(No Model.) 2 Sheets—Sheet 1.

J. SHOECRAFT.

AUTOMATIC BLOCK SYSTEM.

No. 576,166. Patented Feb. 2, 1897.

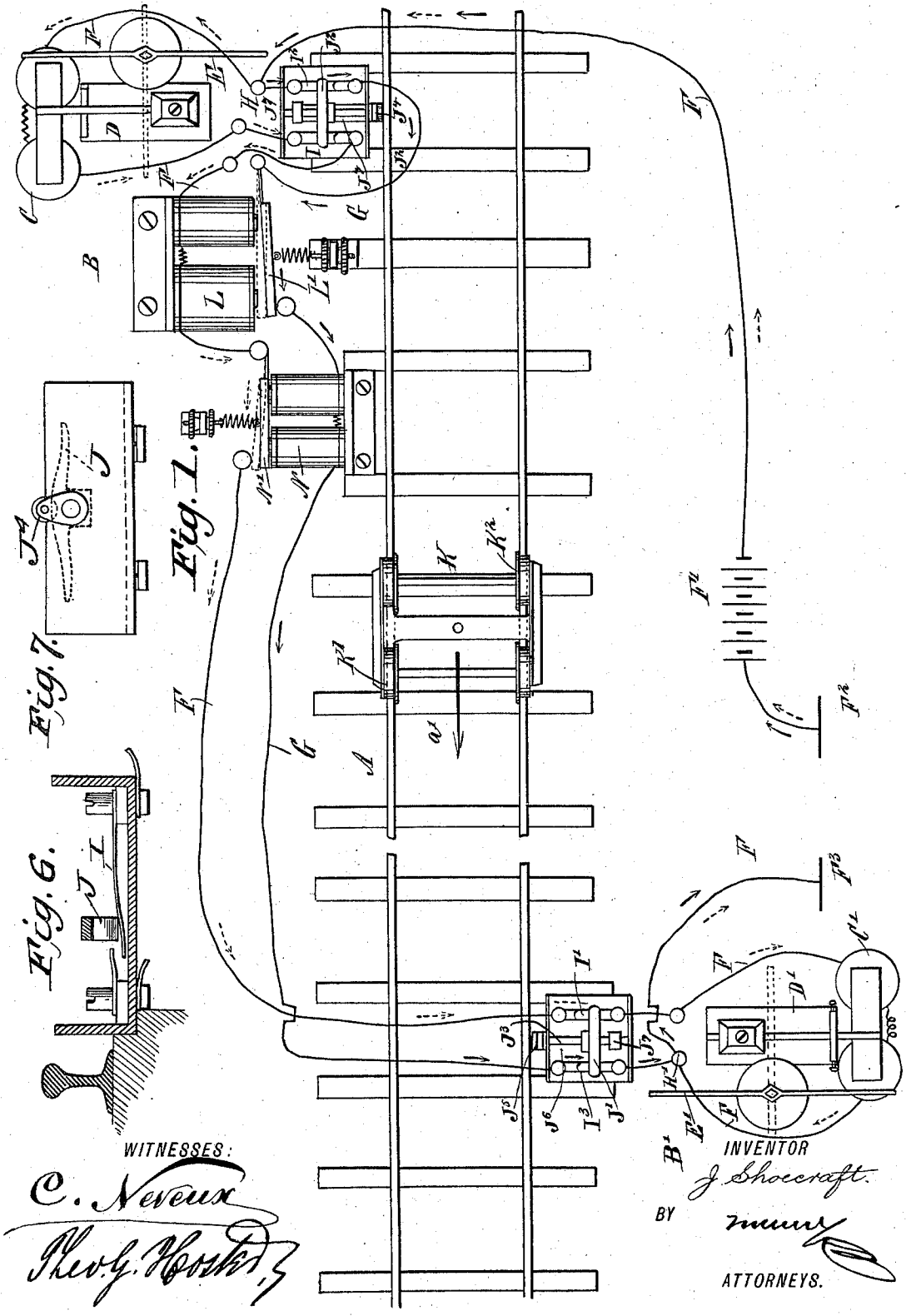

Fig. 1.

