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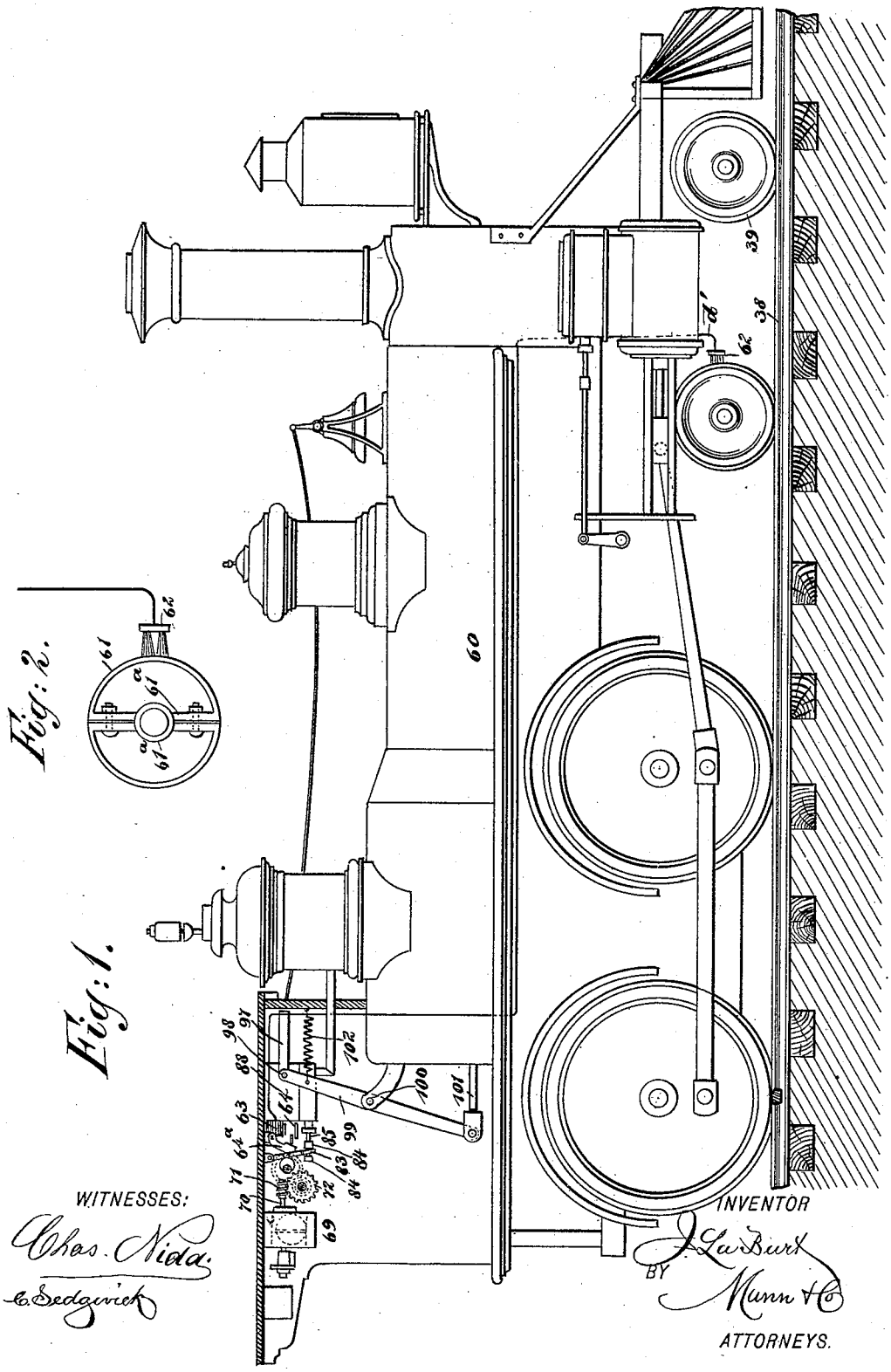
J. LA BURT.

BLOCK SIGNAL SYSTEM.

No. 494,007. Patented Mar. 21, 1893.



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J. LA BURT.

BLOCK SIGNAL SYSTEM.

No. 494,007. Patented Mar. 21, 1893.

