No. 897,401. PATENTED SEPT. 1, 1908.

H. C. REAGAN.

ELECTRIC SIGNALING SYSTEM.

APPLICATION FILED MAY 27, 1907.

3 SHEETS—SHEET 1.

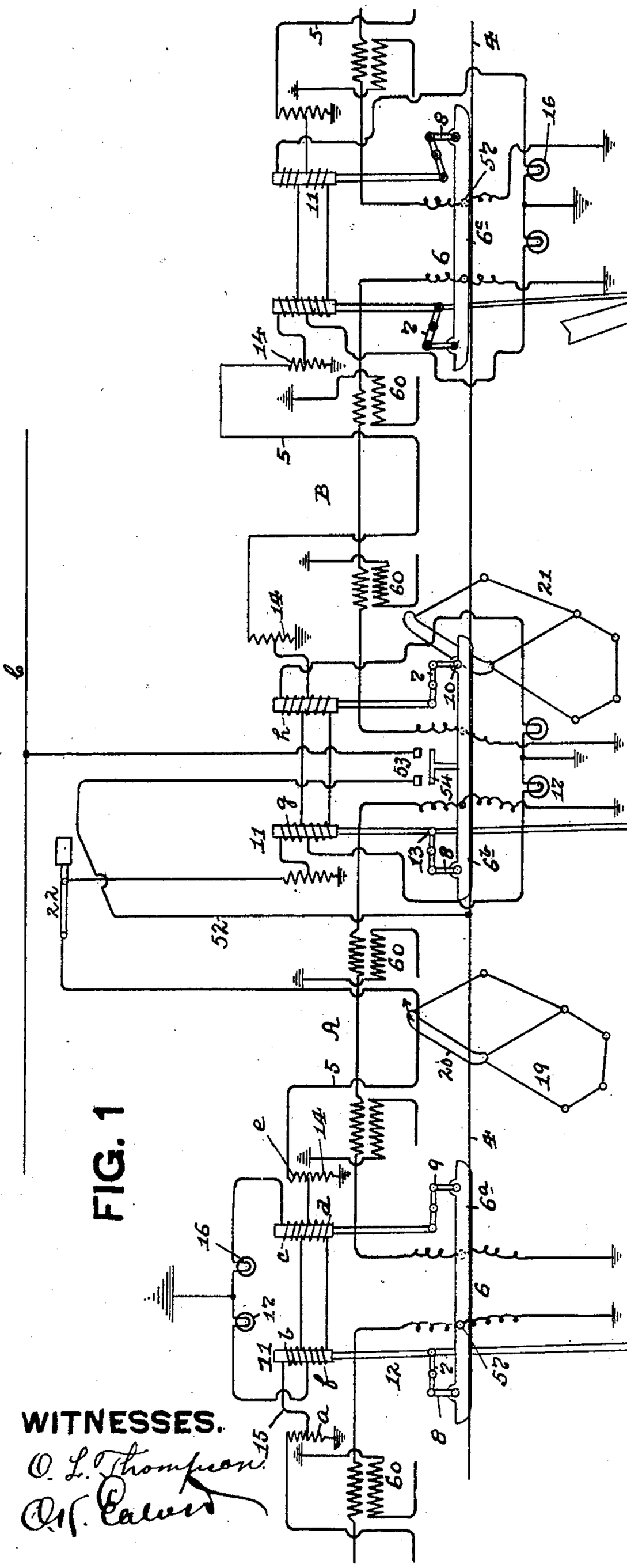


FIG. 1

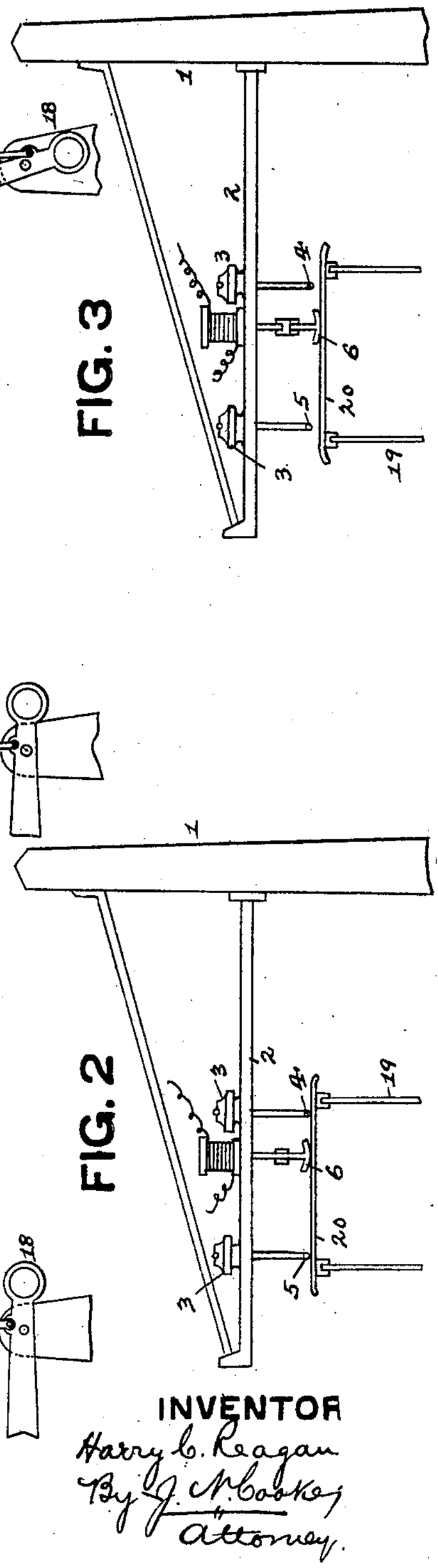


FIG. 3

FIG. 2

WITNESSES.

O. L. Thompson.

D. C. Calver

INVENTOR

Harry C. Reagan

By J. N. Cobbey

Attorney.

No. 897,401. PATENTED SEPT. 1, 1908.

H. C. REAGAN.

