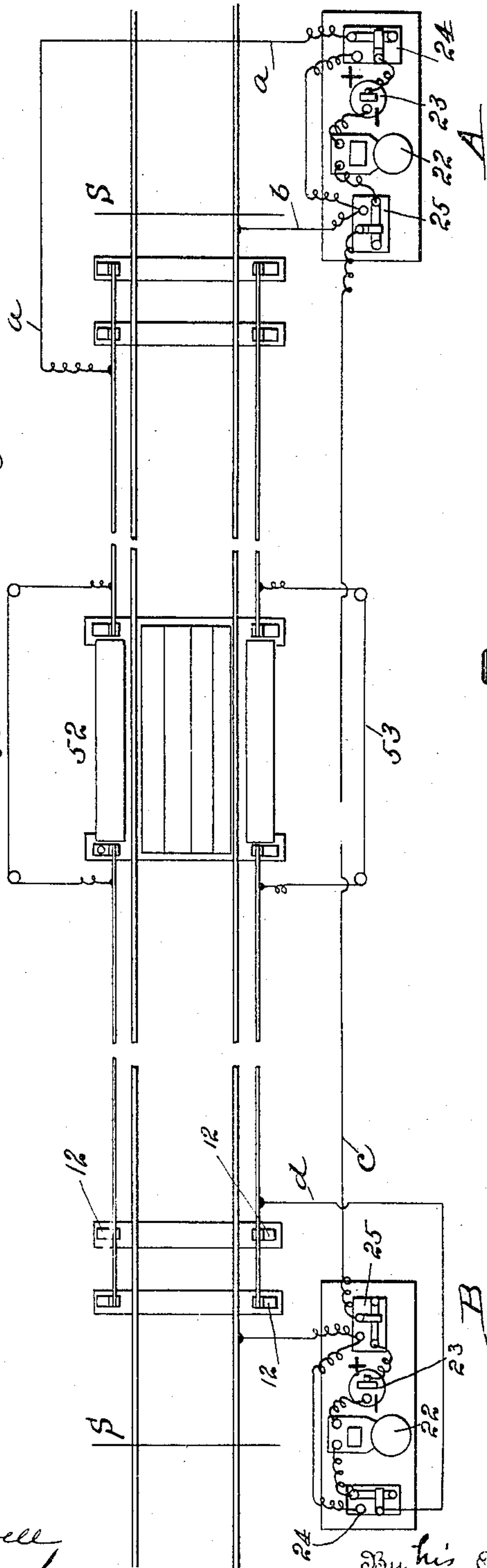


Fig. 13.