Fig. 7.

Fig. 6.

WITNESSES:

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(No Model.) 2 Sheets—Sheet 2.

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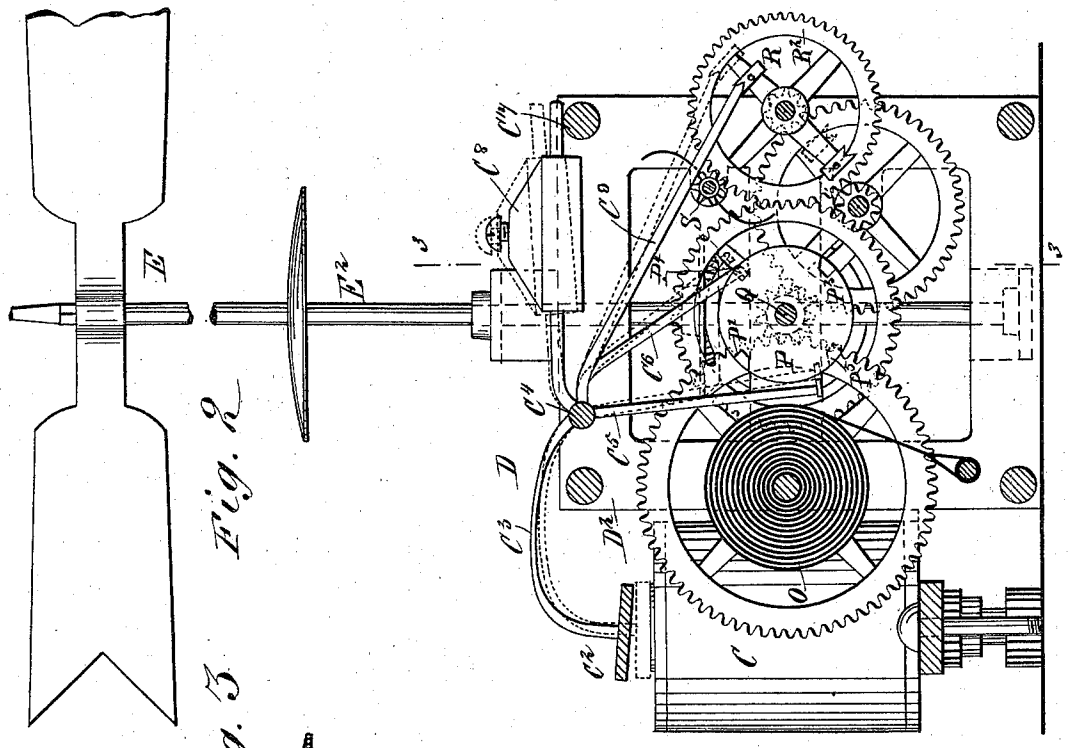