ELECTRIC SIGNALING SYSTEM.

APPLICATION FILED MAY 27, 1907.

3 SHEETS—SHEET 2.

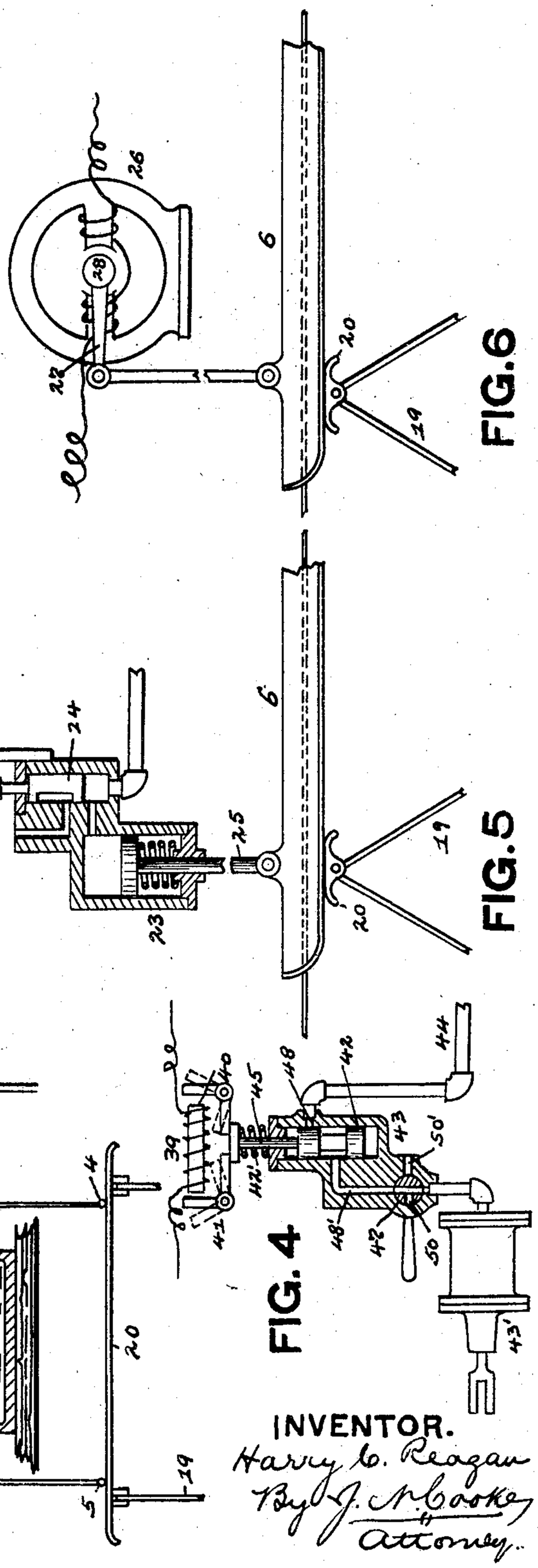


FIG. 6

FIG. 5

FIG. 4

FIG. 7

WITNESSES.

J. R. Keller

O. K. Eaton

INVENTOR.

Harry C. Reagan

By J. N. Cooke

Attorney.

No. 897,401. PATENTED SEPT. 1, 1908.

H. C. REAGAN.

ELECTRIC SIGNALING SYSTEM.

APPLICATION FILED MAY 27, 1907.

3 SHEETS—SHEET 3.

Fig. 8.