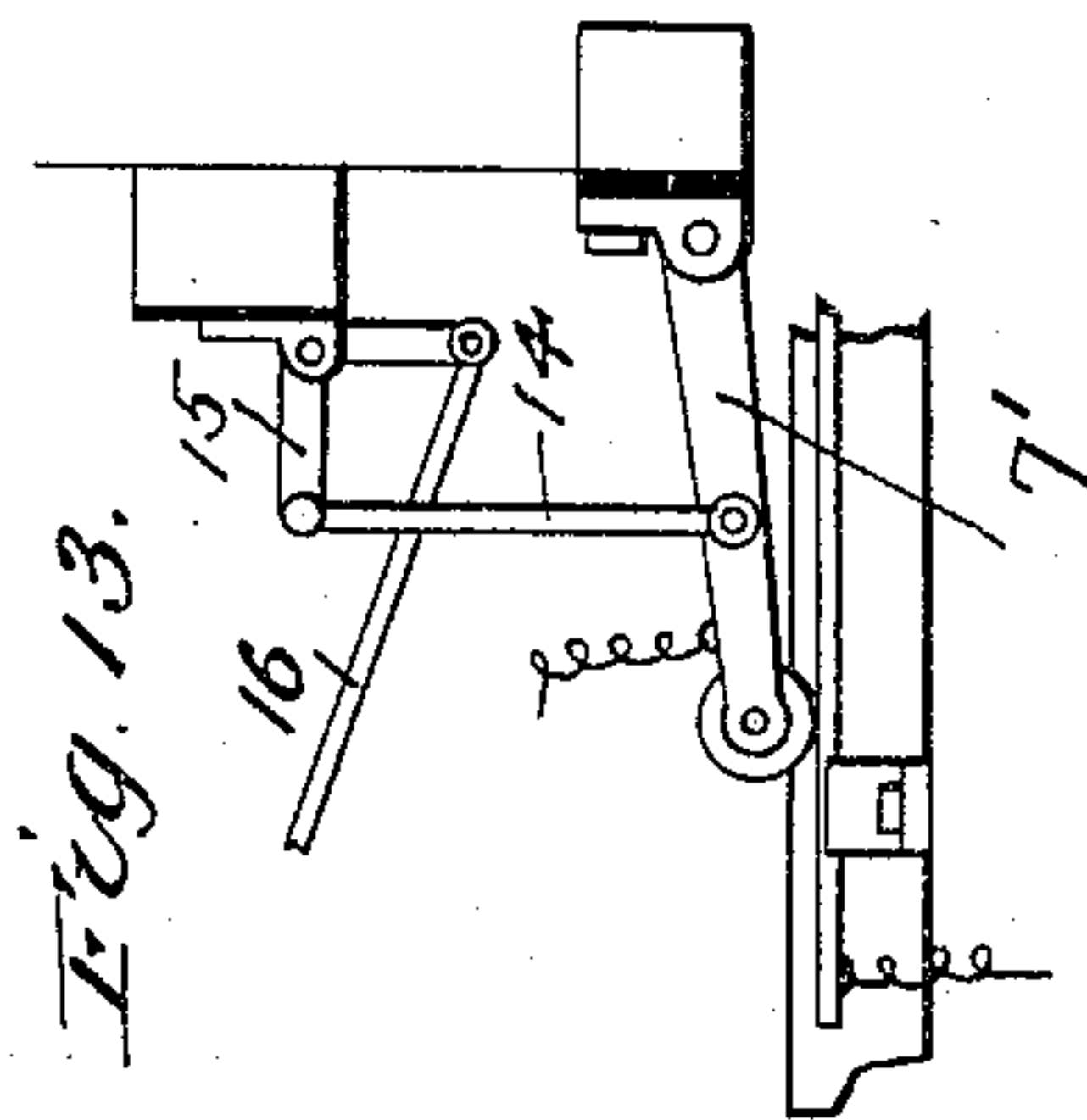
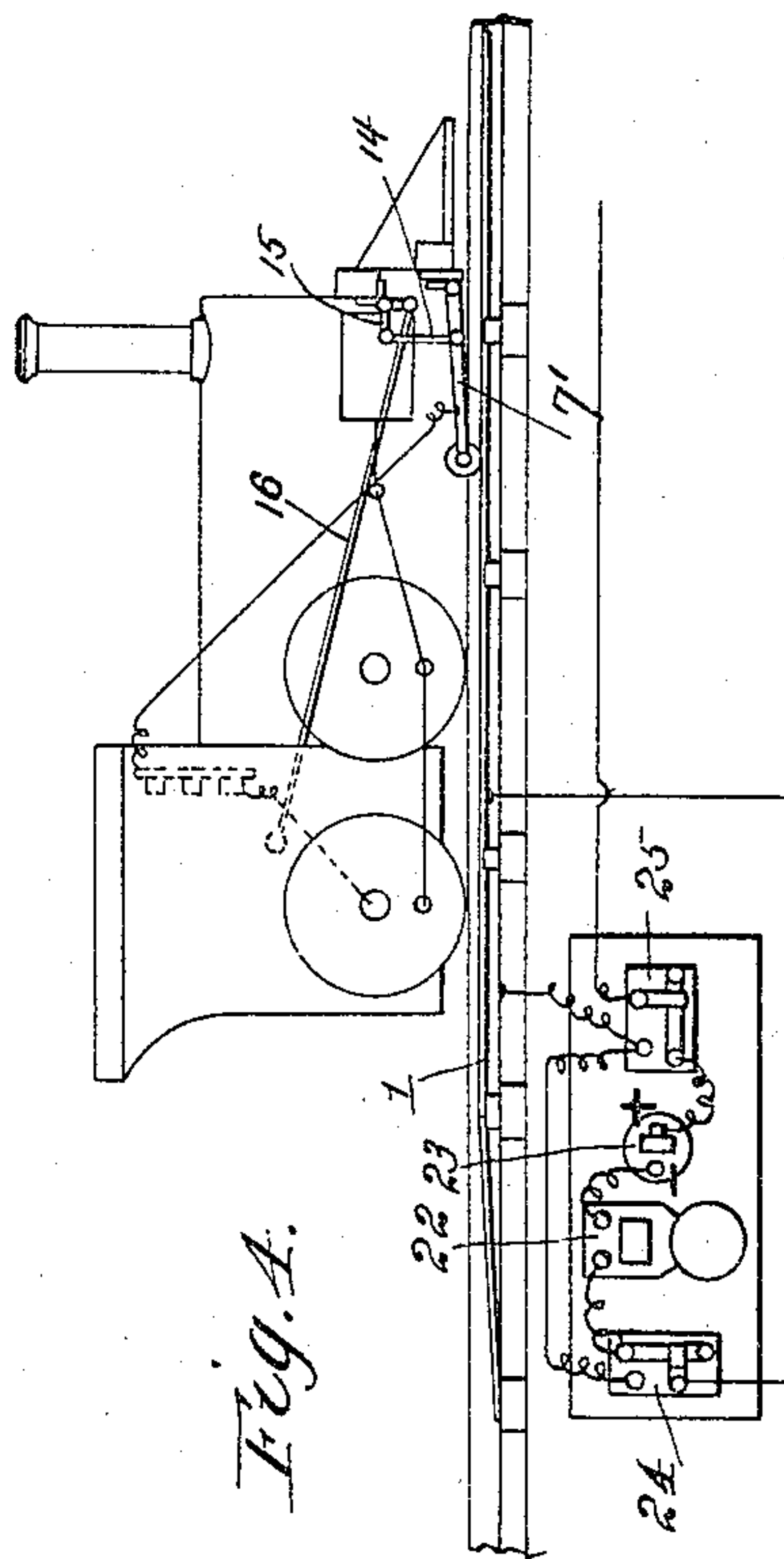


Fig. 4.