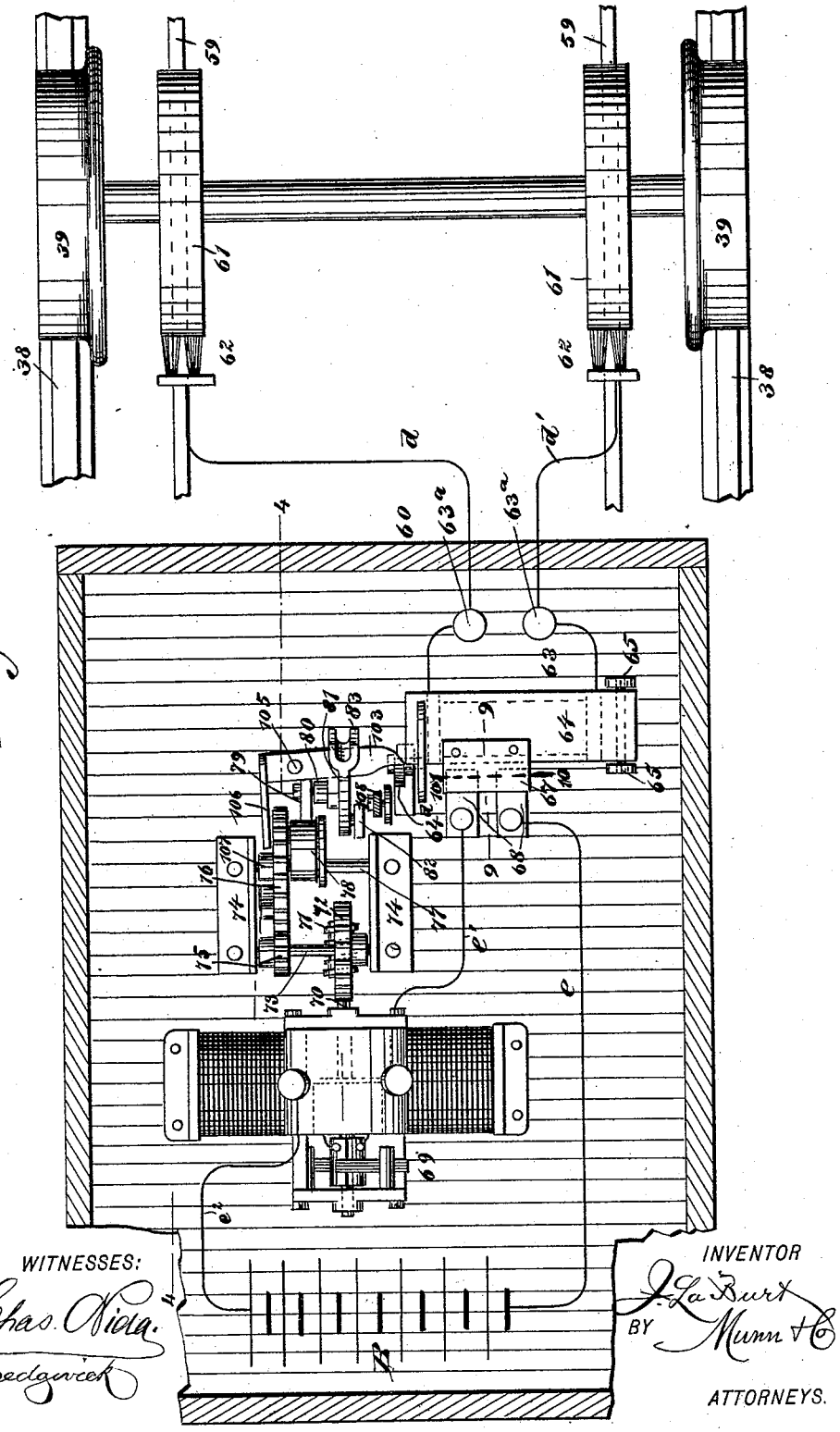


Fig. 3.

WITNESSES:

Chas. Nida.

E. Sedgwick

INVENTOR

J. La Burt

BY Munn & Co

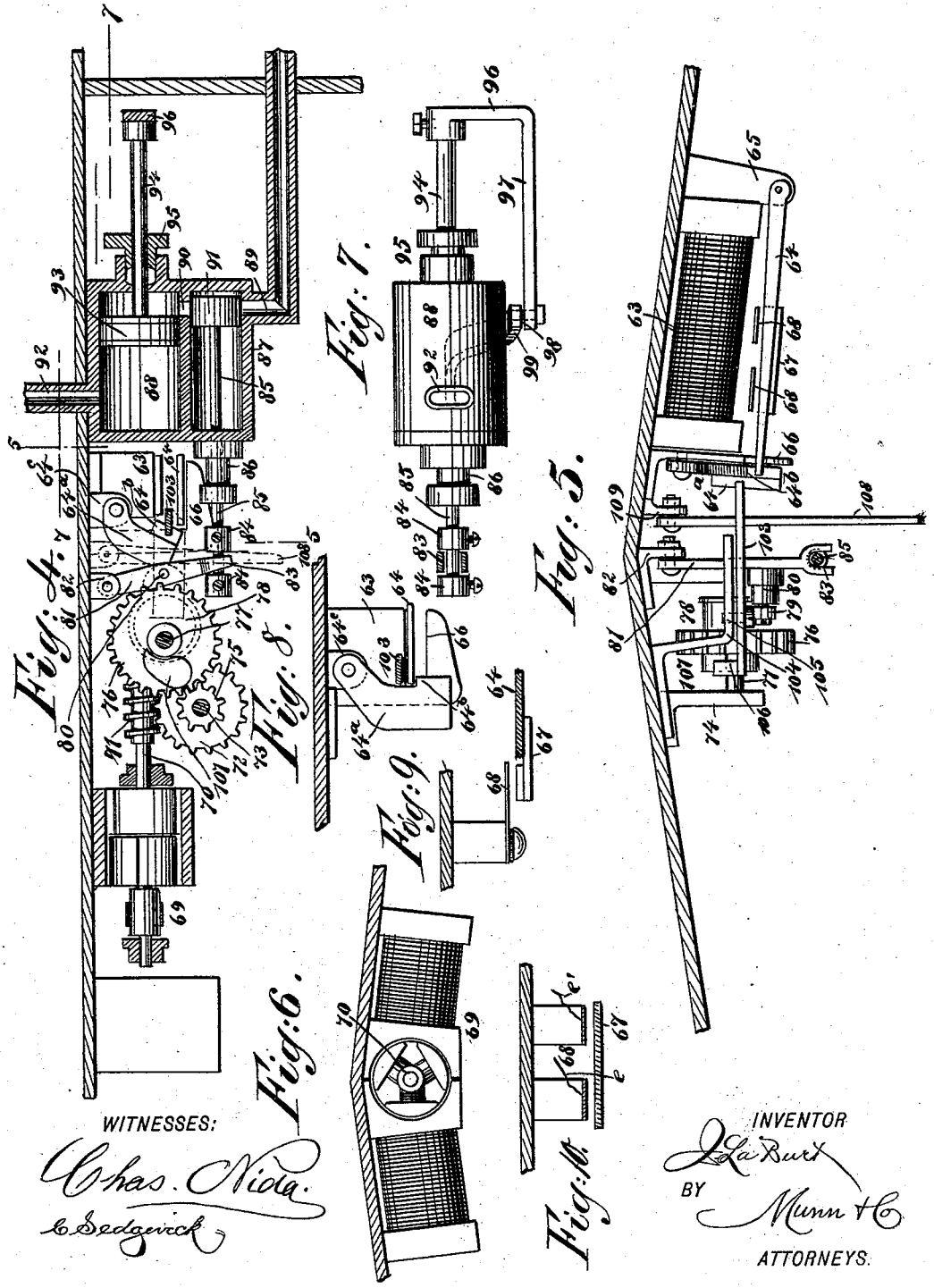
ATTORNEYS.

(No Model.) 6 Sheets—Sheet 3.

J. LA BURT.

BLOCK SIGNAL SYSTEM.

No. 494,007. Patented Mar. 21, 1893.



WITNESSES:

Chas. Nida.