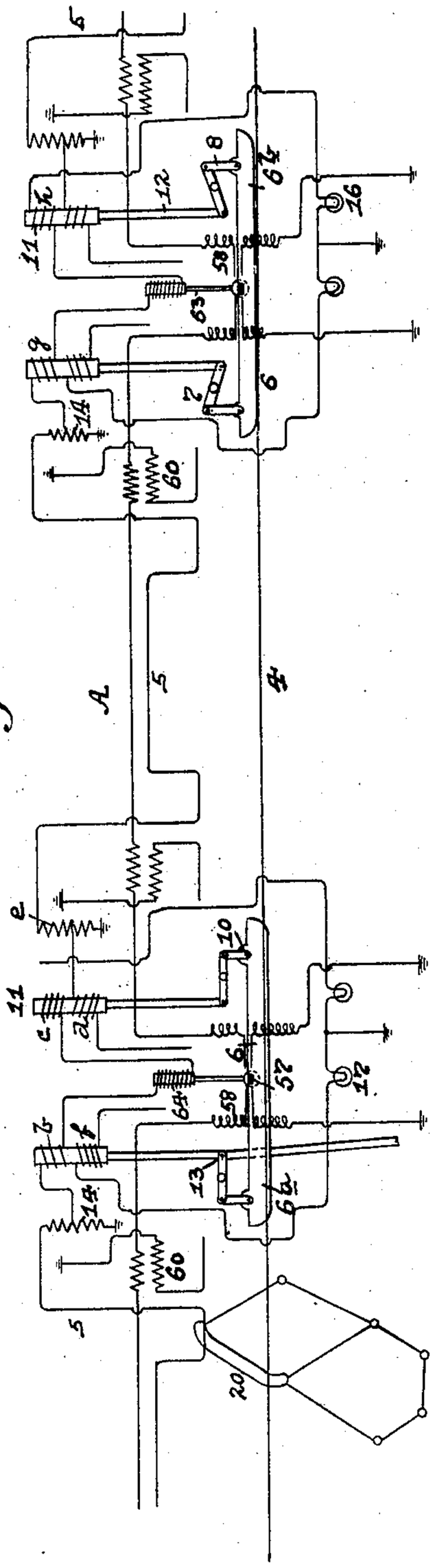
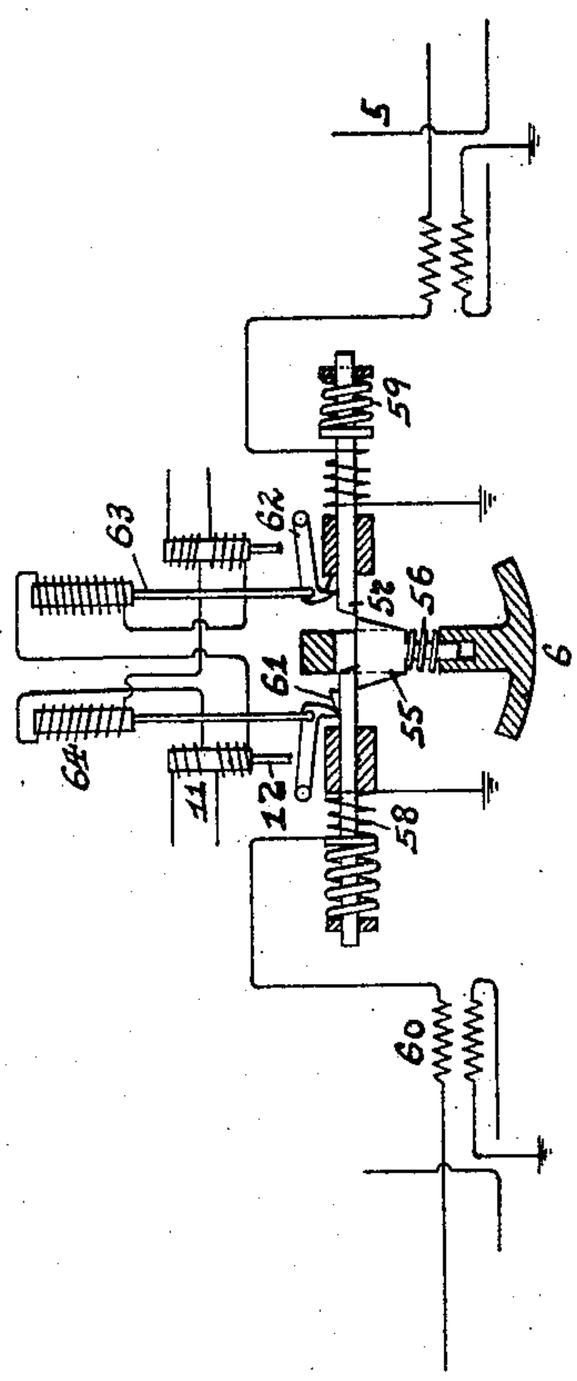


Fig. 9.



WITNESSES

Walter Famariss

O. L. Thompson.

INVENTOR

Harry C. Reagan,

By J. N. Cooke

Attorney.

UNITED STATES PATENT OFFICE.

HARRY C. REAGAN, OF BUTLER, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO JOHN H. BARRETT, OF MARS, PENNSYLVANIA.

ELECTRIC SIGNALING SYSTEM.

No. 897,401. Specification of Letters Patent. Patented Sept. 1, 1908.

Application filed May 27, 1907. Serial No. 375,765.

