No. 817,497.

PATENTED APR. 10, 1906.

J. H. LYNCH.

SIGNAL SYSTEM.

APPLICATION FILED OCT. 25, 1905.

3 SHEETS—SHEET 1.

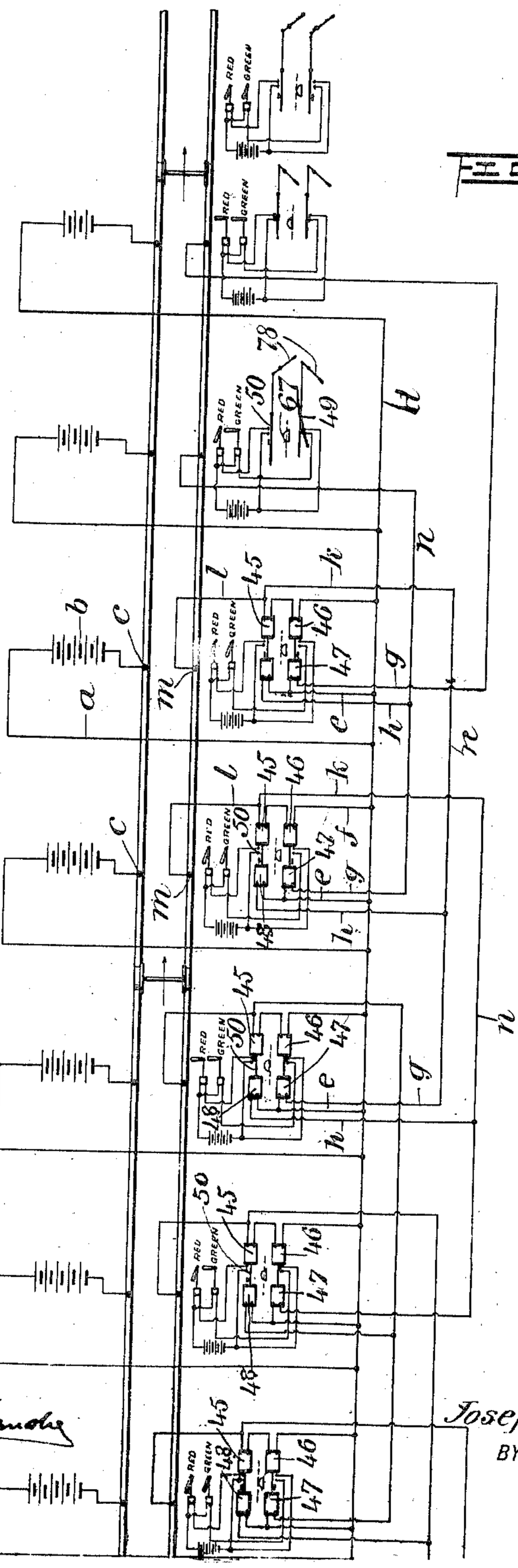

FIG. 1.

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3 SHEETS—SHEET 2.

FIG. 2.

