No. 772,278. PATENTED OCT. 11, 1904.

G. P. FINNIGAN.

ELECTRIC AUTOMATIC BLOCK SIGNAL AND SAFETY SYSTEM.

APPLICATION FILED MAY 1, 1902.

NO MODEL. 3 SHEETS—SHEET 1.

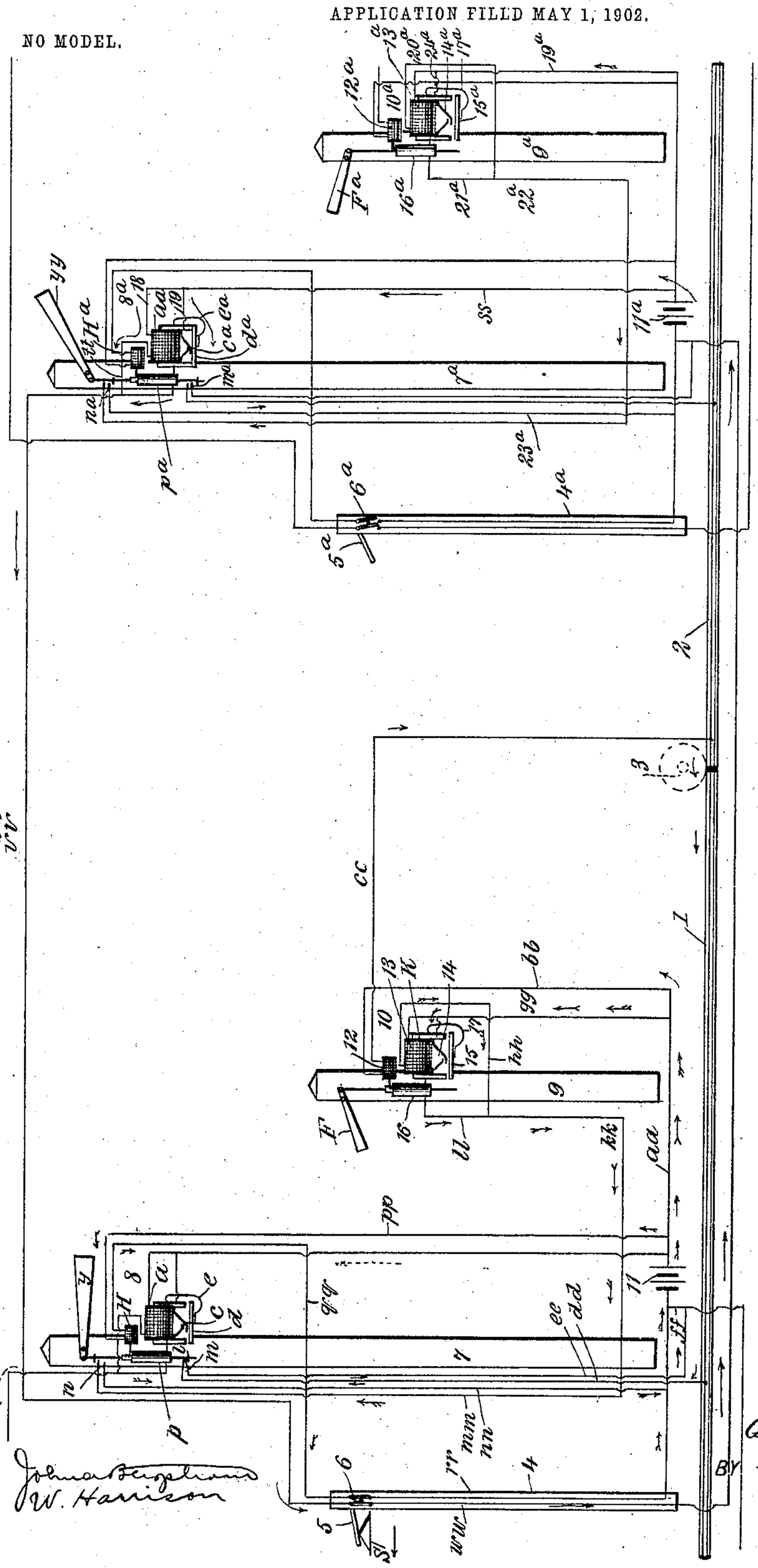

Fig. 1

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NO MODEL. 3 SHEETS—SHEET 2.