E. Sedgwick

INVENTOR

J. La Burt

BY Munn & Co

ATTORNEYS.

(No Model.) 6 Sheets—Sheet 4.

J. LA BURT.

BLOCK SIGNAL SYSTEM.

No. 494,007. Patented Mar. 21, 1893.

Fig: 11.

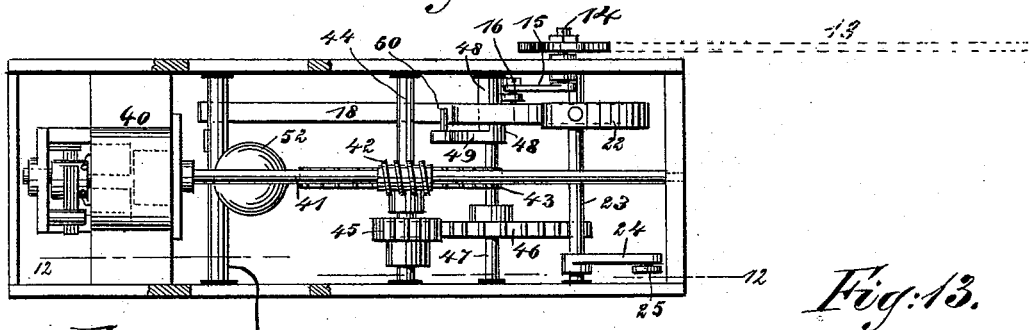
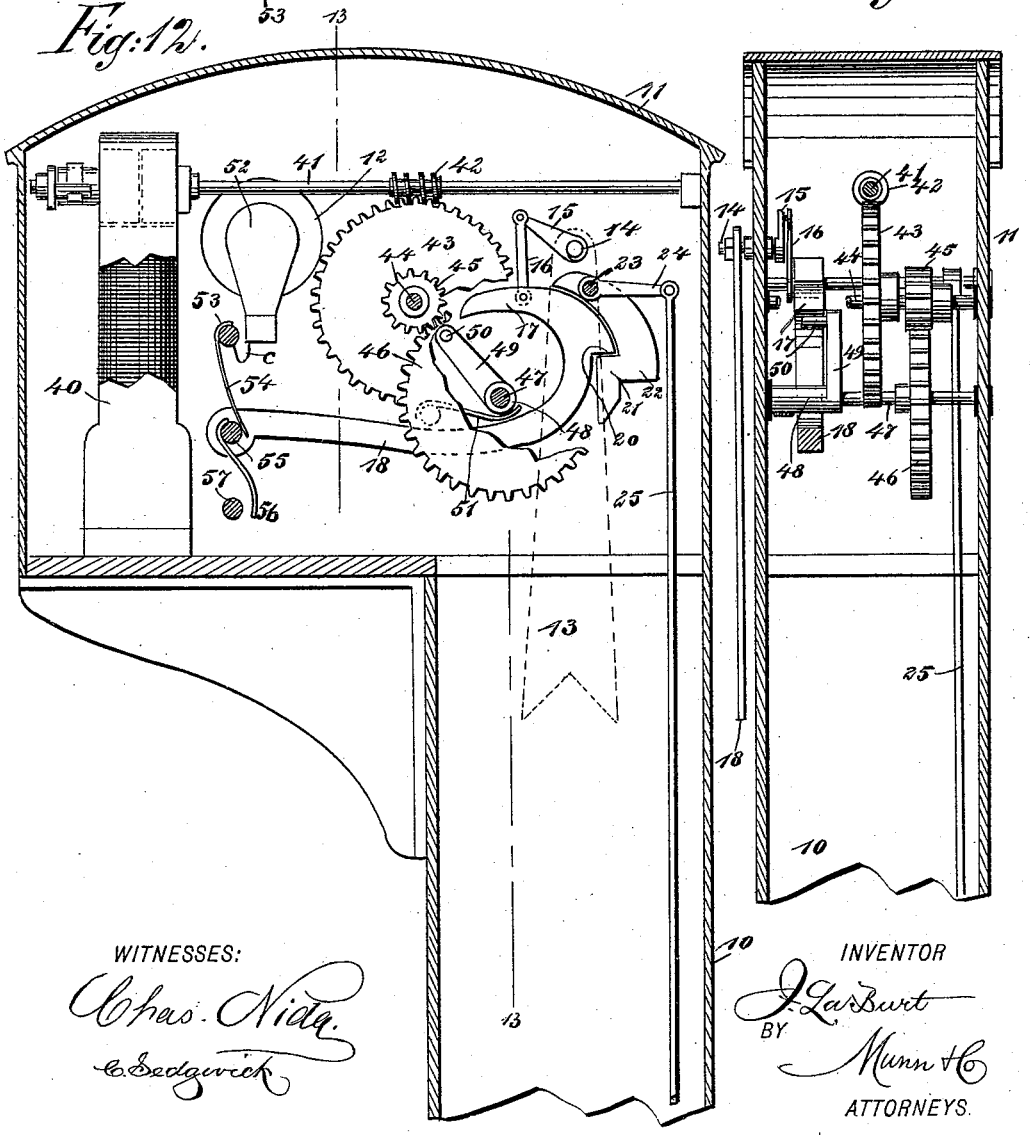


Fig: 13.

Fig: 12.



WITNESSES:

Chas. Nida.

C. Sedgwick

INVENTOR

J. La Burt

BY

Munn & Co

ATTORNEYS.

(No Model.) 6 Sheets—Sheet 5.

J. LA BURT.

BLOCK SIGNAL SYSTEM.

No. 494,007. Patented Mar. 21, 1893.