To all whom it may concern:

Be it known that I, HARRY C. REAGAN, a resident of Butler, in the county of Butler and State of Pennsylvania, have invented a new and useful Improvement in Electric Signaling Systems; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to an electrical signaling system for railroads, and has special reference to such a system for use in connection with electric railroads.

The object of my invention is to provide a cheap, simple and efficient electric signaling system for railroads which can be easily and quickly operated automatically and will prevent the cars from running into each other, thereby overcoming accidents, loss of lives, injuries and damages.

My invention consists, generally stated, in the novel arrangement, construction and combination of parts as hereinafter more specifically set forth and described and particularly pointed out in the claims.

To enable others skilled in the art to which my invention appertains, to construct and use my improved electric signaling system for railroads, I will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 is a diagram view showing my improved signaling system for railroads. Fig. 2 is a side elevation of the upper end of the trolley wire supporting pole showing the bow trolley or pantograph in engagement with the signal and trolley wires. Fig. 3 is a like view showing the trolley or pantograph in engagement with the stop bar. Fig. 4 shows a side view partly in section of the means for stopping the car. Fig. 5 shows a detail view of an air cylinder for operating the stop bar. Fig. 6 is a like view of an electric motor for operating the same. Fig. 7 is a detail view showing an electric switch between the signal and trolley wires. Fig. 8 is a modification of my improved electric signaling system for railroads showing another form of the signal wire. Fig. 9 is a detail view of the locking device.

Like symbols of reference herein indicate like parts in each of the figures of the drawings.

As illustrated in said drawings, 1 represents one of the usual trolley poles having the arm 2 extending out therefrom and supporting the two insulators 3, one of which carries the trolley wire 4 for supplying the current from the usual source of power to the cars (not shown) running on the tracks below the same, while the other wire 5 carries the signal operating current, which may be of the same potential as the trolley current, and thus signal current is taken from the trolley circuit in a novel manner, as will be shown.

The wires 4 and 5 are insulated from each other under normal conditions and three blocks or sections are shown in the diagrammatic view (Fig. 1) with wiring at the end of each section, while a safety stop-bar 6 is placed at the ends of each section, and through which one car is caused to block the other, or block itself against a car following or coming head-on. This stop-bar 6 lies parallel with the trolley wire 4 and in its normal position is above said wire, while connected to this bar and at each end thereof are the levers 7 and 8 which are pivotally connected to each other at one end, as at 9, and the lever 8 at its other end is pivotally attached or fulcrumed to the bar 6 at 10, in any suitable manner. Attached to the other end of the levers 7 at each end of the stop-bar 6 is an operating device 11 which may be an electrically driven motor, as shown in Fig. 6, or an air cylinder, as shown in Fig. 5, whose valves are electrically operated to permit air to enter into the cylinder to operate said bar, or as shown in Fig. 1 a solenoid can be used and provided with a plunger 12 of soft laminated iron, which is pivotally connected at 13 to the said end of the levers 7, and passes through the two parts composing said solenoid.

The above describes the mechanical portion of my improved signaling system and the electrical portion is as follows: At each end of the stop-bar 6 adjacent thereto is the translating device or compensator 14 which will reduce the potential of the current on the signal wire 5, as desired, and this transformer may be a transformer when used on an alternating system, or preferably an autotransformer. The signal wire 5 connects with the translating device 14 at each end of the signal block or section and one terminal of said device is connected to said wire and the other to the ground. At a predetermined point or tap on the compensator *a* a wire 15 leads to the one part solenoid *b* surrounding the plunger 12 at one end of the

stop-bar 6 and from there to the one part solenoid *c* on the other plunger 12 at the other end of said bar 6, while from there the circuit passes to the ground and through a signal lamp 16. The other solenoid part *d* is connected to compensator *e* and to the other solenoid *f* and from there the circuit passes to the ground through the signal lamp 17. From the foregoing description it will be seen that each stop-bar 6 is operated from two sections or blocks and pivotally attached to the end of the plunger 12 is an ordinary semaphore signal 18.

Fig. 1 shows two blocks or sections A and B and three stop-bars 6^a, 6^b, and 6^c with such sections formed between said bars, so that the operation of my improved signaling system is as follows: In the block or section A is shown a pantograph or bow trolley 19 which is carried by the car and the trolley 20 thereon spans the trolley wire 4 and signal wire 5 throughout the block to cause the current to pass from said trolley to said signal wire, and in case of said car trolley 19 the current passes into solenoids *d*, *f*, *g*, and *h*, thereby lowering the stop-bars 6^a and 6^b on each end of side of said section below the trolley wire 4 and thus blocking the car in from and behind, as well as lighting signal lamps 16 and 17 connecting each of said bars and setting the semaphore 18 to danger position at the right hand stop-bar 6^b from said section A. A second car is represented by pantograph 21 and this car attempting to enter the same block A with the car 19 from the block B will run upon the bar 6^b which will take the pantograph trolley 20 on the pantograph 21 from the trolley wire 4, thereby breaking the circuit to said car 21 and cause the motors on said car to stop, after which the brakes can be applied to stop said car, such braking of the car being to prevent the car from running beyond said stop-bar. A siding wire C is shown as connected to the safety stop-bar 6^b, as hereinafter described, and when the car 19 reaches the side C, the pantograph 20 on said car will clear the signal wire 5 and thus release the stop-bar 6^b to allow it to rise and release the car 21 and then it can proceed past said bar, so that said car will then span the trolley wire 5 and set bars 6^a and 6^b against the same, while car 19 can then enter block B and assist in setting bar 6^b and bar 6^c. This same action will occur if one car is following the other or two cars are opposing each other as has just been described, while the cars will always block themselves ahead and back and clear themselves automatically.