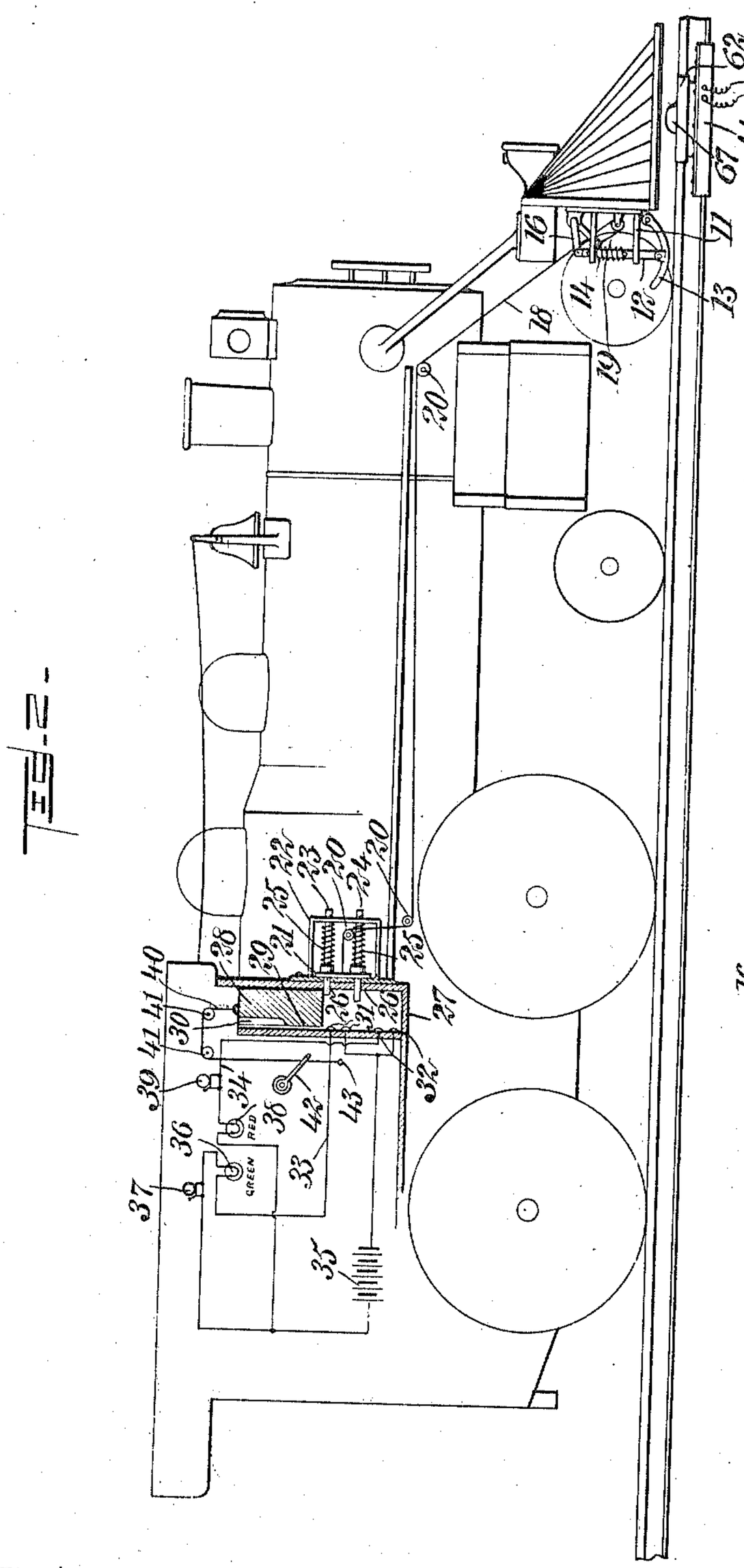
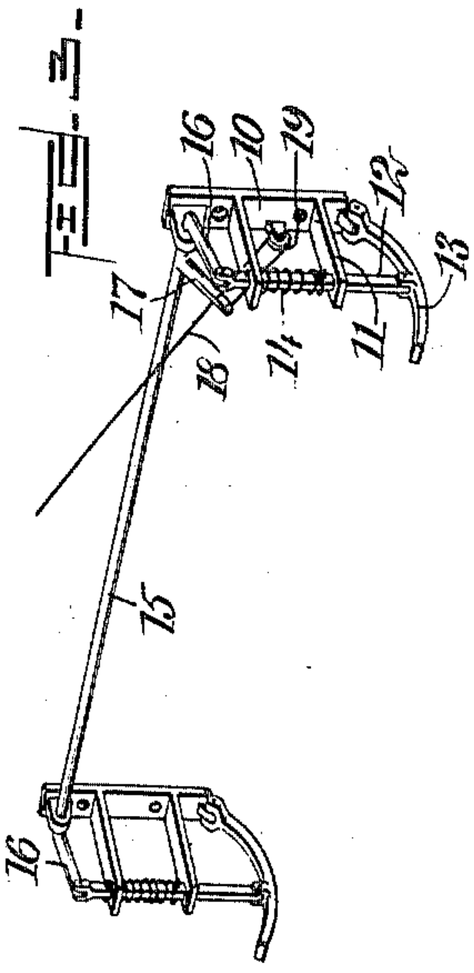


FIG. 3.



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3 SHEETS—SHEET 3.

FIG. 4.