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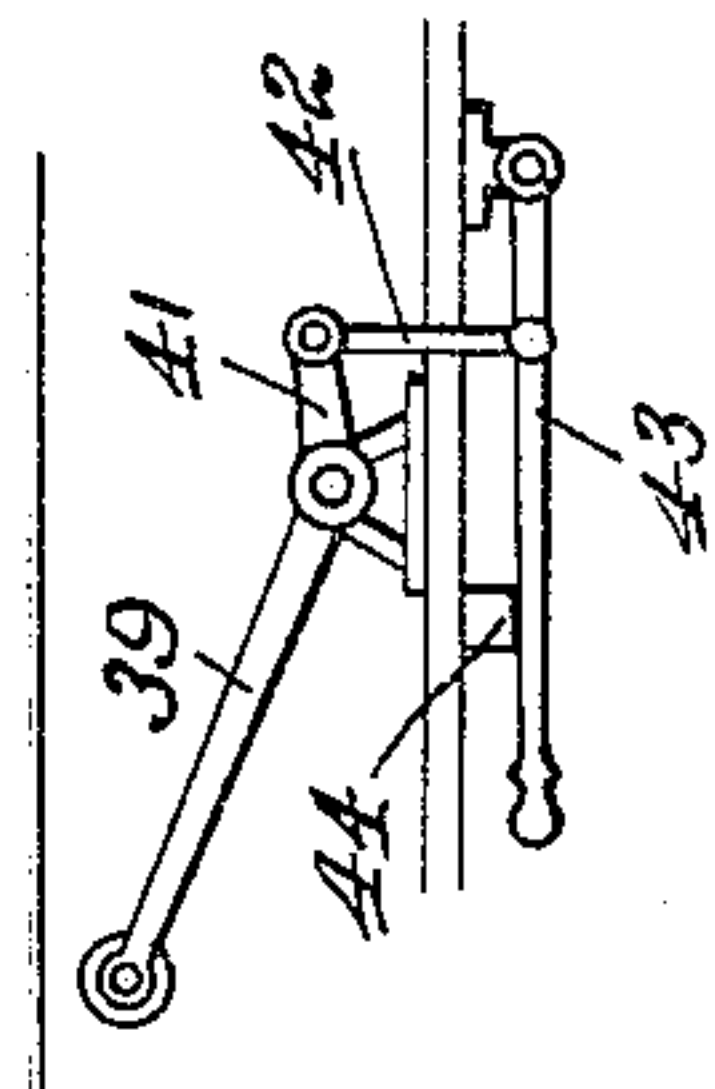