If it was desired to run two cars in the same block and following each other, means can be provided to permit the stop bar to be raised until the second car can pass under said stop-bar, as for instance if car 21 was following car 19, and going in the same direction, in which case the switch 22 in the signal wire 5 would be opened to open both circuits to the solenoids on bar 6^b, thereby permitting said bar to rise up to clear trolley wire 4, and allow trolley 20 on car 21 to give current to said car. Just as quick as car 21 passes from under bar 6^b the switch 22 is closed, thereby blocking cars 21 and 19 in front and back, and it will thus be seen that this will also operate with cars going in either direction, while it will also be seen that bars 6^a and 6^b are in the blocked position, bar 6^a will be clear unless car 21 tried to run by bar 6^b, as shown.

In Fig. 5 is shown another manner of operating the stop-bars other than solely with the use of the solenoids and plunger, which consists in providing an air cylinder 23 connected to said bars for use with the plunger and a single solenoid and connecting said plunger to a valve 24 on said cylinder, so that the current is taken from the auto-transformer to move said valve and operate the piston 25 in said cylinder for raising the said bar. In Fig. 6 there is shown an electric motor 26 for this same purpose, in which the solenoids are placed in position adjacent to said motor and an arm 27 is connected at one end to the shaft 28 of said motor and pivoted at its opposite end and to the plunger connecting the stop-bar.

As shown in Fig. 4 means for stopping the car is shown for use on the car in connection with my improved signaling system, which consists in providing a magnet 39 having poles 40 and one or more bell crank armatures 41 adjacent to said plates. A plunger valve 42 is placed in the cylinder 43 and this cylinder is attached to the brake pipe 44 leading to brake cylinder 43′ from a source of air supply. The piston 45 on the valve 42 projects beyond the cylinder 43 and in contact with the armatures 41, while in the cylinder 43 and beyond the valve 42 a stop cock 47 is provided. When the current is flowing down through the pantograph or trolley-wheel on the car, it is passing through the coil in the magnet 39 and holding the levers 41 in the position shown in said Fig. 4, so that the valve 42 will close the port 48 in the cylinder 43 from the port 48 and brake cylinder 43′ through pipe 44, thereby shutting off the air in the straight line pipe 44. When the current is off car, and due to the signal bar or other cause the valve 42 is raised by spring 42′ under the piston 45 on said valve and air is thus permitted to pass through ports 48 and 48′ to the brake cylinder 43′. To apply the brakes as automatic air brakes the air from the brake line 44 is exhausted to the atmosphere through ports 50 and 50′ in the cylinder 43 and cock 47 and such cock is set by hand.

If desired means can be provided for operating the signals with the system herein

described when a track switch is opened on the main line and this is a precautional measure to prevent accidents. A circuit is provided between the trolley wire and signal wire and interposed between said wire is a switch which is connected to the track switch by any means, such as the electric switch immersed in oil such as is shown in Fig. 7, and the operation is as follows: When the track switch is closed and the main track is unbroken, the circuit between the trolley and signal wires is open, but when the track switch is opened the electric switch is closed and will operate the signals the same as if a car was in the block.

In order to cause a section of wire on the trolley for the siding C to be dead when the safety stop-bar 6 is lowered to the stop position, a section of wire 52 is attached to the trolley wire 4 of the main line at one end and the other end is attached to the siding wire C. Interposed in this circuit between the main trolley wire 4 and the siding wire C is a switch 53 to open this siding circuit, and in this particular case the terminals of said switch are brought adjacent to the safety stop-bar, while attached to the safety stop-bar 6 is a switch blade 54 or means to open or close the circuit on the movement of stop-bar. The operation would be as follows: As shown in Fig. 1 of the drawings and with the safety bar 6 set to stop position the switch blade 54 will be withdrawn so that the siding trolley C is therefore dead and will remain so until the stop-bar is raised above the main trolley 4 or to the safety position when the circuit is closed by said switch blade bridging the terminals of the switch 53.