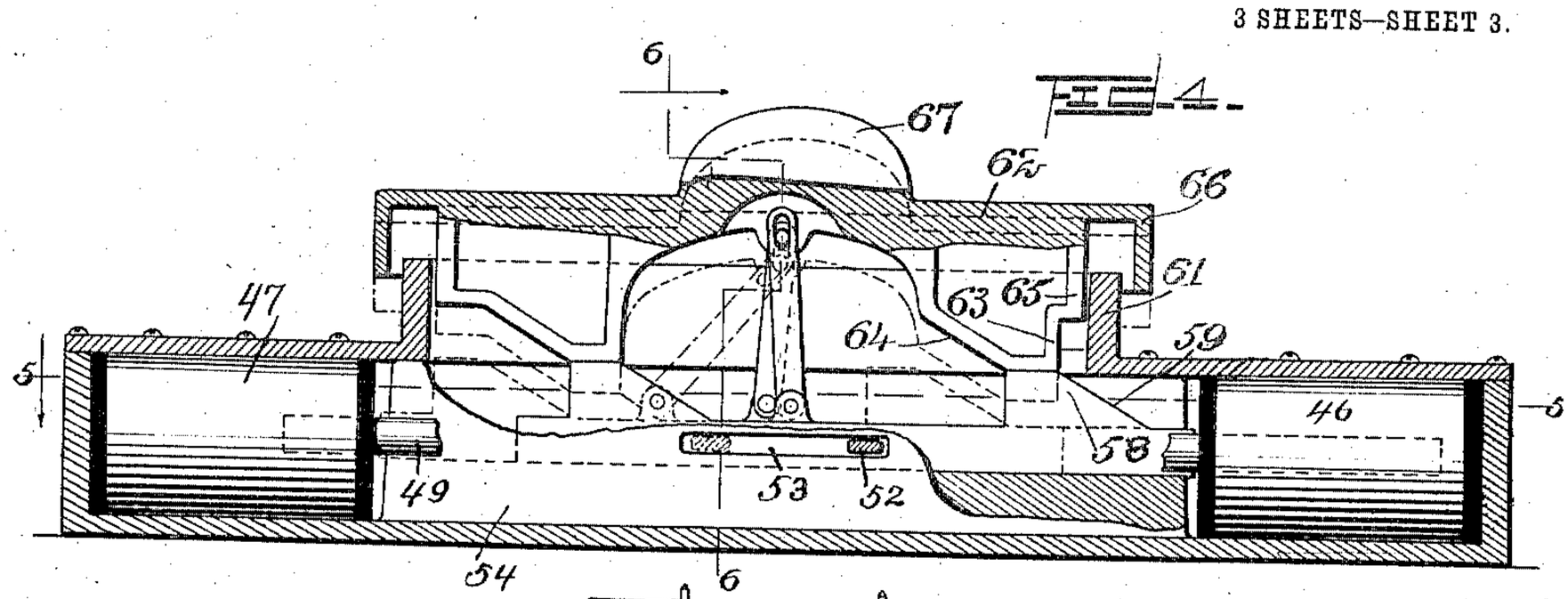


FIG. 5.