Fig. 2

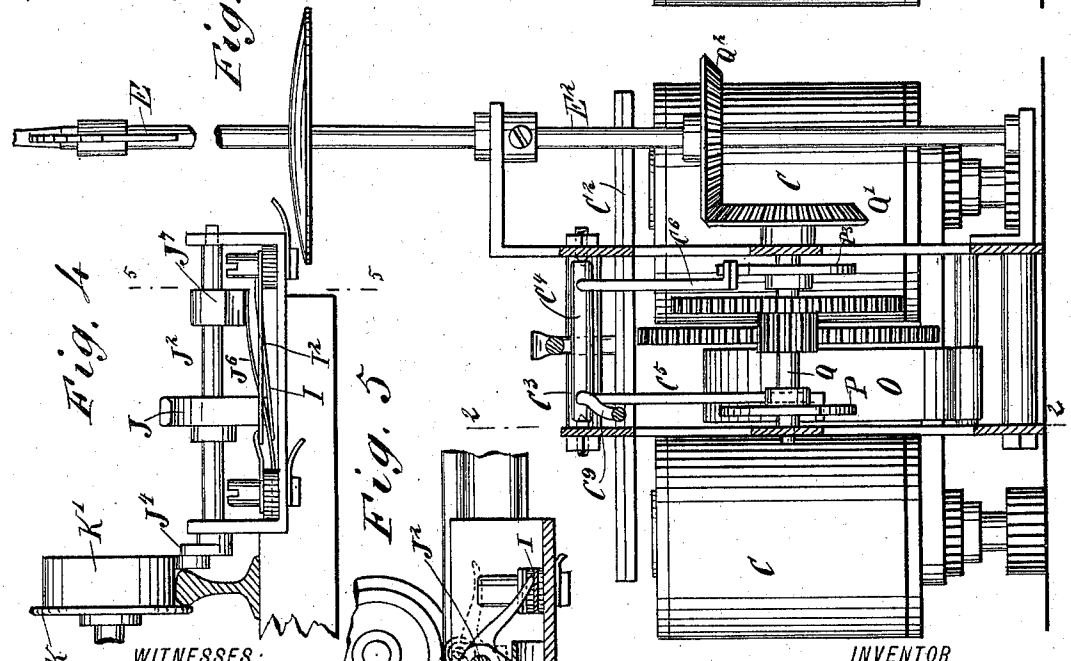

Fig. 3

Fig. 4

Fig. 5

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UNITED STATES PATENT OFFICE.

JUDSON SHOECRAFT, OF HARVEYVILLE, KANSAS, ASSIGNOR TO THE WESTERN RAILWAY SIGNAL COMPANY, OF TOPEKA, KANSAS.

AUTOMATIC BLOCK SYSTEM.

SPECIFICATION forming part of Letters Patent No. 576,166, dated February 2, 1897.

Application filed May 7, 1896. Serial No. 590,608. (No model.)

To all whom it may concern:

Be it known that I, JUDSON SHOECRAFT, of Harveyville, in the county of Wabaunsee and State of Kansas, have invented a new and Improved Automatic Block System, of which the following is a full, clear, and exact description.

The invention relates to automatic block systems such as shown and described in the Letters Patent of the United States, No. 548,469, granted to me on October 22, 1895.

The object of the invention is to provide a new and improved automatic block system more especially designed to prevent both front and rear collisions on railroads, said system being automatically controlled by a closed-circuit battery operated by circuit-breakers and relays which change the current from one signal-carrying wire to another as the train enters or leaves the station.

The invention consists principally of a signal-station at each end of the block-section, a closed electric circuit comprising a ground-wire containing a battery and the signal-magnets, a second wire connected at each station with the ground-wire, a relay in the ground-wire and having its armature forming part of said second wire, and a second relay in said second wire and having its armature forming part of the ground-wire.

The invention also consists of certain parts and details and combinations of the same, as will be fully described hereinafter, and then pointed out in the claims.

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 plan view of the improvement. Fig. 2 is an enlarged transverse section of the same on the line 2 2 of Fig. 3. Fig. 3 is a sectional side elevation of the same on the line 3 3 of Fig. 2. Fig. 4 is an enlarged end elevation of one of the double circuit-breakers. Fig. 5 is a sectional side elevation of the same on the line 5 5 of Fig. 4. Fig. 6 is a section at right angles to Fig. 5, and Fig. 7 is a side elevation of the same.

The device illustrated in Fig. 1 is arranged on a section A of a railroad, and at the ends of said section and on opposite sides of the same are arranged the stations B B', provided with electromagnets C C', respectively, used for actuating the signals E E', respectively, as hereinafter more fully described. The electromagnets C C' are located in an electric circuit comprising a ground-wire F and a second wire G, said ground-wire F containing a battery F' and having ground-sections at F^2 F^3, as is plainly shown in Fig. 1. The second wire G is connected at the stations B B' by binding-posts H H', respectively, with the ground-wire F.