In order that the safety-stop bar 6 shall be held in danger position after being set by the car entering the block and also that it may be unlocked by the car leaving the block, without the pantograph being in contact with the signal wire throughout the length of the block, means are provided, as shown in Fig. 9 of the drawing, in which said stop-bar 6 has two locking blocks 55 which are movable in relation to said bar by having a spring 56 between said bar and the under side of said blocks. These locking blocks 55 extend beyond the side of the stop-bar 6 and adjacent to these locking-blocks are the locking pins 57 which are operated by the solenoids 58 surrounding said locking-pins, and carried by suitable means. Abutting against said locking-pins 57 are the springs 59 which force the pins into the locking position, and the solenoids 58 are used to withdraw or unlock the bar 6 when the car leaves the block. There is a locking-pin 57 on each side of the bar 6 and at the back of said locking-pin is a spring 59 which abuts against the said pin to force the same between the lock block 55 and the stop-bar 6. The locking-pins 57 have a shoulder or stop 61 into which drops a locking-latch 62, and this latch has attached to it a plunger 63 of soft iron, which projects into a solenoid 64, or the latch can be a soft iron armature adjacent to a magnet. This solenoid 64 or magnet is in series with the circuit leading from the compensators 14 to the solenoids 11 operating the safety stop-bars 6.

It will be seen that the locking or unlocking latches 62 for locking-pins 57 are operated by the car in the section to which they are attached, and the operation will be as follows:—There is a stop-bar 6 at the end of each section or block and between two sections, and the stop-bar is operated to set to danger position from each section by a car in either section, so that this requires two locking-pins 57, one for each section; each with the unlocking device or latches 62, so as to show such danger position.

A pin 57 is put on each side of stop-bar 6, one for each block or section, and has its locking and unlocking latch 62, so that when a car enters the block the current passes into the signal wire 5, thereby energizing the compensator 14 at each end of the block, which in turn sets the stop-bars 6 in position at each end of the block. When the current flows to solenoids 64 to pull down the stop-bars 6 the plunger 63 and one locking-latch 62 is raised, so pulling the said latch from stop 61 or its locking-pin 57 and permitting it to pass to top of locking block 55 or stop-bar 6, thereby holding the said stop-bar down. It will be seen that the locking-pin 57 on the other side of stop-bar 6 is held from locking in by the latch 62. If a car enters the adjacent block, it will cause the locking-pin 57 for that section to be thrown into position to hold down said stop-bar. Under this condition the locking-pins 57 are in position, and the locking latches 62 have fallen down on top of said locking-pins and behind the detents or stops 61 which are made in the form of an incline. Now by the movement of—say the first car to the end of the block which it is in when the pantograph or bow trolley 20 thereon comes in contact with the short section of wire leading to the primary of the compensator 60, the current will flow from the trolley to primary of the compensator, which will cause current for secondary of said compensator to flow in the circuit leading to the solenoids 58 of the locking-pins 57 on each stop-bar at each end of the block or section or pins 57 belonging to that section only, so that the current will draw the pins 57 from the stop-bar 6, and when drawn back far enough the locking-latches 62 will drop into the indents back of stops 61 on said pins and hold said pins in the unlocked position. If there is no car in the other block or section the stop-bar 6 will rise to clear the trolley wire and permit the car to pass to the next

block; but if there is a car in the next block the bar will not rise, which is due to the fact that the locking-pin 57 for that section has not been withdrawn and will not be until the car has cleared the next block by either going out of the section at the far end, or passing the car blocked at the rear end; so that the operation for locking and unlocking will be the same for either car. By this means it will be seen that each car can lock and unlock the stop-bar 6 for the section in which it is, and also another car will lock and unlock the stop-bar, and then will block itself front and back, against and opposing, or a car following in another block.

Various other modifications and changes in the design, construction and operation of my improved electric signaling system for railroads may be resorted to without departing from the spirit of the invention or sacrificing any of its advantages.

What I claim as my invention and desire to secure by Letters Patent is—

1. In an electric railway signal system, an electrically operated car, a trolley wire, a signal wire, and a safety stop bar operated through said signal wire for drawing the current collecting device on the car away from the trolley wire to disconnect said car from its electric operating current.

2. In an electric railway signal system, an electrically operated car, a trolley wire, a signal wire, a safety stop bar operated through said signal wire for drawing the current collecting device on the car away from the trolley wire to disconnect said car from its electric operating current, and means for moving said bar to and from said current collecting device.

3. In an electric railway signal system, an electrically operated car, a trolley wire, a signal wire, a safety stop bar operated through said signal wire for drawing the current collecting device on the car away from the trolley wire to disconnect said car from its electric operating current, and a solenoid connected to said bar for moving the same to and from said current collecting device.

4. In an electric railway signal system, an electrically operated car, a trolley wire, a signal wire divided into sections or blocks, and a safety stop bar connected to each of said sections and operated through said signal wire for drawing the current collecting device on the car away from the trolley wire to disconnect said car from its electric operating current.

5. In an electric railway signal system, an electrically operated car, a trolley wire, a signal wire divided into sections or blocks, a safety stop bar connected to each of said sections and operated through said signal wire for drawing the current collecting device on the car away from the trolley wire to disconnect said car from its electric operating current, and a compensator in circuit with the end of each of said sections.