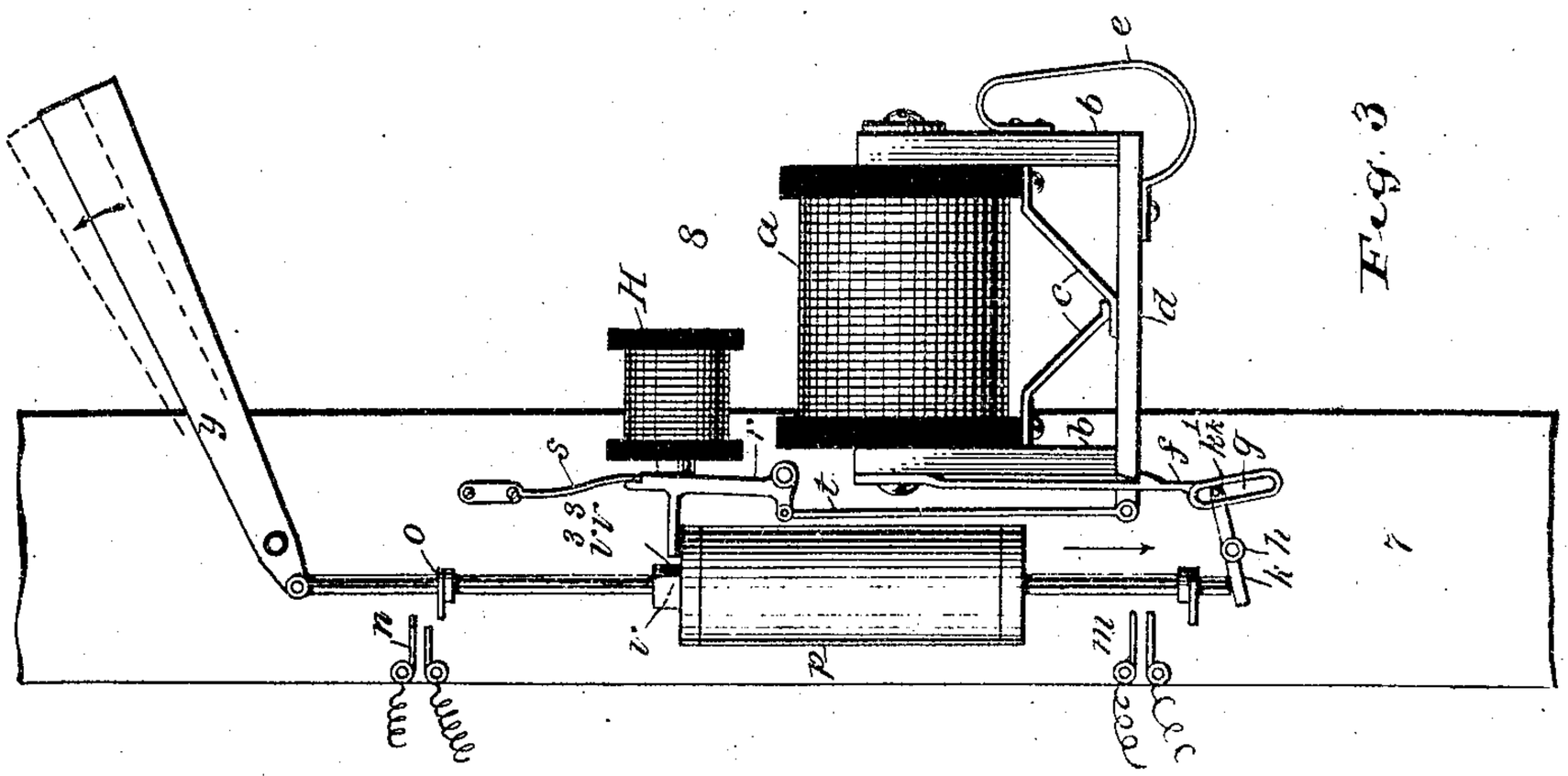

Fig. 3

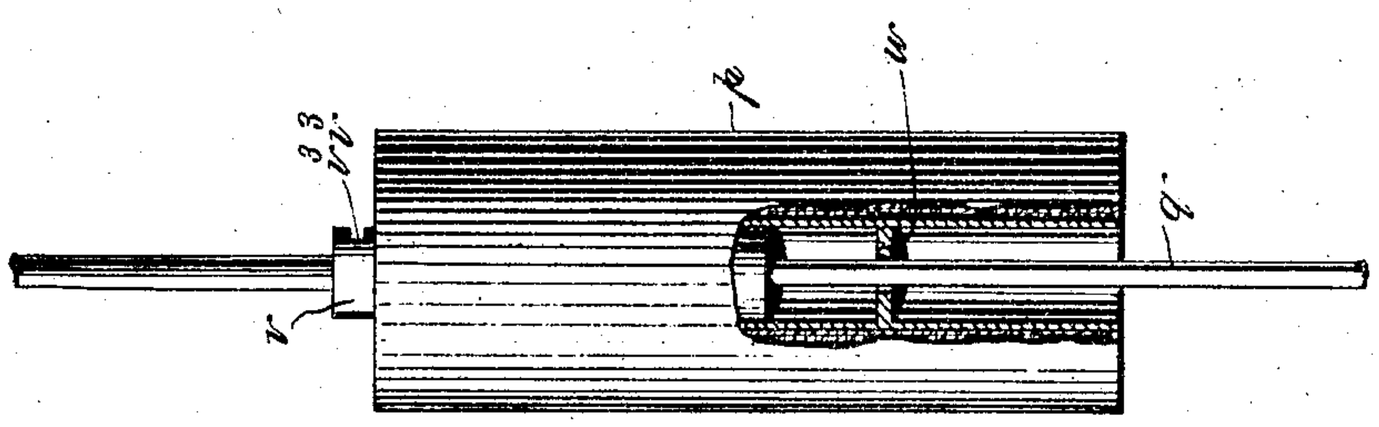

Fig. 4

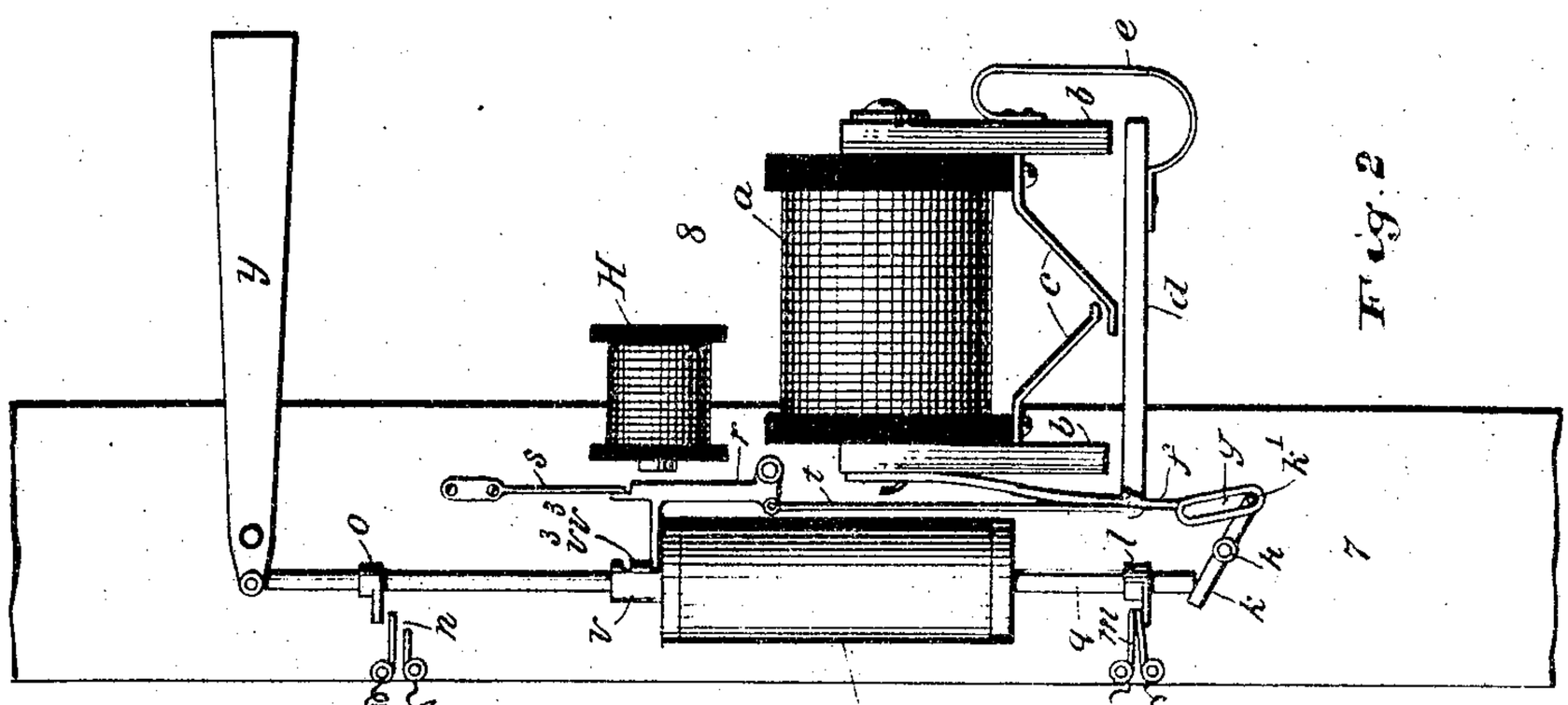