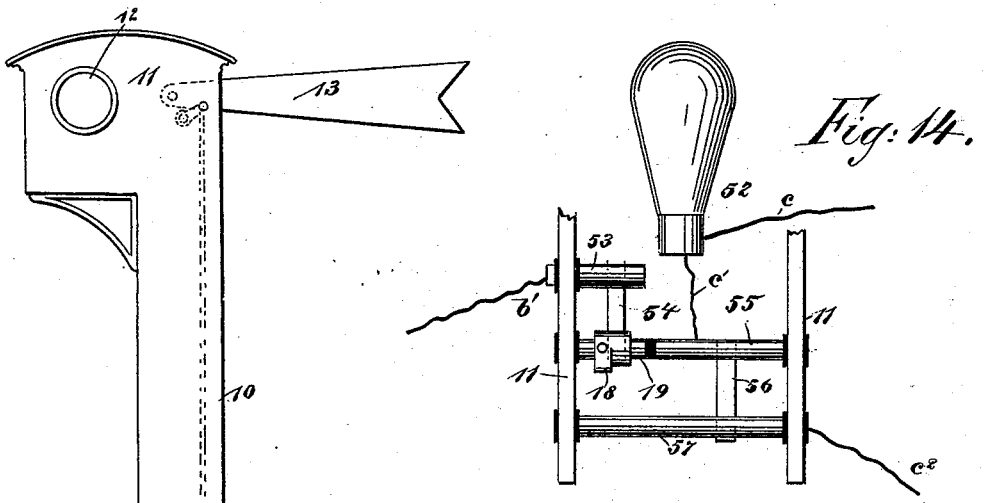


Fig. 14.

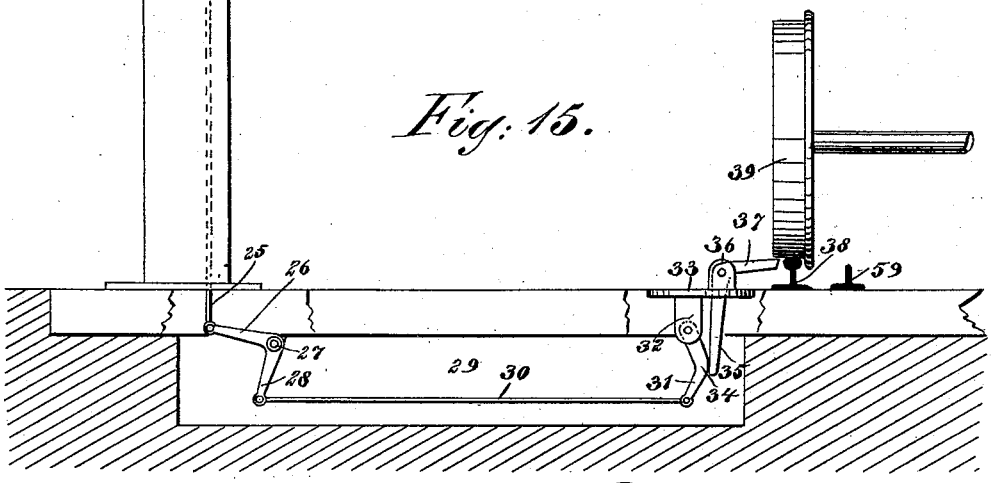


Fig. 15.

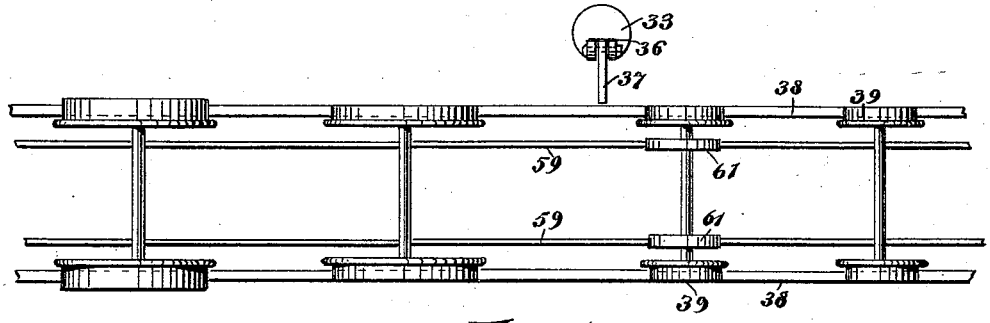


Fig. 16.

WITNESSES:

Chas. Nida.

C. Sedgwick

INVENTOR

J. La Burt

BY Munn & Co

ATTORNEYS.

(No Model.) 6 Sheets—Sheet 6.

J. LA BURT.

BLOCK SIGNAL SYSTEM.

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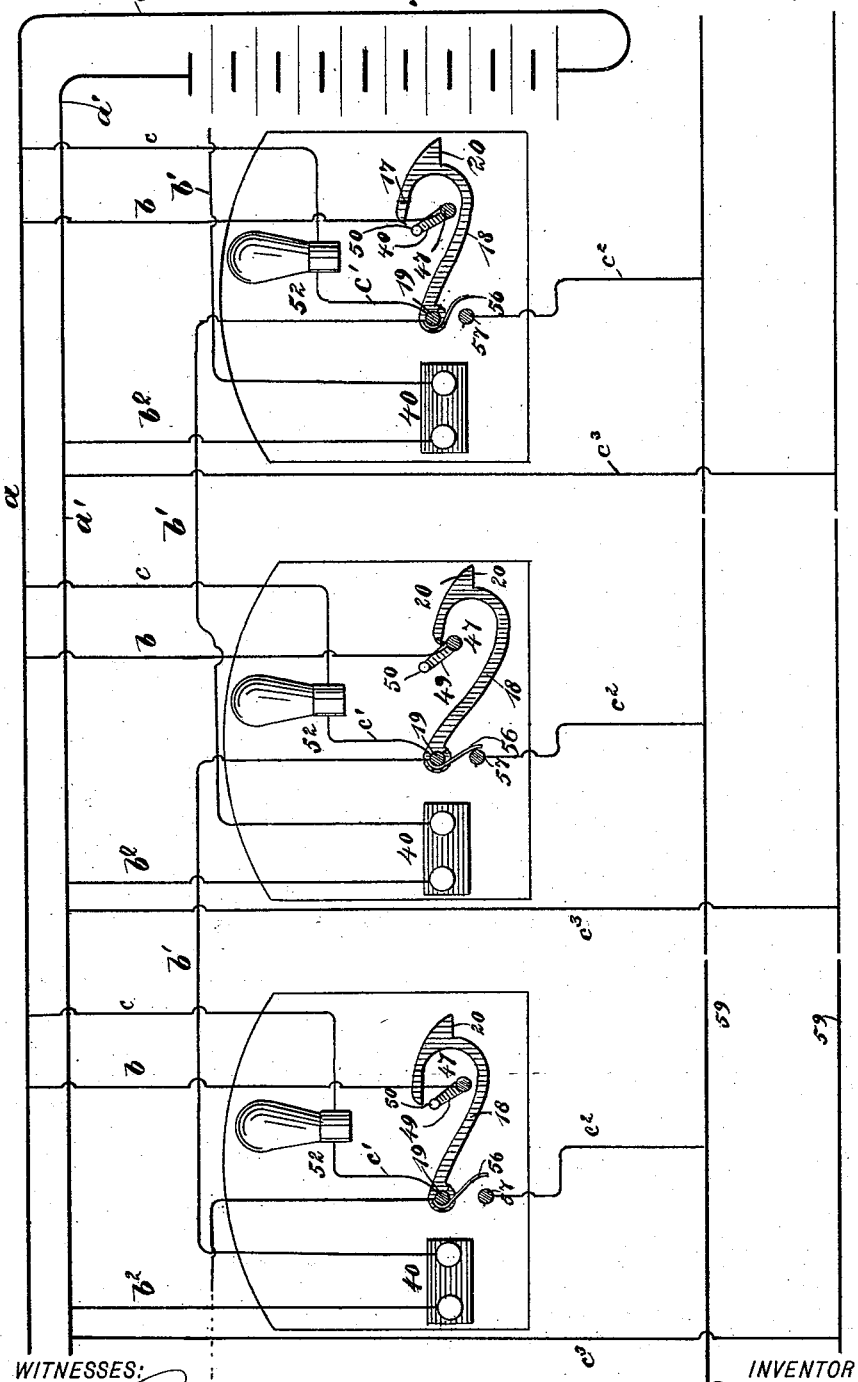