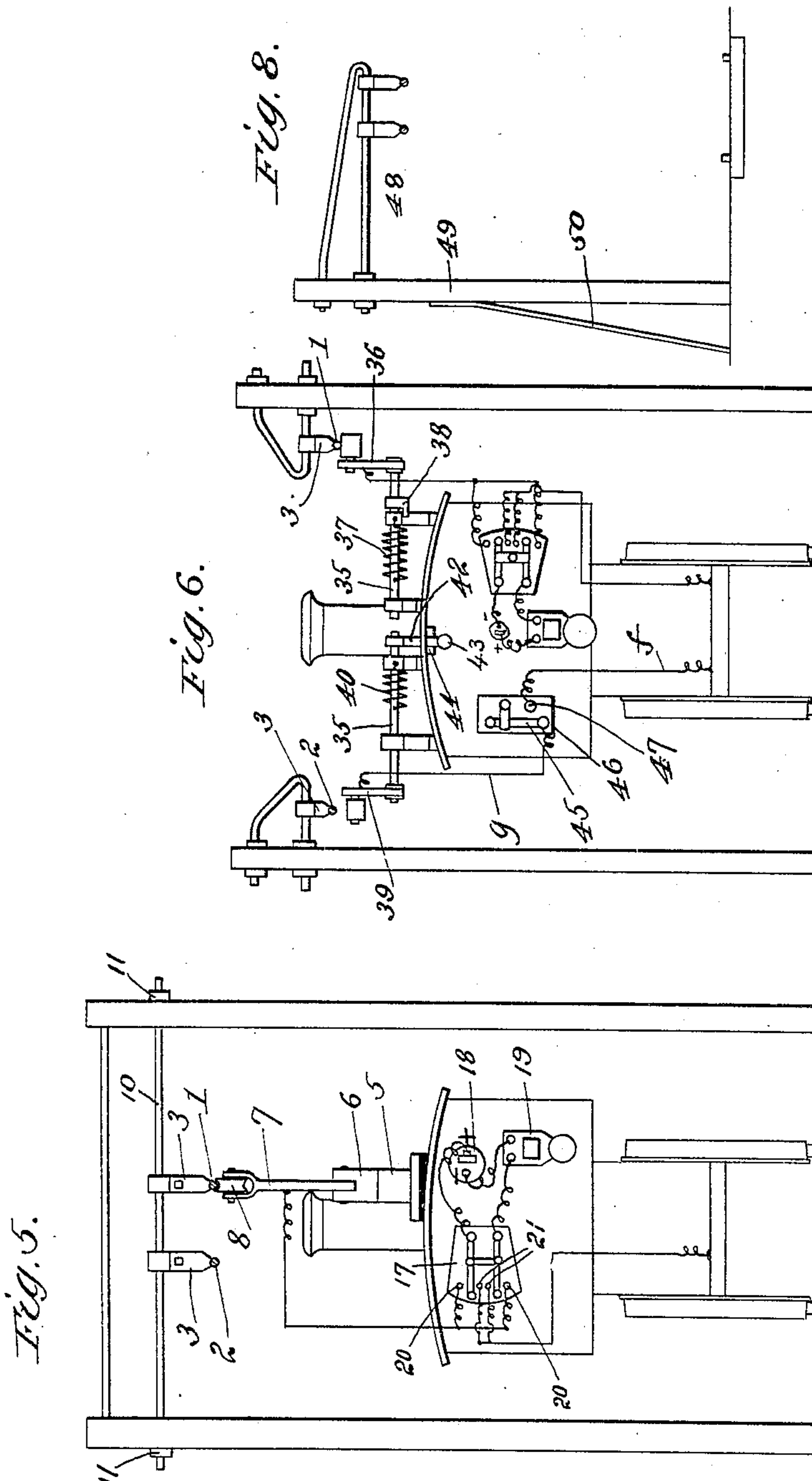
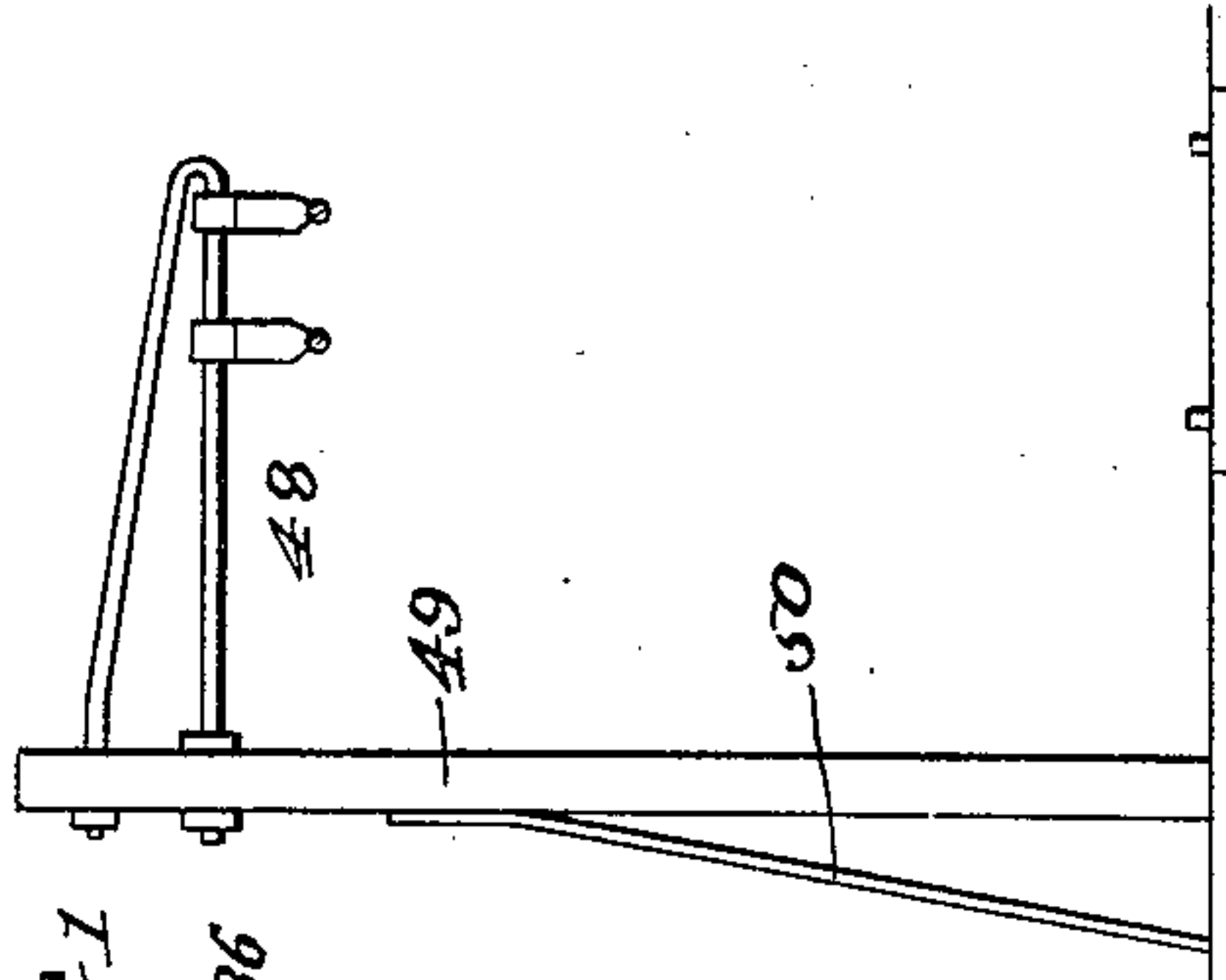