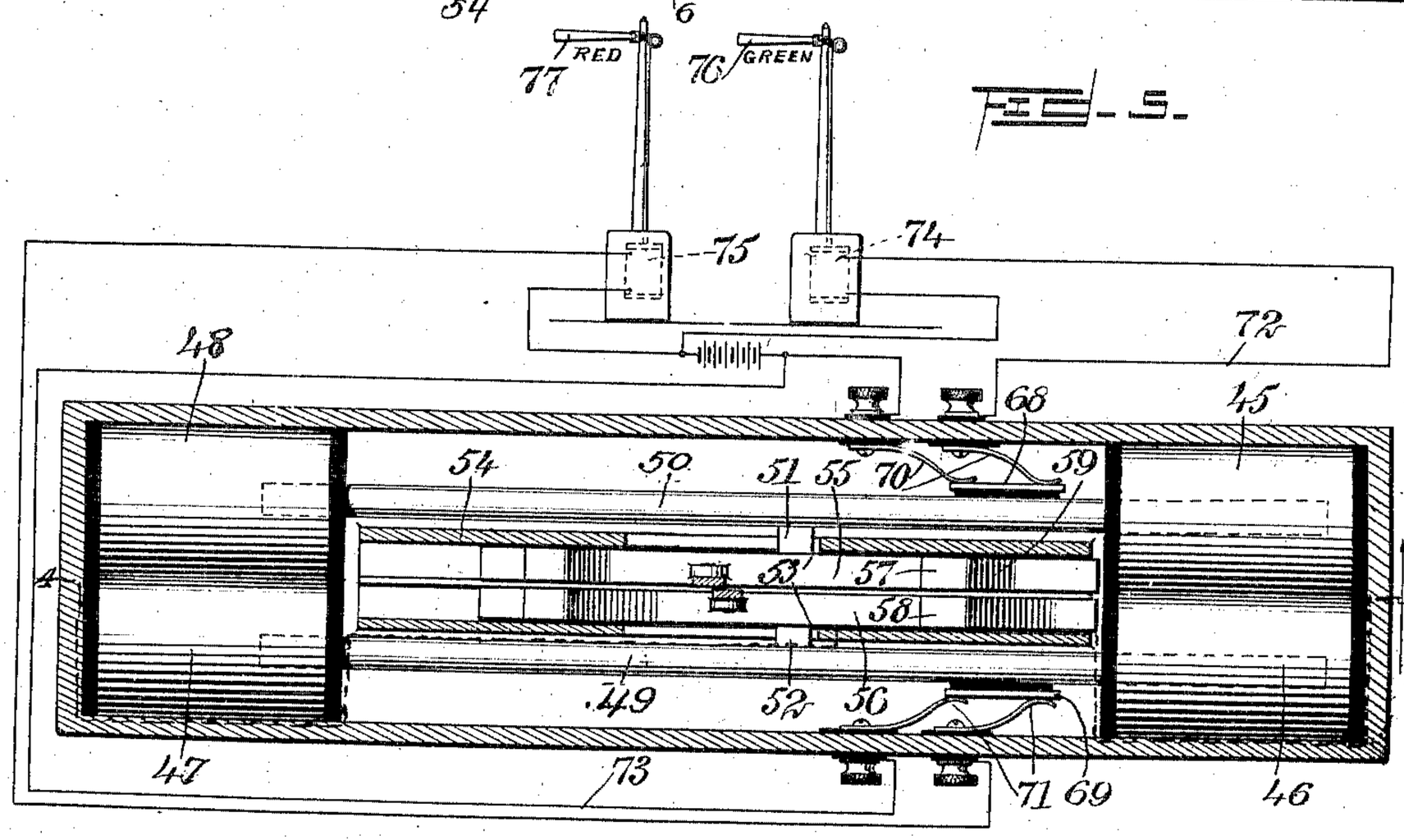
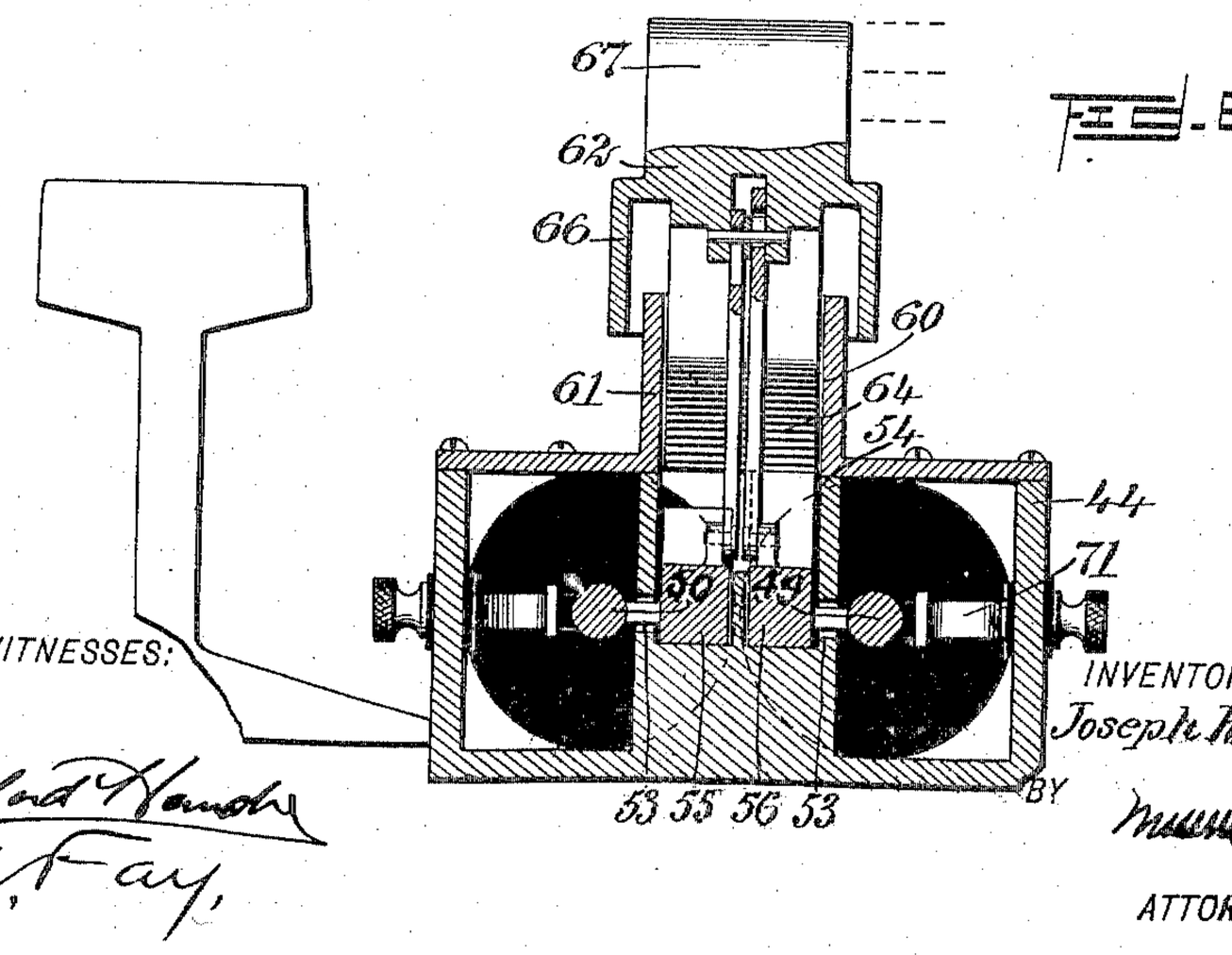


FIG. 6.