Fig. 2

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NO MODEL. 3 SHEETS—SHEET 3.

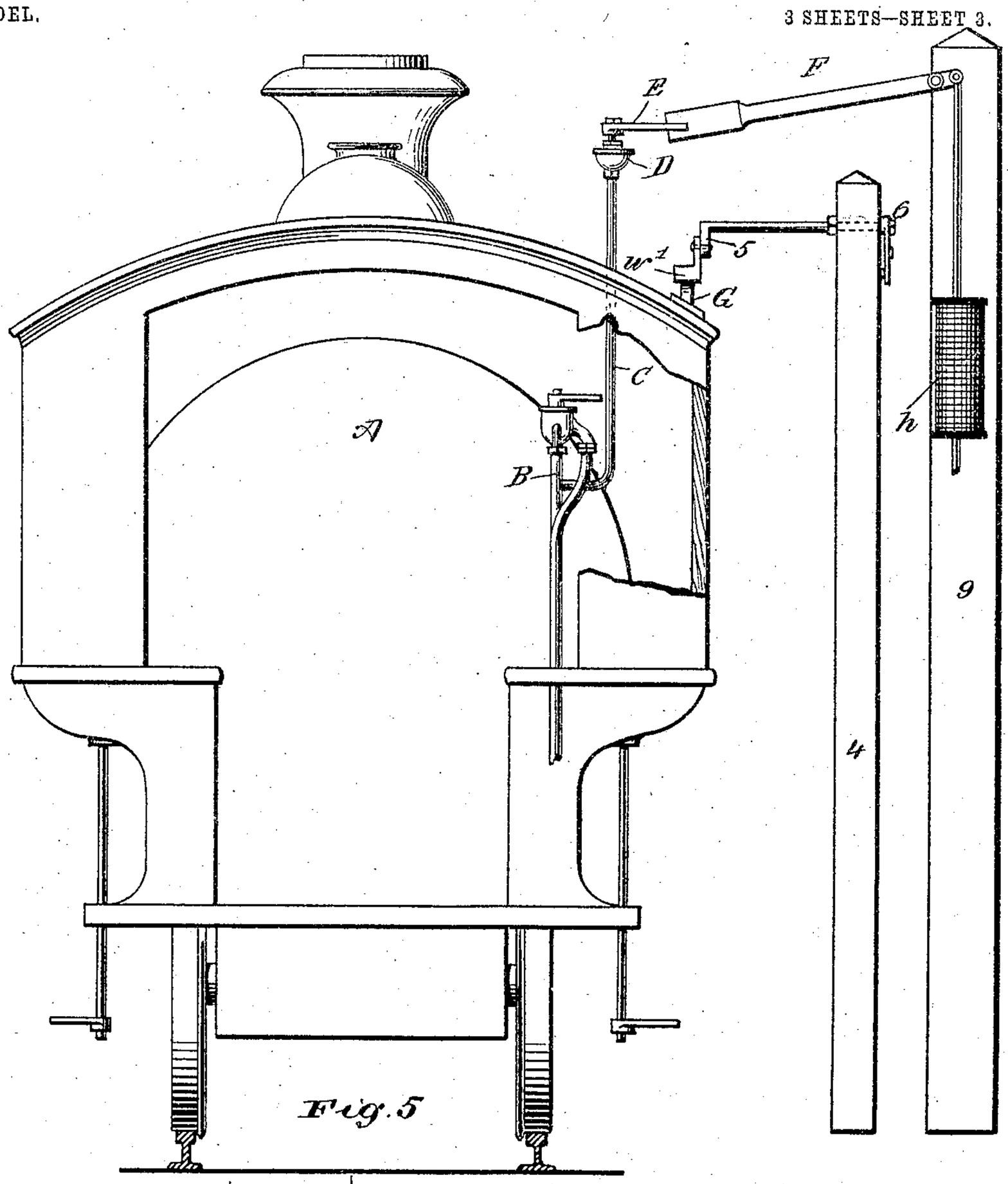

Fig. 5.