6. In an electric railway signal system, an electrically operated car, a trolley wire, a signal wire divided into sections or blocks, a safety stop bar connected to each of said sections and operated through said signal wire for drawing the current collecting device on the car away from the trolley wire to disconnect said car from its electric operating current, and a compensator at the end of each of said sections.

7. In an electric railway signal system, an electrically operated car, a trolley wire, a signal wire divided into sections or blocks, a safety stop bar connected to each of said sections and operated through said signal wire for drawing the current collecting device on the car away from the trolley wire to disconnect said car from its electric operating current, a compensator at the end of each of said sections, and a solenoid connected to said compensator and having a plunger attached to each end of said bar.

8. In an electric railway signal system, a trolley wire, a signal wire divided into sections or blocks, a safety stop-bar connected to each of said sections, a compensator at the end of each of said sections, a solenoid having a plunger attached to each end of said bar, and a wire leading to said solenoid and from said solenoid to ground through a signal lamp.

9. In an electric railway signal system, a trolley wire, a safety stop-bar for drawing the current collecting device on a car away from said trolley wire to disconnect said car from its electric operating current, and means connected to said bar and actuated by an electric current from said wire to move said bar to and from said current collecting device.

10. In an electric railway signal system, a trolley wire, a safety stop-bar for drawing the current collecting device on a car away from said trolley wire to disconnect said car from its electric operating current, means connected to said bar and actuated by an electric current from said wire to move said bar to and from said current collecting device, and a compensator and signal wire delivering current to said means for actuating said bar.

11. In a electric railway signal system, a trolley wire, a signal wire divided into sections, a safety stop-bar, a plunger connected to the end of each bar, a compensator at the end of each of said sections, and two solenoids around each plunger, one of said solenoids connected in series with the other and in circuit with one compensator, and the other solenoid connected in series with the other and in circuit with the other compensator, whereby a car in either section can lower said bar.

12. In an electric railway signal system, a trolley wire, a signal wire divided into sec-

tions, a safety stop-bar, a compensator at each end of said bar and in series with each section of said signal wire, and means whereby said stop-bar can be raised or lowered by a car in each section.

13. In an electric railway signal system, a trolley wire, a signal wire, a car having a trolley or pantograph thereon for engaging with said wires, and means whereby said pantograph will be lowered from the trolley wire and signal wire to break the circuit between said wires and the car motors and cause said car to stop.

14. In an electric railway signal system having a signal wire divided into sections, a compensator at the end of and between said sections, a safety stop-bar, plungers connected to each end of said bar, solenoids around said plungers and in circuit with said transformer to actuate said bar, and a semaphore signal connected to each of said plungers and operated by same in connection with said safety stop-bar.

15. In an electric railway signal system, electrically operated cars, a trolley wire, a signal wire divided into a plurality of sections, a plurality of stop-bars for drawing the current collecting device on the cars away from said trolley wire to disconnect said cars from their electric operating current, and means for operating said bars by cars running in said sections.

16. In an electric railway signal system, electrically operated cars, a trolley wire, a signal wire divided into sections, a safety stop-bar for disconnecting said cars from their electric operating current, said cars having a trolley or pantograph thereon for engaging with said wires, and means for raising said bar to clear said pantograph when two cars are in the same section.

17. In an electric railway signal system, a trolley wire, a signal wire, an electrically operated car having a trolley or pantograph thereon for engaging with said wires, a safety stop-bar for disconnecting said car from its electrically operating current, and a brake system whereby when said pantograph is lowered from said wire by said bar the brakes on said car will be set to stop the said car.

18. In an electric railway signal system, a trolley wire, a signal wire divided into sections or blocks, a siding trolley wire, a safety stop-bar, and a switch operated by said bar.

19. In an electric railway signal system, a trolley wire, a signal wire divided into sections or blocks, a siding trolley wire, a safety stop-bar, a switch operated by said bar to open or close said siding circuit, and a circuit leading from a source of supply to said switch and from said switch to said siding wire, so that when said bar is in its normal position said switch is closed and when set to danger said switch is closed.

20. In an electric railway signal system, the combination of a safety stop-bar and a switch actuated thereby, a main trolley wire, a siding trolley wire, and means whereby the siding trolley wire may be disconnected from said main trolley wire.

21. In an electric railway signal system, an electrically operated car, a trolley wire, a signal wire divided into sections or blocks, a safety stop-bar for disconnecting said car from its electrically operating current, and means for locking and unlocking said bar by a car entering and leaving a block or section.

22. In an electric railway signal system, an electrically operated car, a trolley wire, a signal wire divided into sections or blocks, a safety stop-bar for disconnecting said car from its electrically operating current, and locking pins adjacent to said bars for locking and unlocking said bar by a car entering and leaving a block or section.