Fig. 17.

WITNESSES:
Chas. Nida.
C. Sedgwick

INVENTOR
J. La Burt
BY Munn & Co
ATTORNEYS.

UNITED STATES PATENT OFFICE.

JOHN LA BURT, OF NEW YORK, N. Y., ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO THE LA BURT AUTOMATIC ELECTRIC BLOCK SIGNAL SYSTEM AND CAR COUPLER COMPANY, OF SAME PLACE.

BLOCK-SIGNAL SYSTEM.

SPECIFICATION forming part of Letters Patent No. 494,007, dated March 21, 1893.

Application filed June 16, 1892. Serial No. 436,923. (No model.)

To all whom it may concern:

Be it known that I, JOHN LA BURT, of New York city, in the county and State of New York, have invented a new and Improved Block-Signal System, of which the following is a full, clear, and exact description.

My invention relates to improvements in block signal systems such as are used upon railroads; and the object of my invention is to produce an electrically operated system which is of comparatively simple construction, which is positive and efficient in operation and not likely to get out of repair, and which is automatically operated by the movement of the train so as to throw up a semaphore as the train passes a block, and throw down the arms in advance of and in the rear of a train.

A further object of my invention is to provide an efficient means for automatically shutting off the steam of the engine and stopping the latter in case the engineer, through accident or carelessness, runs over a block.

To this end my invention consists in a block signal system which will be hereinafter described and claimed.

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

Figure 1 is a sectional elevation of a locomotive, provided with the mechanism for shutting off the steam, the latter being shown in side elevation. Fig. 2 is a detail side elevation of one of the contact wheels carried by the locomotive. Fig. 3 is an enlarged inverted plan of the shut-off mechanism of the locomotive, showing also a diagram of its electrical connections. Fig. 4 is an enlarged sectional elevation of the locomotive controlling mechanism on the line 4—4 in Fig. 3. Fig. 5 is a vertical cross section on the line 5—5 in Fig. 4. Fig. 6 is a detail of the motor used in operating the shut-off mechanism. Fig. 7 is a sectional plan view, on the line 7—7 in Fig. 4, of the engine or cylinder controlled by the motor and adapted to operate the shut-off lever. Fig. 8 is a detail sectional elevation of the circuit closing magnet and armature of the shut-off mechanism and the hook which holds the armature in a raised position. Fig. 9 is a detail section of the circuit closing mechanism on the line 9—9 in Fig. 3. Fig. 10 is a section of the same mechanism, on the line 10—10 in Fig. 3. Fig. 11 is a sectional plan of the semaphore controlling mechanism. Fig. 12 is a vertical section of the same on the line 12—12 in Fig. 11. Fig. 13 is a vertical cross section on the line 13—13 in Fig. 12. Fig. 14 is a detail elevation of the circuit closing shafts of the semaphore, showing also the wire connections of said shafts and the connections with the electric light. Fig. 15 is a broken cross section of one side of the railroad, showing a semaphore signal adjacent thereto and the mechanism for setting the signal by the passing of a train. Fig. 16 is a detail plan of the railroad, the truck wheels thereon, and the contact wheels for closing the circuit through the locomotive electrical mechanism; and Fig. 17 is a diagram of the several electrical connections.

The railroad is provided at the usual intervals with semaphore signals, these having hollow posts 10 erected vertically at the side of the track and each post terminates at the top in a case 11 containing the semaphore arm controlling mechanism. The case 11 is provided on the sides, at right angles to the track, with holes 12 through which an electric light may be seen and the holes may be covered by glass of the necessary color. On the exterior of each case 11 is hung a swinging semaphore arm 13, adapted to extend at right angles to the post 10 and over the track, or to hang parallel with the post, as desired. This semaphore arm is hinged to a shaft 14 which is journaled in the side of the case 11 and the shaft has, at its inner end, a crank 15 which is pivotally connected by means of a pitman 16 with the free end 17 of a hook 18, which hook is hung in a nearly horizontal position in the case and is pivoted and insulated on a shaft 19, as best shown in Fig. 14. The point of the hook is thus brought uppermost to enable it to be raised when necessary, as described below. On the back of the hook and at one end is a shoulder 20 beneath which swings the shoulder 21 of a pawl 22, and the pawl thus holds the hook in a horizontal position. When, however, the pawl is released from the hook, the weight of the hook is suffi-

cient to cause it to drop and to swing downward, the crank 15 thus raising the semaphore arm 13 into a horizontal position, as shown in Fig. 14. The pawl 22 is carried by a shaft 23 which is journaled in the case 11 beneath and parallel with the shaft 14, and the shaft 23 has a laterally extending crank 24 to which is secured a rod 25 which extends downward with the hollow post 10, the rod at its lower end being pivoted to the upper arm 26 of a bell crank lever which is pivoted at its elbow, as shown at 27, to a suitable support and extends downward into a recess 29 at the side of the track, which recess, it will be noticed, should be covered.