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JOSEPH HAMILTON LYNCH, OF RED BANK, NEW JERSEY.

SIGNAL SYSTEM.

No. 817,497. Specification of Letters Patent. Patented April 10, 1906.

Application filed October 25, 1905. Serial No. 284,314.

To all whom it may concern:

Be it known that I, JOSEPH HAMILTON LYNCH, a citizen of the United States, and a resident of Red Bank, in the county of Monmouth and State of New Jersey, have invented a new and Improved Signal System, of which the following is a full, clear, and exact description.

My invention relates to an automatic signal system for use on locomotives and the like.

The principal objects of the invention are to provide means whereby the passage of a train over a certain part of the roadway can be caused to set certain signals in the rear for the observation of the crew of any train approaching from behind, and, furthermore, to provide means whereby the setting of these signals will not only permit the crew to understand the position of a train in advance, but to automatically give a signal in the cab of the engine or other convenient place and apply air-brakes to automatically stop the approaching train.

The present invention deals principally with mechanism by which the signals are operated in the locomotive and the air-brakes applied and means for setting an obstruction in a plurality of positions, thereby giving different signals to the operator of the locomotive, and also for providing for setting the signals and obstruction when a train passes a given point and for gradually lowering said obstruction and hiding the signals after the train passes.

Further objects of the invention will appear below.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a diagrammatic view of a portion of a railway, showing one way in which the electrical connections can be made for the purpose of setting the signals and accomplishing the other results mentioned above. Fig. 2 is a side view of a locomotive, showing diagrammatically certain electrical connections and other important features of my invention. Fig. 3 is a perspective view of certain details of the locomotive. Fig. 4 is a central sectional view on the line 4 4 of Fig. 5 of a portion of signal-setting device which constitutes a part of the invention. Fig. 5 is a sectional view on the line 5 5 of Fig. 4, and Fig. 6 is a sectional view on the line 6 6 of Fig. 4.

I will first describe the principle of the mechanism which I employ on the locomotive or other part of the frame for transmitting signals and turning on the air-brakes, reference being had especially to Figs. 2 and 3. On the pilot is located a bracket 10, having guides 11 for directing the motion of a reciprocable bar 12. This bar is pivotally connected with a shoe 13 near its lower end, the shoe also being pivoted to the bracket. This shoe preferably has a curved lower surface, so that when it comes into contact with any obstruction along the roadway it will be moved upwardly without any very sudden jar. A spring 14 is preferably employed for cushioning this motion. These parts may be duplicated on the other side of the engine, so as to provide for operating in both directions and also independently of the side of the track upon which the obstruction is located. For connecting the two devices on the opposite sides of the engine together I provide an oscillatable rod 15, mounted in bearings on the pilot. This rod is provided with arms 16, pivotally connected with the upper ends of the reciprocable bars 12. Consequently these bars will be oscillated when either of the shoes 13 is moved upwardly. The rod is also provided with an arm 17, which extends in a direction either parallel with the arms 16 or at a slight angle thereto, and to this arm is secured the end of a flexible connection 18, which runs downwardly over a pulley 19 and then upwardly over pulleys 20 to a plate 21, reciprocably mounted in a frame 22 on the cab or any other convenient part of the locomotive or car. The plate is provided with two or more bars 23 and 24, which serve as guides for the plate, and springs 25, connected with them, serve to normally force the plate inwardly against the operation of the reciprocable bars 12. The bars 23 and 24 are placed one above the other, and they project through openings 26 into a well 27, located in any convenient position upon the locomotive or car. The bar 23, which is above the bar 24, projects a shorter distance into the well than the bar 24. Located in this well and vertically slidable therein is a weight 28, adapted to rest on the bar 23 when the latter is in the normal position; but when operated by the shoe 13 the bar 23 can be withdrawn, leaving the bar 24 still projecting into the well. This bar will then sustain the weight at a lower position in the well. If this bar is then completely withdrawn, the

weight will drop to the bottom. The weight is provided with a conducting-surface 29 and with a slot 30, which may, if desired, be replaced by an insulating plate or surface. Located in two positions near the bottom of the well are two pairs of open contacts 31 and 32. These contacts are so located that when the bar 23 is in the position shown in Fig. 2 the weight will be above both of them and they will both be open. When, however, this bar is withdrawn and the weight rests on the bar 24, the conducting-surface 29 will bridge the contacts 31 and close them. When both bars are withdrawn and the weight rests upon the bottom of the well, the surface 29 will bridge and close the contacts 32, while the contacts 31 will remain open on account of the space or insulating material 30 being opposite them. The two contacts are connected, respectively, with conductors 33 and 34, both being connected with a battery or other source of power 35. The circuit in which the conductor 33 is located contains a green light 36 and a bell or other audible signal 37. The circuit in which the conductor 34 is contained is provided with a red light 38 and a bell or other audible signal 39. The signal 39 is intended to be of a louder and more noticeable character than the signal 37. It will be clear that only one of these circuits will be closed at the same time and that when the bar 23 is withdrawn, leaving the bar 24 projecting into the well, the green light and the weaker signal 37 will be operated; but when both bars are withdrawn the red light and the stronger signal 39 will be operated. The weight 28 is provided with a flexible connection 40, which passes over pulleys 41 and is connected with a lever 42, which controls the air-brake system of the train. This connection 40 is also provided with a handle 43. It will be readily understood that when the weight drops the lever 42 will be operated. It is preferable to connect this lever with the air-brake system in such a way that when the weight drops to such a position as to rest on the bar 24 the brakes will be set in the position ordinarily called "service," while when the weight drops to the bottom of the well the air-brakes will be applied with full force.