23. In an electric railway signal system, an electrically operated car, a trolley wire, a signal wire divided into sections or blocks, a safety stop-bar for disconnecting said car from its electrically operating current, spring operated blocks on said bar, and locking-pins engaging with said blocks for locking and unlocking said bar by a car entering and leaving a block or section.

24. In an electric railway signal system, a trolley wire, a signal wire divided into sections or blocks, a safety stop-bar, spring operated blocks on said bar, spring operated locking pins engaging with said blocks for locking and unlocking said bar, and a solenoid connected to said pins and in series with an electric circuit whereby said pins will be withdrawn by a car leaving the section or block.

25. In an electric railway signal system, a trolley wire, a signal wire divided into sections or blocks, a safety stop-bar, spring operated blocks on said bar, spring operated locking pins engaging with said blocks for locking and unlocking said bar, solenoids actuating to withdraw said pins to release said bar, an electric circuit, and compensators in said circuit and solenoids with the secondary windings in series with said circuit and solenoids and the primary circuit having one end adjacent to the trolley wire and the other end to ground.

26. In an electric railway signal system, a trolley wire, a signal wire divided into sections or blocks, a safety stop-bar, locking devices for said bar, an electric circuit, and compensators in said circuit whose secondary windings are in series with said locking devices and whose primary windings are adjacent to said trolley wire or other source of current from a car for conveying current from said trolley wire to the primary winding of said compensator.

27. In an electric railway signal system, a trolley wire, a signal wire divided into sec-

tions or blocks, a safety-stop-bar between the ends of two sections, locking pins on each side of said bar, and solenoids attached to each pin to unlock the same upon a car leaving either section so that source of current is generated in each section to unlock said bar independent of the source of current in the other section.

28. In an electric railway signal system, a trolley wire, a signal wire divided into sections or blocks, a safety stop-bar, an electric circuit and means to operate said bar, an electric circuit and means to lock and unlock said bar, and means conveying current from said trolley wire to said circuit for operating said bar and to said circuit for unlocking said bar.

29. In an electric railway signal system, a trolley wire, a signal wire divided into sections or blocks, a safety stop-bar, locking blocks on said bar and movable in vertical relation therewith, locking pins engaging with said blocks, and a spring between each of said blocks and bar which is adapted to be compressed when one of the locking pins is above its blocks and upon the withdrawal of said pin the block is raised by said spring above the pin to prevent said pin from locking.

30. In an electric railway signal system having sections or blocks, safety stop-bars for disconnecting electrically operated cars from their operating current, and means for locking and unlocking said bars by cars entering said sections or blocks and controlled by said bars.

31. In an electric railway signal system having sections or blocks, safety stop-bars for disconnecting electrically operated cars from their operating current, spring operated locking-pins engaging with said bars, and means for locking and unlocking said bars by cars entering said sections or blocks and controlled by said bars.

32. In an electric railway signal system having sections or blocks, safety stop-bars, spring operated locking-pins engaging with said bars to lock the same, and latches actuated by solenoids and engaging with said pins to unlock said bars.

33. In an electric railway signal system having sections or blocks, safety stop-bars, spring actuated locking-pins engaging with said bars to lock the same, latches engaging with said pins, and plungers connected to said latches and actuated by solenoids to unlock said bars.

34. In an electric railway signal system having sections or blocks, the combination of a safety stop-bar, a locking-pin, a locking-latch, and a solenoid operating said latch to release said pin.

35. In an electric railway signal system having sections or blocks, the combination of a safety stop-bar for disconnecting an electrically operated car from its operating current, a locking-pin, a plunger attached to said pin and to a solenoid, and a compensator for delivering current to said solenoid.

36. In an electric railway signal system a trolley wire, a signal wire divided into sections or blocks and having a short section at each end adjacent to the said trolley wire, a safety stop-bar for disconnecting an electrically operated car from its operating current and means carried by a car whereby current is led to said short wire section.

37. In an electric railway signal system, a trolley wire, a signal wire divided into sections or blocks and having a short section at each end adjacent to said trolley wire, a safety stop-bar adjacent the trolley wire, and a compensator having one end of the primary wind adjacent to the trolley wire and at each end of the blocks.

38. In an electric railway signal system, a trolley wire, a signal wire, a compensator, a car, and a safety stop-bar for disconnecting an electrically operated car from its operating current, means operated by the current from said compensator whereby the said bar is lowered and the mechanism on the car and in contact with the trolley or supply shall be raised from said trolley wire and the circuit to said car and trolley wire opened.

39. In an electric railway signal system, a trolley wire, stop-bars, locking pins to hold said bars in danger position, solenoids surrounding said pins, compensators, the secondary circuit of which being in circuit with said solenoids and one end of the primary circuit being adjacent to said trolley wire and in circuit therewith, a car, and means carried by said car whereby current will flow in said primary circuit to generate current in the secondary for operating said pins and unlock the said bars in the passing of said car.

In testimony whereof, I, the said HARRY C. REAGAN have hereunto set my hand.

HARRY C. REAGAN.

Witnesses:
J. N. COOKE,
JAMES L. WEHN.