The lower arm 28 of the bell crank is secured to a horizontal rod 30 which extends through the recess 29, at right angles to the track rails, and the inner end of this rod is pivoted to a swinging lever 31 which, at its upper end, is pivoted between lugs 32 and hangs downward into the recess 29. The lugs 32 are secured to a plate 33 which is held at the top of the recess and near the track. The lever 31 has a knuckle 34 on its inner side which is struck by the lower arm 35 of an elbow lever, which lever is pivoted between lugs 36 on the top of the plate 33 and the arm 35 extends, in a nearly vertical position, downward into the recess 29 and into contact with the lever 31. The upper arm 37 of this bell crank extends inward to a point adjacent to one of the track rails 38, and it is of such a height that it will be struck and depressed by one of the locomotive or car wheels 39. It will be seen then that the passage of a train will actuate the bell crank, comprising the arms 35 and 37, thus pushing outward the rod 30 and lifting upward the rod 25, and the latter acting on the crank 24 and shaft 23, will swing upward and release the pawl 22, thus permitting the hook 18 to drop and set the semaphore. It should be here remarked that the hook 18 is a circuit closing hook and closes an electric circuit through a motor 40 carried in the case 11 and through the several parts of the system, as hereinafter described.

The motor 40 may be of any approved type and it is provided with an elongated armature shaft 41 which extends through the upper portion of the case 11 and at right angles to the shafts 14 and 23. The armature shaft has a worm 42 thereon which engages a worm wheel 43 on a transverse shaft 44 in the case 11, and this shaft carries also a pinion 45 which engages a gear wheel 46 on a transverse shaft 47, and the latter has thereon an insulated sleeve 48 having an upwardly extending crank 49 which has a stud 50 at its free end, and the stud extends opposite the upper portion of the circuit closing hook 18. It will thus be seen that when the circuit is closed through the motor, the shaft 47 will be revolved by means of the connecting gearing, and the crank 49 and stud 50 will swing around in the bow of the hook 18 and will raise the hook into a horizontal position, so that the pawl 22 will drop by gravity in position to bring its shoulder 21 beneath the shoulder 20 of the hook and the hook will thus be brought to its normal position and the circuit broken, as described presently.

The sleeve 48 is adapted to be put into an electric circuit by means of a contact spring or brush 51 which is secured to the side of the case 11, and the free end of which projects against the sleeve. The case 11 carries an electric light or lamp 52 which is held opposite the holes 12, and adjacent to the lamp and extending transversely through the case is a shaft 53 which is suitably insulated and which has a downwardly extending brush 54 adapted to contact with the shaft 19. The shaft 19 has joined to one end of it and forming practically a continuation thereof, a shaft 55, the two being separated by suitable insulation, as shown in Fig. 14. The shaft 55 is held to turn with the shaft 19 and carries a depending brush 56 which extends adjacent to a transverse shaft 57 which is insulated in the case 11, and the brush 56 is held normally out of contact with the shaft 57, but when the circuit closing hook 18 is dropped, the shaft 55 is turned and the circuit closed through each light and other parts of the mechanism as described below.

Extending parallel with the track are line wires a and a', which connect with a source of electricity, the source in the drawings being a battery A. From the wire a lead wires b which connect with the sleeve 48 on the shaft 47 through the contact brush 51, and a wire b' leads from the shaft 53 of one semaphore to one binding post of the motor 40 of the next semaphore, and a wire b^2 leads from the other binding post of said motor to the line wire a'. The shafts 53 and 19 are in constant connection by means of the brush 54. Another wire c leads from the wire a, adjacent to each semaphore to the lamp 52 of said semaphore, from which a wire c' leads to the shaft 55, which shaft is adapted to connect with the shaft 57 by means of the brush 56, and a wire c^2 leads from the shaft 57 to one of the rails 59 which are laid between the track rail 38, as shown in Fig. 16, and the purpose of which is to close the circuit through the locomotive mechanism, as hereinafter described. A return wire c^3 leads from the opposite rail 59 back to the wire a'.

The above circuits are shown clearly in the diagram in Fig. 17. The operation of the semaphore mechanism will then be as follows:—When the semaphore arm 13 is swung into a horizontal position, in the manner already described, the circuit closing hook 18 will drop and the hook will come in contact with the sleeve 48 on the shaft 47, and at the same instant the brush 56 will be carried downward into contact with the shaft 57. It will be seen then that the several circuits will be thus closed, the first circuit being from the line wire a, through the wire b, the contact

spring 51, the sleeve 48, the hook 18, the shaft 19, the wire b', the motor 40 of the semaphore in advance of the one just operated, and the wire b^2, back to the line wire a'. It will be seen then that when one semaphore is set the next semaphore will be dropped, as when the circuit is closed to the motor 40, the motor starts, and by means of the connecting gear mechanism already described, depresses the arm 13 and resets the circuit closing mechanism, breaking as it does so its own circuit. When the above described action takes place, the circuit will also be closed through the lamp and rails 59, the circuit being from the wire a through the wire c, the lamp 52, the wire c', the shaft 55, the brush 56, the shaft 57, the wire c^2, the rails 59, and the mechanism on the locomotive and the wire c^3, back through the wire a'; it follows then that when the arm 13 is set an electric light will also be displayed so that the signal operates as well at night as in the daytime. But it will be understood that the shunt circuit of the lamp may be provided with a common form of switch, so that the lamp may be cut off in the daytime.