Fig. 8.



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UNITED STATES PATENT OFFICE.

DAVID C. WOLFE, OF LYONS, KANSAS.

AUTOMATIC ELECTRIC SIGNALING SYSTEM FOR RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 791,972, dated June 6, 1905.

Application filed January 5, 1905. Serial No. 239,697.

To all whom it may concern:

Be it known that I, DAVID C. WOLFE, a citizen of the United States, residing at Lyons, in the county of Rice, State of Kansas, have
 5 invented certain new and useful Improvements in Automatic Electric Signaling Systems for Railways, of which the following is a specification, reference being had therein to the accompanying drawings, in which—

10 Figure 1 is a side elevation illustrating the apparatus in diagram; Fig. 2, a plan view of the apparatus of the form shown in Fig. 1; Fig. 3, a plan view of the apparatus, showing the conductor-wires supported near the rails;
 15 Fig. 4, a side elevation showing in diagram the form of apparatus illustrated in Fig. 3; Fig. 5, a diagrammatical end view of a locomotive fitted with apparatus for use in the signaling system; Fig. 6, a similar view showing the engine provided with means for signaling to the stations; Fig. 7, a detail of a portion of the apparatus shown in Fig. 6;
 20 Fig. 8, a detail view of a modified form of the trolley-wire-supporting posts; Fig. 9, a detail, partly in section, of one of the switch-keys; Fig. 10, a plan view thereof; Fig. 11, detail views of the trolley-wire hangers; Fig. 12, a detail view of the brackets for holding the conductor or trolley wires near the rails;
 25 Fig. 13, a detail view of the trolley adapted for use where the trolley-wire or conductor is supported near the rails; Fig. 14, a detail view of the trolley-base.

One of the many objects of this invention
 35 is to provide a simple automatic electric signaling system for use on railways by which two trains approaching each other on the same track will be warned the instant they enter the same block of the system, the signaling
 40 apparatus being arranged in blocks, each block being complete in itself and independent of the adjoining blocks.

A further object of the invention is to provide means to maintain electrical communication between the stations and a train between
 45 them, so that communication may be had from the station to the moving train or from the train to the station whenever desired.

A further object of the invention is to provide means whereby a station may communi-

cate with trains moving in either direction on the block controlled by the station.

Other important objects and advantages of the invention will appear hereinafter.

Referring to the various parts by numerals, 55 1 and 2 designate conductor-wires which are mounted upon suitable supports and are insulated therefrom. These conductors are parallel with the track and may be supported on posts, as shown in Fig. 1, above the track or
 60 on brackets by the side of the rails, as shown in Figs. 3 and 4. It will of course be understood that in both cases the wires are insulated from their supports. These wires are arranged in blocks or sections, each section
 65 being unconnected with the adjoining sections. I prefer to so arrange the conductors that they terminate beyond the last switch near the station. For instance, let the line S
 70 in Figs. 2 and 3 designate the last switch. The conductor-wires begin at a point outside or beyond this line. This is desirable in order to prevent any complications by reason of the train passing over switches and onto side
 75 tracks.

When the conductors are supported above the track, as shown in Figs. 1 and 2, the locomotive or other part of the train is provided with a trolley having a contact engaging one of the conductors. This trolley consists of
 80 a suitable base 5, secured to and insulated from the roof of the cab and on which is mounted a freely-rotatable block 6, balls being interposed between the base of the block to permit the block to easily adjust itself to the position
 85 of the wires. To the top of the block 6 is pivoted an upward-extending trolley-arm 7, in the upper end of which is mounted the contact-wheel 8, which is adapted to contact with one of the conductor-wires. It will be noted
 90 by reference to Fig. 5 that the trolley-base is mounted at the right-hand side of the longitudinal center of the locomotive to bring it directly under its feed or conductor wire. A suitably-coiled spring 9 is provided, which
 95 maintains the trolley-wheel in yielding contact with the conducting-wire.

The supports for the overhead conductor-wires may be made in any desired manner. As shown in Fig. 5, two uprights are provided 100

on opposite sides of the track, and through the top of these uprights is passed a rod 10, which is securely bolted thereto by means of suitable nuts 11. On this rod are secured the
5 clamps 3, which support the conductor-wires at their lower ends.