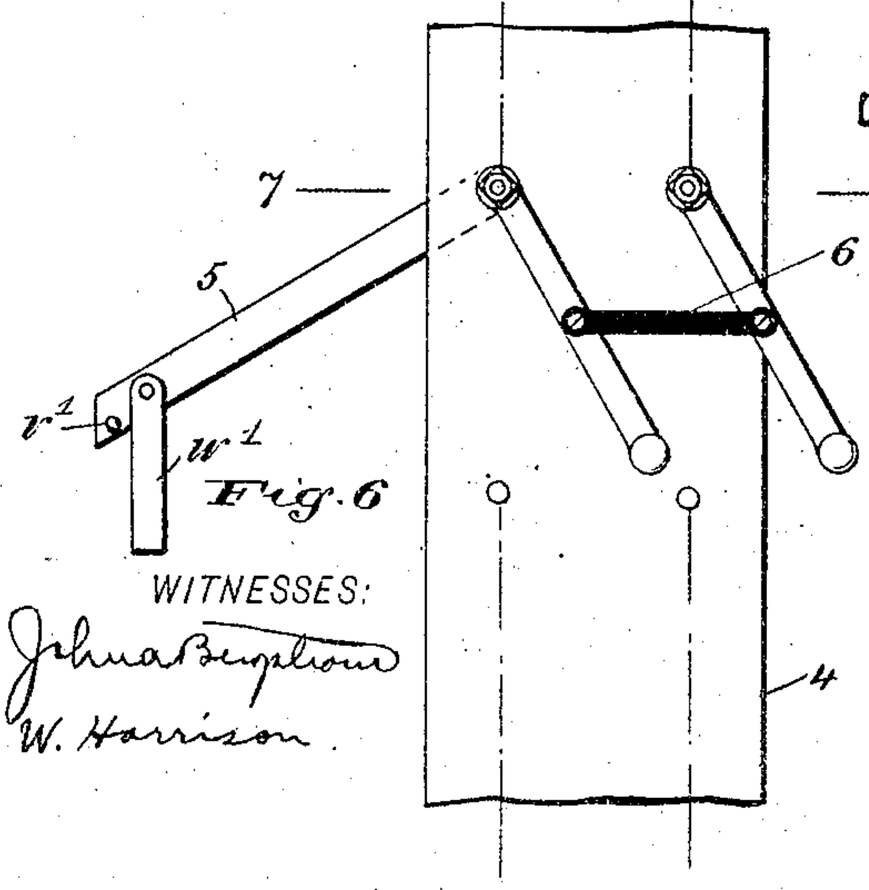

Fig. 6.

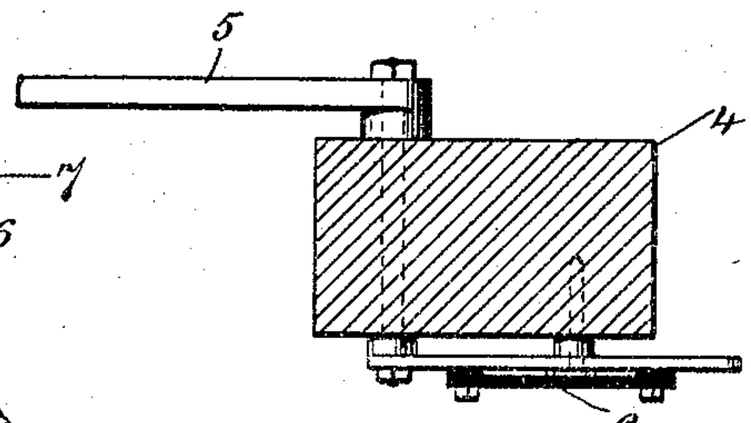

Fig. 7.

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No. 772,278. Patented October 11, 1904.

UNITED STATES PATENT OFFICE.

GEORGE P. FINNIGAN, OF GREENE, NEW YORK.

ELECTRIC AUTOMATIC BLOCK-SIGNAL AND SAFETY SYSTEM.

SPECIFICATION forming part of Letters Patent No. 772,278, dated October 11, 1904.

Application filed May 1, 1902. Serial No. 105,530. (No model.)

To all whom it may concern:

Be it known that I, GEORGE P. FINNIGAN, a citizen of the United States, residing at Greene, in the county of Chenango and State of New York, have invented a new and Improved Electric Automatic Block-Signal and Safety System, of which the following is a full, clear, and exact description.

My invention relates to electric block-signal and safety systems, more particularly for use upon railroads, drawbridges, &c., where it is desired that a moving member shall actuate an alarm adjacent thereto and also actuate an alarm at a distance.

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 diagram showing my device as applied to a railroad. Fig. 2 is a side elevation of a semaphore-arm and electrical mechanism for actuating the same. Fig. 3 is a somewhat similar view showing the semaphore-arm in motion and practically at the end of its upstroke. Fig. 4 is a side elevation of the solenoid immediately connected with the semaphore-arm and partly broken away. Fig. 5 is a rear elevation of a locomotive as used in connection with my system. Fig. 6 is a fragmentary front elevation of a double switch to be actuated by the locomotive or analogous object. Fig. 7 is a plan view of the subject-matter of Fig. 6 and showing the post in section on the line 7 7 in Fig. 6.