The contact rails 59 are arranged in the paths of contact wheels 61 which are carried by the locomotive 60, each contact wheel being secured to one of the engine axles from which it is insulated, as shown in Fig. 2, and the wheels 61 are preferably made in two parts having central flanges 61^a adapted to be bolted together. The wheels are engaged by contact brushes 62 carried by the locomotive, and these brushes are connected by wires d and d' with the binding posts 63^a of a magnet 63 which is carried in the locomotive and preferably suspended from the cabin roof. Beneath the magnet 63 is a swinging armature 64, which is pivoted in one end between lugs 65 attached to the cabin roof, and the armature is held to swing in a hook 66 which incloses its free end and limits its movement, the hook being secured to the roof above.

Secured to the under side of the armature, and adjacent to one edge, is a contact plate 67 which projects from the edge of the armature and which, when the armature is raised, engages the contacts 68 which are also suspended from the cabin roof and are in electrical connection with a motor 69 which is adapted to operate the cabin mechanism for the shunt controlling mechanism. A separate battery B is carried by the locomotive and runs the motor, this battery being connected with one of the contacts 68 by means of a wire e, and the opposite contact connects with the motor by a wire e', while a wire e^2 leads from the motor back to the battery B. It will be seen then that when the plate 67 is pressed against the contacts 68, the circuit through the motor will be closed and will be from the battery B through the wire e, the contacts 68 and plate 67, the wire e', the motor, and the wire e^2, to the battery.

The motor 69 has a prolonged armature shaft 70 which extends forward beneath the cabin roof and carries a worm 71 which engages a worm wheel 72 on a shaft 73, the latter being held in suitable hangers 74 which are secured to the cabin roof, and the shaft 73 carries also a pinion 75 which engages a gear wheel 76 on a shaft 77 which is also suspended in the hangers 74, and the shaft 77 is provided with an eccentric 78 which has, on one side, a projecting plate 79 and the latter is pivoted, as shown at 80, to a swinging lever 81 which is suspended from the cabin roof and is pivoted between lugs 82. The lower end of the lever 81 terminates in a fork 83 which is held between stops 84 on a valve stem 85, and the latter extends longitudinally through a stuffing box 86 on one end of a steam chest 87, this chest being formed on the under side of a steam cylinder 88 which is secured also to the roof of the cabin. A pipe 89 leads from the steam chest to the locomotive boiler and a port 90 opens from the front end of the chest into the front end of the cylinder 88.

A valve 91 is secured to the front end of the stem 85 and when in its forward position, as shown in Fig. 4, it closes the pipe 89 and the port 90, but when pulled back, it opens the pipe and port and admits steam in front of the piston 93 which is held to reciprocate in the cylinder 88. An exhaust pipe 92 opens from the upper rear portion of the steam cylinder 88. The piston 93 has a forwardly extending piston rod 94 which slides in a stuffing box 95 on the front end of the cylinder, and the outer or free end of the piston rod is secured to a lever 96 which extends at right angles to the piston rod, as shown in Fig. 7, and is then bent so as to extend nearly parallel with the rod, as shown at 97, and the rear end of the lever 96 is pivoted, as shown at 98 in Fig. 7, to a shut-off lever 99 which is pivoted in a support 100 carried on the boiler plate, and the lower end of the shut-off lever connects, pivotally, with a rod 101 which controls the steam supply pipe of the locomotive in the usual way.

The upper end of the shut-off lever is normally held forward by a spring 102, but when the upper end of the lever is pushed backward by the action of the piston 93, the lower end is pushed inward, thus shutting off the supply of steam to the locomotive and stopping the latter. It is necessary that the motor 69 be kept in operation long enough to cause the eccentric 78 to make a revolution and swing rearward the forked lever 81, so as to actuate the valve 91 and admit steam to the cylinder 88, and to this end the following mechanism is employed to keep the circuit closed through the motor for the necessary time.

A hook 64^a is suspended from lugs 64^c over the adjacent free end of the armature 64 and near the free end of the latter, the hook having a shoulder 64^b adapted to swing beneath the armature when the latter is raised, and the heft of the hook will cause it to swing into the posi-

tion to hold the armature up, and when held up the plate 67 will be held against the contacts 68 so that the circuit will be kept closed for some little time.

The following mechanism is employed for releasing the hook 64^a and dropping the armature so as to break the circuit through the motor 69:—A horizontal lever 103 is pivoted to a bent support 104 which is secured to the cabin roof, the lever being pivoted, near the center, as shown at 105, and it extends nearly parallel with the shaft 77 and at one end of the armature 64, as shown clearly in Fig. 3. This lever has one end arranged to extend into contact with the shoulder 64^d on the hook 64^a, as shown in Fig. 3, and the opposite end of the lever has a rearwardly extending arm 106 which extends into the path of a cam 107 carried by the gear wheel 76, and by reference to Fig. 4, it will be noticed that the cam is on the back side of the shaft 77 when the eccentric 78 is in its most forward position. It will be seen then that when the shaft 77 revolves, the cam 107 will eventually strike the arm 106 which will push forward one end of the lever 103 and cause the opposite end of the lever to push backward upon the shoulder 64^d of the hook 64^a, and the hook will thus be pushed out of engagement with the armature 64, thus allowing the latter to drop away from the contacts 68 and break the circuit.

The above movement of the lever 103 will, however, throw it out of position for another operation, and to this end a lever 108 is hung from a lug 109 on the cab roof, the lever extending downward at right angles to the lever 103 and near the hook 64^a, and by throwing this lever forward slightly by hand, the lever 103 will be brought forward into the position shown in Fig. 3, so that the apparatus will be ready for another operation.

As previously described, the electric current will be thrown into the rails 59 by the raising of the adjacent semaphore arm 13, and if then an engineer should, by accident or through carelessness, run forward upon the wrong block, the wheels 61, by contacting with the rails 59, will close the circuit through the wires d, and d' and through the magnet 63, and the latter acting on the armature 64 will raise the armature, bringing the plate 67 against the contacts 68 and closing the circuit through the motor 69, as described.

The hook 64^a swings beneath the armature, thus holding it up and the movements of the motor actuate the eccentric 68 through the gear mechanism described, and the latter pulls back the forked lever 81 thus opening the valve 91, thus admitting steam in front of the piston 93, and the latter will operate the shut-off lever of the locomotive as described. The continued motion of the motor will bring the cam 107 against the arm 106, which will swing the lever 103 and trip the hook 64^a, thus again breaking the circuit, but the engine will be brought to a standstill.