When it is desired to mount the wires along the road-bed near the rails, brackets 12 are employed, these brackets being secured out-
10 side of the rails and at a suitable distance from them, as shown in Fig. 12. It will of course be understood that the wires are insulated from the brackets by means of the non-conducting material 13, which is interposed be-
15 tween the wire and the brackets. Where the conductor-wires are mounted in brackets on the ties, the contact devices or trolleys are secured to the locomotive, as shown in Figs. 4 and 13. It will be noted that the trolley-arm
20 7' is pivoted to a rigid part of the locomotive and is insulated therefrom. Connected to this arm and insulated therefrom is a vertical link 14, whose upper end is connected to the rearward-extending arm of an angle-lever 15,
25 said lever being pivoted on the locomotive-frame in such a position that one of its arms will be vertical and in contact with a part of the frame when the trolley-wheel is in contact with the conductor-wire. Connected to
30 the lower end of the vertical arm of the angle-lever is a rod 16, which extends to the engineer's cab in order that he may raise or lower the trolley, as desired.

On each locomotive in convenient position
35 to be reached by the engineer is mounted a pole-changing switch 17, a battery 18, and an alarm-bell 19 or incandescent lamp, as desired. The pole-changing switch consists of a pair of parallel arms connected together so that they
40 swing in unison, their free ends being arranged to engage two pairs of contacts 20 and 21. The contact-points 20 are connected together and with the trolley-wheel, and the contact-points 21 are electrically connected to
45 the engine-wheels and thence with the rails. The arms of the pole-changing switch at their pivoted ends are connected to the battery and to the bell or signal-light, one pole of the battery being also connected to the signal means.
50 It will of course be understood that when the conductor-wires are placed near the rails the trolley-wheel is connected, through the pole-changing switch, with the battery and bell, and the pole-changing switch is connect-
55 ed to the ground through the engine-wheels in exactly the same manner as described with respect to the overhead wire.

Each station at the end of each block is provided with a signaling apparatus to be used
60 on the block. Each signal apparatus consists of a suitable board or base, on which is mounted a signal-bell 22, battery 23, switch-key 24, and switch-key 25. The switch-keys consist of a base-block 26, on which is mounted a spring
65 key-bar 27, secured rigidly to the base at one

end and insulated therefrom. This key-bar is provided with two contact-points 28 and 29, one of said points being on its upper side and the other on its lower side. The upper con-
70 tact 28 is adapted to normally rest in contact with a terminal bar 30, which is mounted on the base and is provided with a binding-post 31. Below the key-bar is a contact-point 32, which is electrically connected to a binding-
75 post 33, secured to the base. The key-bar is provided with a binding-post 34. The switch-keys are all of the same construction.

The apparatus at station A at the right-hand end of Figs. 1 and 2 is electrically connected
80 as follows: The positive pole of the battery is connected to the binding-post at the end of the key-bar of the switch-key 24, its negative pole being connected to the bell or other signal device. The terminal bar 30 is electric-
85 ally connected, by means of wire *a*, with the conductor-wire 2, and the post 33 is electrically connected to the corresponding post of the switch-key 25, this latter key being elec-
90 trically connected to the rails by means of wire *b*. The key-bar of the switch-key 25 is connected to one post of the bell, and the terminal bar 30 of this latter switch-key is con-
95 nected, by means of a wire *c*, to the corresponding terminal bar of the switch-key 25 of the station B at the left-hand end of Fig. 2. It will of course be understood that these sta-
100 tions are at opposite ends of the block and at opposite ends of the conductor-wires. The key-bar of the switch-key 25 at station B is connected to the positive pole of the battery, the other pole of the battery being connected
105 to the signal device. The signal device is also connected to the key-bar of the switch-key 24, and bar 30 of said key is connected to the conductor-wire 1 by means of the wire *d*. The posts 33 of the switches are electrically con-
110 nected together and to the rails by wire *e*.

The circuits are all normally open and can be completed only by electrically connecting
115 the wires 1 and 2 together. This may be accomplished in various ways to permit the station agent to communicate with moving trains or to permit the engineers of the trains to communicate with the station agents or to set
120 the alarm-bells ringing to notify the agents and the engineers that two trains are on the same block and approaching each other. Should two trains approaching each other enter the same block, the two trains and the
125 stations will be notified in the following manner: Current will flow from the battery at the station A, through wire *a*, to the conductor 2, thence through the trolley, switch, and battery to the rails, thence up through the engine-wheels of the approaching engine and
130 through its alarm apparatus to the trolley and to wire 1. From this latter wire it would flow through wire *d* to the bar 30 of switch 24, thence through the bell to the battery, switch-key 25, and thence through wire *c* to