When my system is used upon railways, a number of abutting rail-sections 1 2 are insulated from each other in the usual manner. A wheel 3 of a locomotive or other piece of rolling-stock is adapted to form a momentary connection between the rail-sections 1 and 2. A post 4 is provided with a movable arm 5, having a boss v' and a pendent lever w', and a double switch 6 is connected with said arm and actuated thereby, the arm 5 being adapted to be tripped by an appropriate member disposed upon the locomotive. A post 7 is provided with magnetic mechanism 8 for the purpose of actuating the semaphore-arm y. Upon a third post 9 is mounted a second movable arm F, which I denominate a "trip." This trip is used for the purpose of automatically stopping the train in case the engineer fails to see the semaphore-arm y when the same is disposed in the position indicating "danger." Magnetic mechanism 10 is provided for the purpose of actuating the trip and of maintaining the same in the predetermined positions indicating "danger" and "safety," respectively. A battery 11 is provided for the purpose of actuating the magnetic members, as hereinafter described. These parts are shown at the left of Fig. 1. The lever w' swings freely in one direction, so that the backing of a train does not disturb the arm 5. When, however, the lever w' swings in the opposite direction, it raises the arm 5. (See Fig. 6.)

The entire mechanism of one block is duplicated in each of the other blocks, so that I do not deem it necessary to describe more than one block, together with its connection with the block immediately adjacent thereto. The parts 4^a, 5^a, 6^a, 7^a, 8^a, 9^a, 10^a, and 11^a (shown at the right in Fig. 1) are therefore in every way similar to the corresponding parts at the left in said figure. The magnetic mechanisms 10 10^a are practically identical with those shown at 8 8^a, the only difference being that in the mechanisms 10 10^a the contact-points m n are omitted. It therefore appears to be unnecessary to describe the mechanisms 10 10^a in detail.

A description of the mechanisms 8 8^a is as follows: Upon the posts 7 7^a are mounted magnets a a^a, provided with poles b and with spring-contacts c, against which an armature d may be drawn when the magnet a or a^a is energized. Springs e e^a are connected with this armature and with one of the poles b for firmly retaining the armature d in the position indicated in Fig. 2. A spring-hook f is provided with a slot g of the shape indicated, which engages a boss k' upon the end of a lever k, pivoted at h on the post. A head l, carried by a stem q, is used for the purpose of momentarily closing the contacts m whenever the core v of the solenoid p moves upward. A pair of contacts n are so disposed as to be closed when the solenoid-core v moves downward, but to remain open when the same

moves upward. This arrangement can be readily seen from an inspection of Fig. 2 and is due to the differential lengths of the members of the contacts. When the head *o* passes upward, the lower member of the contact is unable to reach the upper member; but when the head *o* passes downward the upper member is bent downwardly and into momentary contact with the lower member. A dog *r*, normally pressed to the left by a spring *s* and serving as an armature for the magnet H, is connected by a link *t* with the armature *d*. The dog *r* may be forced to the right, and thereby withdrawn from engagement with the apertures v^3 v^3 in the solenoid-core *v*. This movement of the dog to the right may be effected either by energizing the magnet H or the magnet *a*. When the magnet *a* is energized, the upward movement of the armature *d* causes the dog *r* to act as a bell-crank. The spring *s*, together with the weight of the armature *d*, normally retains the several parts in the position indicated in Fig. 2. When the magnet *a* is energized, the parts are thrown into the position indicated in Fig. 3, and the armature *d* is engaged by the spring-hook *f*. A guide *w* is provided in the solenoid *p*, thus tending to maintain the core *v* always in proper alinement. The slot *g* in the spring-hook *f* is of such shape as to allow a limited movement of the lever *k* without disturbing the position of the spring-hook *f*. When, however, the solenoid *p* is energized and the core *v* is drawn forcibly downward, the rod *q* trips the lever *k*, so as to throw the spring-hook *f* out of engagement with the armature *d*, thereby releasing the same. When the rod *q* is again raised, the lever *k*, acted upon by gravity, assumes the position indicated in Fig. 2. For this purpose one end of the lever *k* is made slightly heavier than the other, as indicated in Fig. 2. The contacts *c* when closed by the armature *d* of the magnet *a* act somewhat after the manner of the contact-points of a relay. They shift the current from the magnet *a* through the contact-points to the solenoid *p*, as indicated more particularly in Fig. 1. When the pendent lever *w'* and the switch-arm 5 are raised by the member G upon the engine, two circuits are automatically closed, as hereinafter explained. One of these circuits acting through the agency of the magnetic mechanism 8 lowers the semaphore-arm *y* into the position indicating "danger." The other circuit acting through the agency of the magnetic mechanism 8^a raises the semaphore-arm *y y* of the rear block into the position indicating "safety." If now a wheel of the rolling-stock makes contact between the rail-sections 1 and 2, the magnetic mechanism 10 actuates the trip F to a position in which it may be encountered by the lever E upon the locomotive for the purpose of stopping the train in case the engineer has not observed the position of the semaphore-arm *y*. When the semaphore-arm *y* is up, indicating safety, the contact of the wheel 3 with the rail-sections 1 and 2 is unable to affect the trip F, for the reason that the circuit is not complete.