From the description which has been given above it will be seen that I have provided for giving a plurality of signals of different character and for operating the air-brake lever in a plurality of different ways. I have illustrated only two, and for ordinary purposes this will be enough. The application of these signals and the brakes depends upon the manner in which the shoe 13 is operated, and this in turn will depend upon the height or position of an obstruction to be placed adjacent to the roadway. For the purpose of properly operating the shoe 13 I have constructed means whereby an obstruction can be set at two different heights, so that the shoe will be operated when the obstruction is set at the lower height in such a manner as to energize the circuit 33 and the green light and so that when the obstruction is placed at its highest position the circuit 34 and the red light will be energized. I will now describe the mechanism which I have illustrated for accomplishing this purpose, reference being had to Figs. 4, 5, and 6. In a box or casing 44, located adjacent to the side of the track, I have shown four solenoids 45, 46, 47, and 48. These solenoids are designed to be energized in a way which will be described below. The two solenoids 45 and 47 are placed opposite each other, and their armatures are mounted on a sliding rod 49. The armatures of the solenoids 46 and 48 are similarly mounted or connected with a sliding rod 50. It will be understood that the energizing of either of the solenoids 45 or 46 will draw the rods 49 or 50 to the right, while the opposite action will be produced by the solenoids 47 and 48. On the two rods are located projections 51 and 52, extending through perforations 53 in an inner casing 54, mounted in the box. These projections are connected with slides 55 and 56, respectively. These two slides are substantially alike in general form, each one being provided with one or more upwardly-extending lugs 57 and 58. These lugs preferably have inclined surfaces 59 upon one side. The lugs 58 are of less altitude than the lugs 57, and this is practically the only difference in the construction of these two slides. Located in a slot 60 in an upwardly-extending casing 61 on the top of the box is a frame 62. This frame extends across the space occupied by the two series of lugs 57 and 58 and is provided with downwardly-extending lugs 63, having inclined surfaces 64, adapted to engage the inclined surfaces 59. These lugs are intended to rest upon the top of either of the lugs 57 or 58. It will be obvious that the reciprocation of the bars 55 and 56 will lift the frame 62 to different heights, according to which one of the bars is manipulated. The frame 62 is provided with guiding-surfaces 65, engaging the front and rear internal surfaces of the casing 61, so as to guide the frame to move in a vertical direction. The frame is also provided with a projecting shoulder 66, operating as a guard to protect the internal parts of the device from dust and snow. On the top of the frame is a projection 67, which is designed to engage the shoe 13. In order to provide for setting a visible signal when the obstruction 67 is raised either to its intermediate or its highest position, I have shown a conducting-plate 68 on the rod 50 and a conducting-plate 69 on the rod 49. These plates are insulated from the rods on which they are mounted. On the box 44 I have placed contacting members 70 and 71, engaging, respectively, the

plates 68 and 69 when the rods 49 and 50 are drawn to the right. In this position the two contacting-pieces 70 on one side or 71 on the other are connected together, and as they normally provide an interruption of the electric circuits 72 and 73, respectively, it will be seen that at this time these circuits will be closed. The circuit 72 is connected with an operating device 74, while the circuit 73 is connected with a similar operating device 75. The former operates a red signal 76 and the latter a green signal 77. Consequently when the solenoids are so operated as to raise the frame 62 and the obstruction or projection 67 to an intermediate point the green signal will be displayed, and when they are so operated as to raise it to its highest point the red signal will be displayed. These parts of the device may be located at any convenient point along the railroad.