the bar 30 of the switch-key 25 at station A, and thence through the key-bar of said switch to the bell, and back to the battery. It will thus be seen that the bells or other signal devices on the locomotives and at the two stations at the ends of the block will be sounded, thereby notifying the engineers and station agents. Under these conditions the engineers would at once bring their trains to a stop, and the first one to enter the block would open his switch, so that the agent at station A might communicate with the engineer of the other train and direct him how to proceed. This may be accomplished by depressing the key-bar of the switch-key 25. This completes the circuit from the battery 23, through switch-bar of the key 24, through wire *a* to the trolley wire or conductor 2, thence through the trolley and alarm mechanism on the engine to the rails, and thence through wire *b* to post 33 of switch-key 25, thence through the key-bar and bell to the battery. Through this circuit suitable signals may be sent to the engineer to direct him to return and leave the main line or to proceed, according to conditions. When the engineer of the train last to enter the block has received his instructions and acted upon them, he opens his switch. The station agent then communicates with the approaching train—that is, the train first to enter upon the block—by depressing key-bar of the switch-key 24. This completes the circuit from the battery 23, through the key-bar of switch 24 to post 33, thence to the corresponding post of the switch-key 25, and from there to the rails. From the rails the current passes through the engine and its alarm mechanism to the trolley and to the wire 1, thence through wire *d* to bar 30 and the key-bar of switch-key 24 at station B, thence through the alarm devices, battery, key-bar of switch 25, and through wire *c*, back to switch-key 25 at station A, and thence through the key-bar to the bell and to the battery. By means of this circuit the station agent at B is advised of the orders given to the train on the block. The operation of the signal sending and receiving apparatus at station B is exactly as described with respect to station A, and either station may communicate with both trains on the block. Rules may be provided to govern the station agents, so that there will be no confusion in the signaling of the trains on the block.

It is clear from the foregoing that the station agents will always be in communication with the trains on the block and that separate signaling-keys are provided for incoming and outgoing trains.

The pole-changing switch is provided on the engine in order that the positive pole of the engine battery may be connected with the trolley or with the rails to complete the circuit with the stations. It will of course be understood that the current flows in the same

direction through the alarm mechanisms on the engines moving in the same direction on the block and in the reverse direction through the engines moving in the opposite direction on the block.

In order to complete the circuit through the alarm mechanisms at the stations and on the trains, it is necessary to electrically connect wires 1 and 2, and in order that the trains may communicate with the stations I provide a separate contact device by which the circuit may be completed.

In Fig. 6 the engine is shown as provided with two trolley devices, one of which, the one at the right-hand side, is normally in contact with the conductor-wire, the other being normally out of contact with the other conductor-wire. Each of these trolleys is secured to a horizontal rod 35, mounted in suitable bearings supported on the engine-cab. Surrounding the rod carrying trolley 36 at the right-hand side of the engine is a coil-spring 37, said spring being connected to the shaft 35 and to a stationary part and being so tensioned as to hold the trolley 36 yielding on the trolley-wire. A stop 38 is secured to said shaft and is arranged to contact with a stationary part to limit the upward movement of the trolley-arm when it is free from the wire. Surrounding the shaft 35 of the trolley 39 on the left-hand side of the engine is a coil-spring 40, said spring being connected at one of its ends to said shaft and at its other end to a stationary part and so tensioned as to hold the trolley-arm depressed and the trolley wheel or contact away from the trolley-wire. Connected to the shaft 35, carrying trolley 39, is a short arm 41, to the end of which is connected a link 42, the other end of which projects within the engine-cab. Connected to the inner end of this link is a lever 43, by means of which the engineer may swing the trolley into contact with the conductor-wire. As soon as said lever is released the spring 40 will rotate shaft 35 to depress the trolley and swing the lever up into contact with stop 44. The trolley 36 at the right-hand side of the engine is connected to the pole-changing switch, alarm mechanism, and engine-wheels in the same manner as the trolleys described with respect to Figs. 1 and 5. The trolley at the left-hand side of the engine is connected by wire *g* with the switch-bar 45 of a switch-key 46, and the post 47 of said switch-key is connected to the engine-wheels by wire *f*. When the engine is provided with this additional signaling apparatus, the engineer may by placing the trolley 39 in contact with the wire at the left-hand side of the engine and then operating his switch-key 46 communicate with the stations at the ends of the blocks.

As shown in Fig. 6, the trolley-wires are supported on posts at the side of the track and are not directly over the engine. This ar-

arrangement is advantageous in that there is no obstruction above the cars. In Fig. 8 the conductor-wires are supported upon arms 48, projecting from the posts 49, arranged at one side of the track. These posts are braced by suitable guy-rods 50.

In order that the trolley-arms may be depressed and held out of contact with the conductor-wires, rods 51 are connected thereto, it being of course understood that any suitable means may be employed to lock said rods to hold the trolley-arms depressed.

In Fig. 3, 52 designates a road-crossing. In this arrangement of the apparatus—that is, where the conductor-wires are mounted on brackets at the side of the rails—said wires are broken at the crossing, as shown, and the current carried across the roadway by means of wires 53.

In Figs. 1 and 2 the overhead wires 54 at each end of the block shown are dead wires—that is, carry no current—and are merely for the purpose of providing a track for the trolley-wheel through the terminal or other point when it is unnecessary to provide means for signaling the trains.

From the foregoing it will be readily seen that I provide an extremely simple and efficient apparatus by which communication may be had between stations and moving trains and between trains and the stations and which acts automatically to alarm trains approaching each other on the same track when they have entered the same block and at the same time to automatically alarm the station agents at both ends of said block. This latter feature of my invention I consider of the greatest importance. It is entirely automatic and does not depend in any respect upon human agencies and gives the alarm at four points, thereby rendering it wholly improbable that the alarm will not be heeded or noticed.