The general operation of my device is as follows: Suppose that all the parts are in the position indicated in Fig. 1, in which a train is supposed to be moving to the left from section 2, indicating one block, to section 1, indicating another block. In moving into section 1 the train does two things. First, it raises the arm 5, thereby closing the double switch 6; second, it forms a metallic contact between the rail-sections 1 and 2. In raising the arm 5, thus closing the double switch 6, the two following circuits are established: from battery 11 up wire *p p* to the magnet H, thence downward to wire *q q*, right-hand member of switch 6, wire *r r* back to the battery, as indicated by the single-tuft darts. This causes the magnet H to attract its dog *r*, thereby releasing the core *v* of the solenoid *p*. This allows the arm *y* to drop by its own gravity to a position indicating "danger," as shown at the left of Fig. 1. The spring *s*, which normally presses the dog *r*, constituting the armature of the magnet H to the left, as indicated in Fig. 2, normally locks the core *v* firmly in position, thus preventing the semaphore-arm *y* from being raised by any accidental cause. The dropping of this arm, whenever it occurs, causes a head *o* on the stem *q* to pass upward, and thus to bend the contact upward. As the lower member of the contact is shorter than the upper one, as shown, the lower one is raised only a slight distance for the upward passage of the stem and is released without making contact with the upper one. The head *l*, at the lower end of the stem *q*, closes the contacts *m*. The purpose of having the contacts *m* closed is to partially complete the circuit of the battery 11 through the magnetic mechanism 10 of the trip, so that only the entry of the wheel 3 to complete the circuit is necessary. In other words, no circuit can normally be formed, for the reason that there are two breaks, one of which is closed by the touching of the contacts *m* and the other closed by the entry of the wheel of a train into the block. The other circuit mentioned as being closed by the switch 6 is a much longer circuit, extending back to the rear block, and is as follows: from the battery 11^a of the rear block, (indicated at the right hand of Fig. 1,) up through the wire *s s* to the magnetic mechanism 8^a, where it first passes through the wire 18, magnet *a a*, wire *t t* to the wire v^2 v^2, thence to the left-hand member of the switch 6, thence through the wire *w w* back to the battery 11^a. (See the long plain darts at the left in Fig. 1.) In passing through the magnet a^a it energizes the same, thus raising the armature d^a, closing the contacts c^a contrary to the tension of the spring e^a. This makes a short circuit, so

that the current instead of going through the short wire 18 and through the magnet a^a, as above described, is shunted off and passes through the short wire 19, contacts c^a, and solenoid p^a to the wires v^2 v^2, finishing its course, as above described, thus raising the semaphore-arm y y. The movement of the solenoid-armature incidental to raising this arm in the rear block causes the contacts m to open. The opening of these contacts prevents the closing of the trip of the rear block by the entry into that block of a wheel of a train. In other words, a train now entering the block shown at the right of Fig. 1 is unable to close the circuit through the magnet 12^a, and therefore unable to lower the trip-arm F^a to its lowermost position. It is clear, therefore, that the raising of the arm 5 by a train going out of the block shown at the right of Fig. 1 and into the block shown at the left of said figure leaves the semaphore-arm y y of the rear block in such a position as to indicate "safety" and also leaves the arm of a trip of the rear block raised, so that the said arm will not be in the path of any part of the rolling-stock of the road. By this means so long as a train is in the block shown at the left of Fig. 1 the semaphore-arm of the same block at the left of Fig. 1 indicates "danger." The trip-arm of this block, owing to the contacts m of the semaphore being closed, will be ready to drop into the position indicated at the left of Fig. 1 the instant the circuit is completed by a wheel of another train making contact between the rail of the block in question and block 2 to the right. Suppose now that a train is standing upon the block indicated at the left of Fig. 1 and that another train proceeds to enter the block from the rear, moving toward the left. The engineer, noticing the semaphore-arm y in a position indicating "danger," as shown at the left of Fig. 1, should stop his engine. Should he fail to observe the semaphore-arm, however, and run his engine into the block indicated at the left, the instant one of the wheels of the engine forms a metallic bridge from one rail-section 2 to rail-section 1 the following circuit is completed: from the battery 11, wire b b, magnet 12, wire c c, rail-section 2, wheel 3, rail-section 1, wire d d, contacts m, wires e e and f f, to the battery 11. (See the short plain darts at the left in Fig. 1.) As above explained, this circuit cannot be completed unless the semaphore-arm y is down, indicating "danger," for the reason that the contacts m would otherwise be open. It is owing to the low position of the semaphore-arm y due to the presence of a train that the contacts m are closed. The circuit just described having been completed, the magnet 12 attracts its armature, thus releasing the trip-arm F and allowing the same to fall by its own gravity. As soon as the wheel passes onward, breaking the contact, the spring of the armature forces the same into engagement with the core of the solenoid 16, thereby firmly holding the trip-arm F in its lowermost position. As the train now passes forward (see Fig. 5) the trip-arm F is struck by the lever E, thus turning the air-valve D, mounted upon the tube C, which is connected with the train-pipe B, and, if desired, with the throttle of the engine. This abruptly stops the engine regardless of the engineer's intentions. Of course if the engineer heeds the semaphore-signal and stops before entering the block the trip-arm F does not move downward, for the reason that the wheel 3 of the engine is unable to complete the circuit except when the contacts m are closed by the fact of the semaphore-arm being down. In other words, the engine can run freely into any block in which the semaphore-arm indicates "safety," but is automatically stopped in case the engineer fails to observe the danger-signal. In moving from the rail-section 2 to the rail-section 1, or, in other words, in moving from one block to another, it is of course desirable that the semaphore-arm in the block just evacuated by the train should be raised to the position indicating safety. Also that the trip-arm, if it chances to be down, (as is sometimes the case,) should be raised to a position in which it is unable to stop the train. The trip-arm is of course seldom lowered, for the reason that the engineer should heed the signal.