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

1. A block signal system, comprising a series of semaphores arranged along the track, a circuit closer connected with the semaphore arm of each semaphore and adapted to act as a counterbalance for the same, an electric motor arranged at each semaphore and geared to depress the semaphore arm and raise the circuit closer, a lever mechanism for tripping the circuit closer by the passing of a train, and electrical connections whereby the tripping of the circuit closer of one semaphore will close the circuit through a motor at the next semaphore, substantially as described.

2. A block signal system, comprising a series of semaphores placed along the track, swinging semaphore arms carried by the semaphore, swinging circuit closing hooks having a crank connection with the semaphore arms whereby the tripping of the hooks will raise the arms, pawls arranged to hold the hooks in a raised position, electric motors at the semaphores and geared to depress the semaphore arms and raise the circuit closing hooks, a lever mechanism for releasing the circuit closing hook pawls by the passing of a train, and electrical connections whereby the dropping of a circuit closing hook at one semaphore will close an electric circuit through the motor at the next semaphore, substantially as described.

3. A block signal system, comprising a series of semaphores arranged along the track, swinging circuit closers arranged at the semaphores and connected with the semaphore arm so that the dropping of the circuit closer will by gravity raise the arm, swinging pawls adapted to engage the circuit closers and hold them in a raised position, a lever mechanism for releasing the pawls by the passing of a train, an electric motor arranged at each semaphore and geared to depress the semaphore arm and raise the circuit closer, an electric lamp at each semaphore, and electrical connections whereby the dropping of the circuit closer at one semaphore will close the circuit through its lamp and through the motor of the next semaphore, substantially as described.

4. In a block signal system, the combination with the semaphore post and the swinging semaphore arm, of a counterbalance connected with the arm and adapted to hold it in extended position, a pawl adapted to support the counterbalance in a raised position, a swinging tripping lever placed adjacent to the track and extending into the path of the wheels of a train, operative connections between the tripping lever and the pawl whereby the movement of the lever will release the pawl, a motor at the post arranged in an electric circuit extending along the track and geared to the counterbalance so as to raise the same, and a circuit closer operated in uni-

son with the tripping lever and adapted to close the circuit through the motor, substantially as described.

5. The combination, of the semaphore posts, the swinging semaphore arm, the counterbalance connected with the semaphore arm and adapted, by dropping, to raise the same and mechanism for raising the counterbalance, of a pawl adapted to hold the counterbalance in a raised position, a rod having a crank connection with the pawl and extending downward through the semaphore post, a bell crank having one arm connected with the rod to raise the same and its lower arm extending downward, a tripping lever pivoted adjacent to the track and having its lower end connected by a rod with the lower arm of the bell crank, said lever having a bend on one side, and a second bell crank lever having one arm extending against the bend of the depending lever and the other arm extending into the path of the wheels of the train, substantially as described.

6. A block signal system, comprising a series of semaphores arranged along the track, semaphore arms carried by the semaphores, swinging circuit closers having a crank connection with the semaphore arms and acting as counterbalances so that the dropping of the circuit closers will raise the semaphore arms, a lever mechanism for tripping the circuit closers by the passing of a train, motors arranged at the semaphores and geared to raise the circuit closers and depress the semaphore arms, contact rails extending between the track rails, electrically controlled mechanism carried by a locomotive and adapted to shut off the steam therefrom, operative electrical connections between said mechanism and the contact rails, and electrical connections whereby the dropping of a circuit closer at one semaphore will close an electric circuit through the contact rails and locomotive mechanism and the motor of the next semaphore, substantially as described.

7. In a block signal system, the combination with the contact rails held upon the track and having their circuit controlled by the action of an adjacent semaphore, of a locomotive provided with contact wheels to engage the contact rails, an engine carried by the locomotive and operatively connected with the shut-off lever thereof, an electric motor adapted to operate the valve of the engine, a circuit closer arranged in the motor circuit, a magnet controlling the said circuit closer and arranged in circuit with the contact rails, and automatic means for locking and releasing the circuit closer, substantially as described.

8. In a block signal system, the combination with electrically connected contact rails supported on the track bed, of a locomotive having contact wheels to engage the contact rails, an engine carried by the locomotive and operatively connected with its shut-off lever, an electric motor carried by the locomotive and geared to the engine valve, a circuit closer arranged in the motor circuit, a magnet arranged in circuit with the contact rails, an armature operated by the magnet and adapted to control the circuit closer, a hook to automatically engage the magnet and hold it against the circuit closer, and a lever mechanism operated by the motor and adapted to release the hook, substantially as described.

9. In a block signal system, the combination with the contact rails arranged upon the track bed and connected with a source of electricity, of a locomotive, an engine carried by the locomotive and operatively connected with its shut-off lever, an electric motor operatively connected with the engine valve so as to open and close the same, a circuit closer arranged in the motor circuit, a magnet arranged in circuit with the contact rails, an armature operated by the magnet and carrying a contact plate to operate the circuit closer, a gravity hook to hold the circuit closer against the magnet, a swinging lever arranged to disengage the hook, and a cam mechanism operated by the motor and adapted to swing the lever, substantially as described.

10. In a block signal system, the combination with the controlling motor carried by the locomotive and the engine operatively connected with the locomotive shut-off lever and having its controlling valve stem projecting from its steam chest, a forked lever pivoted to a support connected with the valve stem, a counter shaft geared to the motor, an eccentric carried with the counter shaft and connected with the forked lever, a circuit closer arranged in the motor circuit, a magnet arranged in an independent circuit, an armature operated by the magnet and held to control the circuit closer, a gravity hook to hold the armature against its magnet, a swinging lever to disengage the hook, and a cam carried by the counter shaft and extending into the path of the swinging lever, substantially as described.

11. In a block signal system, the combination with the track, contact rails having electrical connections controlled by the operations of an adjacent semaphore, a locomotive, an engine carried by the locomotive and operatively connected with the locomotive's shut-off lever, an electric motor carried by the locomotive and adapted to control the engine valve, and an electrically controlled circuit closer adapted to hold the motor in circuit till the engine is operated and then to break the motor circuit, substantially as described.

JOHN LA BURT.

Witnesses:
WARREN B. HUTCHINSON,
C. SEDGWICK.