Both wires F and G are provided at the station B with circuit-breakers I I^2, respectively, and similar breakers I' I^3 are arranged in said wires at the station B'. The circuit-breakers I I^2 at the station B are adapted to be actuated by a lever J, and a similar lever J' serves to actuate the circuit-breakers I' I^3 at the station B'. The levers J J' are secured on transversely-extending shafts J^2 J^3, respectively, mounted to turn in suitable bearings and carrying at their inner ends crank-arms J^4 J^5, respectively, adapted to be engaged by the wheels K' K^2, respectively, on a locomotive K, traveling over the railroad either in the direction of the arrow *a'* or the inverse direction of the same.

The circuit-breakers I, I', I^2, and I^3 are in the form of spring contact-plates, as plainly shown in Figs. 4 and 5, so that the lever J or J' in rocking to one side presses the corresponding contact-plate to break the contact with its mate, and consequently the current. After the train has passed the station the crank-arm J^4 or J^5 and the parts connected therewith return to their normal vertical position by the action of a spring J^6 on a block J^7, secured to each shaft J^2 or J^3.

Now it will be seen that when the locomotive K enters the section A in the direction of the arrow *a'*, then the wheels K' engage the crank-arm J^4 to impart a turning motion to the shaft J^2 and cause the lever J to act on the circuit-breaker I to open the same and to break the current in the ground-wire F. When the locomotive K leaves the section A, then the wheels K^2 act on the crank-arm J^5 to turn the shaft J^3 and to cause the lever J' to open the circuit-breaker I^3 to break the circuit in the wire G. When the locomotive

travels in the inverse direction of the arrow a' and moves into the section A, then the wheels K^2 act on the crank-arm J^5 to turn the shaft J^3, so as to cause the lever J' to actuate the circuit-breaker I' and break the circuit in the ground-wire F, and when the locomotive K leaves the section A in the said inverse direction of the arrow a', then the wheels K' act on the crank-arm J^4 to turn the shaft J^2 and cause the lever J to act on the circuit-breaker I^3, so as to open the same and break the circuit in the wire G. The ground-wire F contains the electromagnets of the relay L, the armature L' of which forms part of the second wire G, which latter contains the electromagnets of a second relay N, the armature N' of which forms part of the ground-wire F.

Now it will be seen that when the section A is clear and the armatures of the electromagnets C C' are attracted and the signals E E' both stand in safety position, then a train can enter the section from either end. When the locomotive K enters the section A in the direction of the arrow a', as above described, then the circuit-breaker I in the wire F is opened, and consequently the current in the wire F is interrupted for an instant, which causes the armature L' of the relay L to move away from its electromagnets and close the circuit through the wire G, and at the same time the energizing of the relay N causes the armature N' to break the circuit through the ground-wire at this point. Thus the circuit through the ground-wire is broken in two places to cause the circuit to pass from the battery through the wire F to the binding-post H and into the second wire G by way of the circuit-breaker I^2, the armature L', the relay N, the circuit-breaker I^3, and the binding-post H' to the ground F^3. Thus both electromagnets C C' are cut out of the circuit, and consequently the armatures of the said magnets are released and the motors D D' are actuated, in the manner hereinafter more fully described, to set both the signals E E' at a danger position. (See Fig. 1.)