The manner in which the semaphore-arm and the trip-arm are raised by the train leaving the block is as follows: The raising of the arm 5 by the train entering a given block—say block 1—sends a current from the rear battery 11^a through the circuit above described, and indicated by the long plain darts. The consequent lowering of the core of the solenoid p^a causes a momentary closing of the contacts n^a, thereby completing a local circuit from the battery 11^a through wire 19^a, magnet 13^a, wire 20^a, wire 22^a, contacts n^a, back to the battery 11^a. This energizes magnet 13^a and causes the same to act as a sort of relay, whereby the current is shunted from the wire 19^a, through the wire 24^a, contacts 14^a, solenoid 16^a, and wire 21^a, to wire 22^a, the rest of the circuit being as just described. This energizes the solenoid 16^a and causes the trip-arm F^a to be thrown up. It is retained in position by the armature of the magnet 12^a in precisely the way above described with reference to the mechanism shown in Fig. 2. The semaphore-arm and the trip-arm are therefore locked in a position indicating "safety."

It will be observed that the magnetic mechanism of one block when actuated by a train in that block affects the magnetic mechanism of the semaphore of the block immediately to the rear, and the magnet a^a of this mechanism acts as a relay, thereby affecting the magnetic mechanism 10^a.

From an inspection of Fig. 3 it will be seen

that while the magnet H is free to release the movable core *v* by attracting the armature or dog *r* the magnet *a* can also effect the release of the solenoid-core by attracting the armature *d*, thus raising the link *t*. The downward movement of the solenoid-core *v* does not disengage the spring-hook *f* until said downward movement is practically completed, as the boss *k'* has a limited play in the slot *g*. The boss *k'* then moves upward and to the left, pulling the hook to the left and leaving the armature *d* free to drop, thereby causing the dog *r* to lock the core *v* in its lowermost position, so as to maintain the arm *y* in a position indicating "safety."

I do not limit myself to the mechanism above described. My invention may be used in other relations and is applicable to drawbridges and switches, as stated in the beginning of this specification.

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

1. In a block-signal, the combination of an electric signaling member disposed in each block and provided with a contact, a relay for actuating said signaling member, an electrically-operated trip-arm disposed in each block, a relay for actuating said electrically-operated trip-arm, electric connections from said contact of said signaling member to said last-mentioned relay for actuating the same, and an electrical supply for energizing said signaling member, said trip-arm and both of said relays.

2. In a block-signal, an electrically-operated signaling member, and mechanism controllable by movements of the rolling-stock for actuating the same, in combination with an electrically-operated trip mechanism connected with said signaling member and provided with a movable arm for automatically stopping movements of the rolling-stock, a normally open electric circuit connected with said trip mechanism for energizing the same, and separate contacts controllable respectively by movements of said signaling mechanism and by movements of the rolling-stock for closing said normally open circuit.

3. In a block-signal, the combination of a movable semaphore-arm, electric mechanism controllable by movements of the rolling-stock for actuating the same, electrically-operated trip mechanism provided with a movable arm for automatically stopping movements of the rolling-stock, a normally open electric circuit connected with said trip mechanism for energizing the same, and means controllable partly by said semaphore-arm and partly by the rolling-stock for closing said electric circuit.

4. In a block-signal, the combination of an electric signaling member, mechanism controllable by movements of a train for actuating the same, electrically-operated trip mechanism provided with a movable arm for automatically stopping movements of another train, a normally open rail-contact to be closed by movements of such other train, electric conductors connected with said rail-contact and with said trip mechanism, and a normally open contact connected with said electric conductors and actuated by said signaling member.

5. In a block-signal, the combination of a signaling member, means for actuating the same upon the arrival of rolling-stock, a trip-arm for automatically stopping movements of said rolling-stock, electric mechanism for shifting said trip-arm to different positions, locking mechanism for normally retaining said trip-arm in predetermined positions, and an electric circuit connected with said signaling member, said trip-arm and said locking mechanism, said electric circuit being provided with two separate contacts normally open, one of said contacts being free to close by the operation of said signaling member, and the other being free to close by movements of the rolling-stock.

6. In a block-signal, the combination of a series of electric signaling members disposed in different blocks, mechanisms controllable by movements of the rolling-stock for actuating said signaling members, electrically-operated trip mechanisms similarly disposed in different blocks and provided with movable arms for automatically stopping the movements of the rolling-stock, and a series of normally open electric circuits connected with said trip mechanisms for energizing the same and provided with contacts actuated by said signaling members for partially closing the circuits and with other contacts actuated by the rolling-stock for completely closing said circuits.

7. In a block-signal, the combination of a signaling member provided with a movable arm, locking mechanism for normally maintaining said arm in different predetermined positions, an electric circuit for controlling said locking mechanism, a magnetic member for shifting said arm, a magnetic relay provided with a contact and with an armature, said armature being connected mechanically with said locking mechanism for the purpose of actuating the same, and said contact being connected electrically with said magnetic member used for shifting said arm, an open-circuit source of electricity connected with said relay for energizing the relay, and also connected with said contact of said relay for energizing said magnetic member used for shifting said arm, and means controllable by movements of the rolling-stock for closing the circuit through said relay.

8. In a block-signal, the combination of a signaling member provided with a movable arm, locking mechanism for normally maintaining said arm in definite positions, a magnetic member for shifting said arm, a magnetic relay provided with a contact and with an armature, said armature being connected mechanically

with said locking mechanism for the purpose of actuating the same, and said contact being connected electrically with said magnetic member used for shifting said arm, a contact connected with said arm and actuated simultaneously therewith, an electrically-operated trip-arm, open-circuit electrical conductors connected with said last-mentioned contact and with said electrically-operated trip-arm, one of said conductors being provided with a normally open contact to be closed by movements of the rolling-stock of a trespassing train, and a source of electricity for energizing said relay, said magnetic member and said electrically-operated trip-arm.

9. In a block-signal, the combination of a signaling member provided with a movable arm, locking mechanism for normally maintaining said arm in definite predetermined positions, a magnetic member for shifting said arm, a magnetic relay provided with a contact and with an armature, said armature being connected mechanically with said locking mechanism for the purpose of actuating the same, and said contact being connected electrically with said magnetic member used for shifting said arm, a contact connected with said arm and actuated simultaneously therewith, an electrically-operated trip-arm connected with said last-mentioned contact and free to drop by its own weight when said contact is closed, and electrical mechanism provided with a contact controllable by movements of the rolling-stock for energizing said relay.