It will of course be understood that I may use any suitable form of pole-changing switch. Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A railway signaling system comprising a signaling apparatus carried by a train, a signaling apparatus at a station, a pair of conductor-wires arranged along the road-bed and divided into blocks, means carried by the train for electrically connecting one of said conductors to the signaling apparatus at the station, said circuit passing through the signal mechanism on the train, a contact carried by the train and normally out of contact with the other conductor but adapted to be brought into contact therewith, means for grounding said other conductor through said contact device, whereby the train may be placed in communication with the stations at the ends of the blocks.

2. A signal apparatus for railroad-trains comprising a pair of conductors arranged

along the track, a signaling apparatus at the ends of said conductors, a source of electric current at one end of said wires, means connecting the positive pole of the electric source to one of the conductor-wires at one station, the negative pole of the other station being connected to the other conductor-wire, means for electrically connecting the apparatus at the two stations and an alarm mechanism carried by a train, a contact device carried by a train moving in one direction to engage one of the conductor-wires, a contact device carried by a train moving in the opposite direction to contact with the other conductor-wire whereby when two trains are approaching each other on the same block the circuit will be completed through the alarm mechanism on the trains and the signal apparatus at the stations.

3. A signaling system for railroad-trains comprising a pair of conductor-wires arranged along the railroad-track, signal apparatus at each end of said conductor-wires, an electric generator, means for connecting one pole of said generator to one conductor-wire, and the other pole to the other conductor-wire through the signaling apparatus at both stations, an alarm mechanism carried by the train, a contact device carried by a train moving in one direction and adapted to engage one conductor-wire, said contact device being electrically connected to the alarm mechanism on the train, a contact device carried by a train moving in the opposite direction adapted to contact with the other conductor-wire, said contact device being electrically connected to the alarm mechanism on said train, whereby when two trains are approaching each other on the same track the circuit will be completed through the signaling apparatus at the stations and through the alarm mechanisms on the trains.

4. A railway-signaling system comprising a signaling apparatus carried by a train, a signaling apparatus at a station, a pair of conductor-wires arranged along the road-bed and divided into blocks, means carried by the train for electrically connecting one of said conductors to the signaling apparatus at the station, said circuit passing through the signal mechanism on the train, and means at the station for completing an electric circuit through the alarm mechanism on an approaching train.

5. A signaling system for railways comprising a signaling apparatus at the station, a conductor-wire arranged along the road-bed, a signaling device carried by a train, a contact device carried by the train and engaging the conductor-wire, means for completing the electric circuit through said conductor, signaling apparatus and alarm mechanism on the train, means for completing an electric circuit through the alarm mechanism on a train moving in one direction, and means at said

station for completing an electric circuit through the alarm mechanism on a train moving in the opposite direction.

6. A signaling system for railroad-trains comprising a pair of conductor-wires arranged along the railroad-track, signal apparatus at each end of said conductor-wires, an electric generator, means for connecting one pole of said generator to one conductor-wire, and the other pole to the other conductor-wire through the signaling apparatus at both stations, an alarm apparatus carried by the train and consisting of a battery, an alarm device and a pole-changing switch, a contact device carried by the train, means for connecting one pole of the battery to the contact device through the pole-changing switch, means for connecting the other pole of the battery to the engine-wheels through the pole-changing switch, and a contact device carried by a train moving in the opposite direction adapted to contact with the other conductor-wire, said contact device being electrically connected to the alarm mechanism on said train, whereby when two trains are approaching each other on the same track the circuit will be completed through the signaling apparatus at the stations and through the alarm mechanisms on the trains.

7. A railway signaling system comprising a signaling apparatus carried by a train and consisting of a battery, a signal device and a pole-changing switch, a signaling apparatus at a station, a pair of conductor-wires arranged along the road-bed and divided into blocks, means carried by the train for elec-

trically connecting one of said conductors to the signaling apparatus at the station, said circuit passing through the signal mechanism on the train, and means at the station for completing an electric circuit through the alarm mechanism on an approaching train.

8. A signaling system for railroad-trains comprising a pair of conductor-wires arranged along the railroad-track, a signal mechanism at one end of each of said wires, said mechanism consisting of a battery, an alarm device and two switch-keys, means for connecting one pole of one battery to one of the conductor-wires, means for connecting the other pole of the other battery to the other conductor-wire, an alarm mechanism carried by the train and consisting of a battery, an alarm device, and a pole-changing switch; a contact device carried by the train and electrically connected to the battery through the pole-changing switch, means for connecting the battery to the rails through the alarm device and pole-changing switch, a contact device carried by a train moving in the opposite direction and adapted to engage the other conductor-wire, means for electrically connecting said contact device with the rails through the alarm mechanism, substantially as described.

In testimony whereof I hereunto affix my signature, in the presence of two witnesses, this 24th day of December, 1904.

DAVID C. WOLFE.

Witnesses:

D. W. STONE,
J. W. PULLIAM.