When the locomotive K of the train leaves the section A at the station B', then the circuit in the wire G is broken at two places, first at the circuit-breaker I^3 by the action of the lever J' on the said circuit-breaker and by the armature L' being attracted by the magnets in the relay L as the latter is again energized by the current flowing through the ground-wire F the moment the circuit is broken at I^3. Thus the armatures of the electromagnets C C' are again attracted, and the motors D D' again cause a turning of the signals E E' to set the same back to a safety position. The same operation takes place when the locomotive K travels in the inverse direction of the arrow a', that is, upon entering the section at the station D' the current in the wire F is broken at two places by the circuit-breaker I' and the armature N', and upon leaving the section at the station B the current is broken twice in the wire G by the circuit-breaker I^2 and the armature L'. Now it will be seen that by having a closed circuit during the time the section is unoccupied it is evident that any derangement of any part of the closed circuit will set the signals to danger position.

The armature C^2 for the electromagnet C or C' is held on a lever C^3, having its pivot C^4 journaled in suitable bearings in the frame D^2 of a motor D or D'. From the pivot C^4 extend two arms C^5 C^6, of which the arm C^5 is adapted to engage notches P' P^2, located opposite each other in the periphery of a wheel P, secured on a shaft Q, journaled in the frame D^2 and driven from a spring-motor O, held in said frame and of any approved construction. The other arm C^6 is adapted to engage at its free end notches P^4 and P^5 on a second disk P^3, likewise secured on the shaft Q. The notches P^4 and P^5 are arranged diametrically opposite each other, but at right angles to the other notches P' P^2. The pivot C^4 is also provided with an arm C^7, carrying an adjustable weight C^8, adapted to impart a swinging motion to the armature-lever C^3 whenever the current is broken in the ground-wire F.

The electromagnets C C' are, however, sufficiently strong, so that when energized they attract the armature C^2 and impart downward swinging motion to the lever C^3 and an upward swinging motion to the arm C^7, carrying the weight C^8. The pivot C^4 is further provided with an arm C^9, adapted to be engaged at its free end by two lugs R R', arranged opposite each other, but at different distances from the center of the wheel R^2, on which the said lugs are fastened. The wheel R^2 is driven from the motor D or D'.

On the shaft Q, previously mentioned, is secured a beveled gear-wheel Q', in mesh with a beveled gear-wheel Q^2, secured on the shaft E^2, mounted to turn in suitable bearings in the frame D^2 and extending vertically, the upper end of said shaft carrying the signal E, which, when standing parallel thereto, indicates "safety."

When the several parts are in the position shown in Fig. 2 and the locomotive K leaves the section A at the station B', then the circuit in the wire G is broken and the current is sent through the ground-wire F to energize the electromagnets C C'. The armatures C^2 are thus attracted, and consequently a swinging motion is given to each lever C^3, whereby the wheel R^2 is unlocked and the spring-motor O sets the train of gear-wheels in motion to cause a turning of the shaft Q and that of the shaft E^2 until the latter has made a quarter-revolution to bring the signals E E' back to the safety position. (Indicated in dotted lines in Fig. 1.)

It is understood that the operation of the arms C^5 C^6 relatively to their disks P P^3, together with the arms C^9 and the wheel R^2, is

similar to that described in the patent above referred to, so that further description of the same is not deemed necessary.

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

1. An automatic block-signal system, comprising a signal at each end of a block-section, a closed electric circuit comprising a ground-wire containing a battery and the signal-magnets, a second wire connected at each signal system with the ground-wire, and a relay in each of said wires of which the armature forms part of the other wire, substantially as specified.

2. An automatic block system, provided with a closed electric circuit comprising a ground-wire containing a battery and the signal-magnets, and a second wire connected with the ground-wire at the station at the end of the section, each wire containing a relay, of which the armature forms part of the other wire, substantially as shown and described.

3. An automatic block system, provided with a closed electric circuit comprising a ground-wire containing a battery and the signal-magnets, a second wire connected with the ground-wire at the station at the end of the section, each wire containing a relay, of which the armature forms part of the other wire, and two circuit-breakers at each station and connected with the said wires and controlled by the locomotive entering or leaving the section, substantially as shown and described.

JUDSON SHOECRAFT.

Witnesses:
J. WINGETT,
E. A. CROSSEN.