In Fig. 1 I have illustrated one way in which the parts can be so connected as to operate in accordance with my principle. In this figure I have shown a series of conductors *a*, each connected with a battery *b* and with a contact *c* on one of the rails of the railway. Each of these conductors *a* is connected with a conductor *d*, which extends along the roadway. The latter conductor is also connected at intervals by means of wires *e* and *f* with the solenoids 47 and 46, respectively. The conductor *e* also extends to the solenoid 48 and the conductor *f* to the solenoid 45, the latter after passing through the solenoid 46. The opposite end of the winding on the solenoid 47 is connected with a conductor *g*, and the opposite end of the winding on the solenoid 48 is connected with a conductor *h*. The opposite end of the winding of the solenoid 45 is connected with a conductor *k*. The conductor *k*, by means of a wire *l*, is connected with a contact *m*, which is located on the track exactly opposite the contact *c*, and consequently when a train passes this point the circuit between the two points *c* and *m* will be completed. The current will consequently be sent around the wires *a*, *d*, *f*, and *l*. Hence the two solenoids 45 and 46 will be energized and the red and green signals at this point will be displayed, while the obstruction 67 is raised to the highest point, and any train which follows the train passing this point while these elements are in this condition will be warned of the danger and automatically stopped by the air-brake. I have also provided means whereby when the train passes on out of the block and into the next block the red signal will be lowered, leaving the green one displayed and the frame 62 lowered from its highest into its intermediate position. This I accomplish by connecting the wire *k* of one of the systems with the wire *h* of the preceding one by means of a conductor *n*. Now when the train passes into the next block it will form a contact there between the points *c* and *m* and raise the signals at that block. Also a current will be sent through the conductors *l*, *k*, and *n* of that station and the conductor *h* of the next station to the rear or to the left in the form shown in the drawings. This current will then continue through the solenoid 48 and the conductor *e* back to the conductor *d* and from there through the conductor *a* to the battery. This will result in drawing the rod 50 to the left and allowing the red signal to be lowered, the green one being left in position. I also provide means whereby when the train reaches the third block ahead it will lower the green signal and leave the road free. This is accomplished by connecting the wire *g* of each block or station with the wire *k* of the third station ahead by means of an extension of the conductor *n*. It will be readily seen that when the locomotive forms the contact between the third points *m* and *c* a current will be sent over the conductor *n* through the solenoid 47 and draw back the rod 49, so as to lower the green signal. This has a corresponding effect on the frame 62.

At the right of Fig. 1 I have shown how the system may be employed when automatic signals are not used, the signals being operated from a tower or other operating-station. In this case the solenoids 45, 46, 47, and 48 are not employed, but the rods 49 and 50 are used in the same way as before, and they are operated directly or indirectly by levers 78. In Fig. 1 I have represented diagrammatically the projection 67, but have not shown how it is connected with the other parts, as that is clearly illustrated in the other figures.

It will of course be understood that the wiring is designed to suit the road, the invention being applicable either to a double or to a single track road. Also at switches the signals are preferably so connected with the operating mechanism as to be properly controlled by it.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A signal system comprising a movable body, means for holding the body in a certain position, means for releasing the body to allow it move into another position, a signal device, means operable by the movement of said body for operating said signal, a flexible connection secured to said body, and a lever for controlling an air-brake system connected with said connection.

2. A signal system comprising a weight, means for supporting the weight, means for withdrawing the supporting means, a signal device, electric means for operating said signal device when the weight descends, and a flexible connection for controlling an air-brake system.

3. An automatic signal system for railways and the like, comprising a weight, means for

supporting the weight, means for releasing the weight, an open contact adapted to be closed by the descent of the weight, an electric circuit in connection with the contact and having a signal device, a flexible connection secured to said weight, and a lever for an air-brake system connected with said flexible connection.

4. An automatic signal system for railways and the like, comprising a movable body, means for holding the body in a certain position, means for releasing the body to allow it to move to another position, an open contact adapted to be closed by the movement of the body, an electric circuit in connection with said contact and having a signal device, a flexible connection secured to said body, and a lever for controlling an air-brake system connected with said connection.

5. A signal system comprising a weight, a plurality of bars adapted to project into the path of the weight, said bars being at different heights, and being adapted to support the weight, a pair of signals, and means connected with each signal for operating it when the weight descends into certain positions.

6. An automatic signal system for railways and the like, comprising a weight, means for supporting the weight, means for releasing the weight, an open contact adapted to be closed by the descent of the weight, an electric circuit in connection with the contact and having a signal device, a second open contact adapted to be closed by said weight, and a second circuit connected with the second contact and having a signal device.

7. An automatic signal system, comprising a weight, a plurality of bars adapted to project into the path of said weight, said bars being of different lengths, and means for closing a plurality of electrical circuits by the descent of said weight.

8. An automatic signal system, comprising a weight, a plurality of bars adapted to project into the path of said weight, said bars being of different lengths, and means for closing a plurality of electrical circuits by the descent of said weight; said means comprising a series of open contacts located in the path of said weight, the weight having means for closing certain of said contacts when resting on any of said bars.

9. An automatic signal system, comprising a well, a weight mounted therein, a bar adapted to project into the well for holding the weight in elevated position, a second bar adapted to project into the well for holding the weight in a lower position, means for removing the first bar, and a series of electrical contacts located opposite said bars and adapted to be closed by the weight.