10. In a block-signal, the combination of an electrical signaling member, mechanism controllable by movements of the rolling-stock for actuating the same, a contact connected with said signaling member, and electrically-operated trip mechanism connected with said contact and energized thereby for stopping movements of the rolling-stock.

11. In a block-signal, the combination of a movable signaling member, mechanism controllable by movements of the rolling-stock for actuating the same, contacts connected with said signaling member and actuated by movements thereof, a trip-arm, magnetic mechanism connected therewith for actuating the same, electrical connections extending from said contacts of said signaling member to said magnetic mechanism of said trip-arm, a plurality of longitudinal conductors insulated from each other and provided with separate contact-surfaces to be electrically connected together by engagement with the rolling-stock, and electrical connections from one of said longitudinal conductors to said contacts of said movable signaling member and from another of said longitudinal conductors to said magnetic mechanism of said trip.

12. In a block-signal, the combination of a movable signaling member, means for temporarily securing the same in different predetermined positions, contacts connected with said signaling member and opened and closed by the mechanical movements thereof, a trip-arm at a little distance from said signaling member, magnetic mechanism connected with said trip-arm for actuating the same, electrical connections extending from said contacts of said signaling member to said magnetic mechanism of said trip-arm, longitudinal conductors insulated from each other and provided with separate contact-surfaces to be bridged by engagement of the rolling-stock upon said separate contact-surfaces, and electrical connections from one of said longitudinal conductors to said contacts of said movable signaling member and from another of said longitudinal conductors to said magnetic mechanism of said trip.

13. In a block-signal, the combination of a movable signaling member, mechanism for actuating the same, contacts connected with said signaling member and opened and closed by movements thereof, a trip-arm, magnetic mechanism connected therewith for actuating the same, electrical connections extending from said contacts of said signaling member to said magnetic mechanism of said trip-arm, a plurality of longitudinal conductors insulated from each other, contact mechanism connected with said longitudinal conductors and normally open but free to close by engagement of the rolling-stock, and separate electrical connections extending from said contact mechanism to said contacts of said movable signaling member and to said magnetic mechanism.

14. In a block-signal, the combination of a movable signaling member, a contact connected therewith, a movable trip-arm, magnetic mechanism for actuating the same, open-circuit connections from said contact to said magnetic mechanism, and mechanism controllable by movements of the rolling-stock for closing the circuit through said open-circuit connections.

15. In a block-signal, the combination of a movable signaling member, a contact connected therewith and actuated thereby, electrically-operated trip mechanism for stopping the movements of the rolling-stock, electric connections from said contact to said electrically-operated trip mechanism, and means controllable at will by movements of the rolling-stock for closing a circuit from said contact to said electrically-operated trip mechanism.

16. In a block-signal, the combination of a movable signaling member, mechanism controllable by movements of the rolling-stock for throwing the same into different positions, a contact connected with said signaling member and actuated by movements thereof, trip mechanism for stopping movements of the rolling-stock, magnetic mechanism connected with said trip mechanism for actuating the same, electrical connections extending from said contact of said signaling member to said

magnetic mechanism, a plurality of longitudinal conductors insulated from each other and provided with separate contact-surfaces to be electrically connected together by engagement with the rolling-stock, an electrical connection from one of said longitudinal conductors to said contact of said movable signaling member, and means for establishing electrical communication from another of said longitudinal conductors to said magnetic mechanism of said trip.

17. In a block-signal, the combination of a movable signaling member, means for temporarily securing the same in different predetermined positions, a contact connected with said signaling member and opened and closed by mechanical movements thereof, a device for stopping movements of the rolling-stock, magnetic mechanism connected with said device for actuating the same, means for establishing electrical communication between said contact of said signaling member and said magnetic mechanism, longitudinal conductors insulated from each other and provided with separate contact-surfaces to be bridged by engagement of the rolling-stock therewith, an electrical connection from one of said longitudinal conductors to said contact of said movable signaling member, and means for establishing electrical communication from another of said longitudinal conductors to said contact and to said magnetic mechanism for energizing the same.

18. In a block-signal, the combination of a movable signaling member, mechanism for actuating the same, a contact connected with said signaling member and opened and closed by movements thereof, trip mechanism for stopping movements of the rolling-stock, magnetic mechanism connected with said trip mechanism for actuating the same, means for establishing electrical communication from said contact of said signaling member to said magnetic mechanism, a plurality of longitudinal conductors insulated from each other and provided with contact mechanism normally open but free to close by engagement of the rolling-stock therewith, and separate electrical connections for establishing communication between said contact mechanism, said contact of said movable signaling member, and said magnetic mechanism.

19. In a block-signal, the combination of a movable semaphore-arm, electric mechanism controllable by movements of the rolling-stock for actuating the same, electrically-operated mechanism for automatically stopping movements of the rolling-stock, a normally open electric circuit connected with said electrically-operated mechanism for energizing the same, and means controllable partly by said semaphore-arm and partly by the rolling-stock for closing said electric circuit.

20. In a block-signal, the combination of a movable signaling member, mechanism controllable by movements of a train for actuating the same, electrically-operated mechanism for automatically stopping movements of another train, a normally open rail-contact to be closed by movements of such other train, electric conductors connected with said rail-contact and with said mechanism for automatically stopping movements of such other train, and a normally open contact actuated by said signaling member for establishing communication between said signaling member and said mechanism for automatically stopping the movements of such other train.

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

GEORGE P. FINNIGAN.

Witnesses:
WALTON HARRISON,
EVERARD BOLTON MARSHALL.