10. An automatic signal system, comprising a well, a weight mounted therein, a bar adapted to project into the well for holding the weight in elevated position, a second bar adapted to project into the well for holding the weight in a lower position, means for removing the first bar, and a series of electrical contacts located opposite said bars and adapted to be closed by the weight; said weight having a conducting-surface for engaging said contacts, and an insulating-surface located above the conducting-surface for insulating such contacts from each other as are located above the conducting-surface.

11. A signal system comprising a movable body, a bar adapted to engage said body and prevent its movement beyond a certain point, a second bar also adapted to engage the body, the second bar being longer than the first, and means for simultaneously withdrawing the first bar and partially withdrawing the second.

12. A signal system comprising a pair of bars of unequal length, a contact device adapted to be supported by said bars, springs for forcing said bars into operative position, and means for withdrawing either or both of said bars from operative position.

13. A signal system comprising a pair of bars of unequal length, a contact device adapted to be supported by said bars, springs for forcing said bars into operative position, and means for withdrawing either or both of said bars from operative position; said means comprising a movable shoe and connections from the shoe to the bars.

14. A signal system comprising a pair of bars of unequal length, a plate upon which said bars are mounted, and means for moving said bars; said means comprising a pivoted shoe, a reciprocating bar connected with the shoe, and a flexible connection between the bar and said plate.

15. A signal system comprising a pair of bars of unequal length, a plate upon which said bars are mounted, means for moving said bars, said means comprising a pivoted shoe, a reciprocating bar connected with the shoe and a flexible connection between the bar and said plate, and means located along a road-bed for raising said shoe to a plurality of different heights.

16. A signal system comprising a pair of bars of unequal length, a plate upon which said bars are mounted, means for moving said bars, said means comprising a pivoted shoe, a reciprocating bar connected with the shoe and a flexible connection between the bar and said plate, a series of vertically-reciprocable bars located along a road-bed, and means connected with each bar for raising it to a plurality of different heights, said bars being adapted to engage said shoe and raise it.

17. A signal system comprising a pair of bars of unequal length, a plate upon which said bars are mounted, means for moving said bars, said means comprising a pivoted shoe, a reciprocating bar connected with the shoe and a flexible connection between the

bar and said plate, and means for operating said shoe, said means comprising a pair of reciprocable bars each having a projection thereon, the projections on one bar being higher than those on the other, means for reciprocating said bars, a frame resting on the projections of said bars, and means on said frame for engaging said shoe.

18. An operating device for a signal system, comprising a pair of bars having projections thereon, the projections of one bar being higher than those of the other, means for reciprocating said bars, a frame located above said bars and having downwardly-extending lugs adapted to engage the projections on the bars, a plurality of signals, and electrical connections between said bars and said signals for operating the signals when the bars are reciprocated.

19. An operating device for a signal system, comprising four solenoids arranged in pairs, two rods, each rod entering two of said solenoids and located between them, said rods constituting armatures for the solenoids, a pair of bars one connected with each of said rods, an obstruction, and means connected with said bars for raising said obstruction to different heights.

20. In an electric system, the combination of an open circuit adapted to be closed by the passage of a train, an operating device connected with said circuit, said operating device having a pair of bars provided with lugs projecting upwardly to different heights, and means connected with said circuit for moving one of said bars.

21. In an electric system, the combination of a plurality of circuits, a frame having an obstruction thereon, means connected with one of said circuits for raising and lowering said frame, and means connected with another of said circuits for raising said frame to a different height.

22. In an electric system, the combination of a plurality of open circuits adapted to be closed by the passage of a train, a vertically-movable frame having an obstruction located adjacent to a track and to each of said circuits, means connected with one of the circuits for raising the bar to its highest position when a train passes and closes the adjacent circuit, and means for lowering the bar to an intermediate position when the train passes the next circuit.

23. In an electric system, the combination of a railway-track having a plurality of contacts adapted to be closed by the passage of a train, an electric circuit in connection with each contact, a frame located adjacent to each contact and adapted to be raised into two different positions, means for raising said frame to its highest position when a train passes the contact located adjacent to it, means for lowering the frame to an intermediate position when a train passes the contact next beyond, and means for completely lowering the frame when a train passes the third contact.

24. In an electric signal system, the combination of a railway-track having a series of open contacts adapted to be closed by the passage of a train, an electric circuit connected with each contact, a pair of signals controlled by each of said circuits, a vertically-movable frame located adjacent to said track and to the signals, means for raising said frame to its highest position and displaying both signals when a train passes the adjacent contacts, means for lowering one of said signals and lowering said frame to an intermediate position when a train passes the next contact, and means for lowering the other signal and completely lowering the frame when the train passes the third contact.

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

JOSEPH HAMILTON LYNCH.

Witnesses:

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EVERARD B. MARSHALL