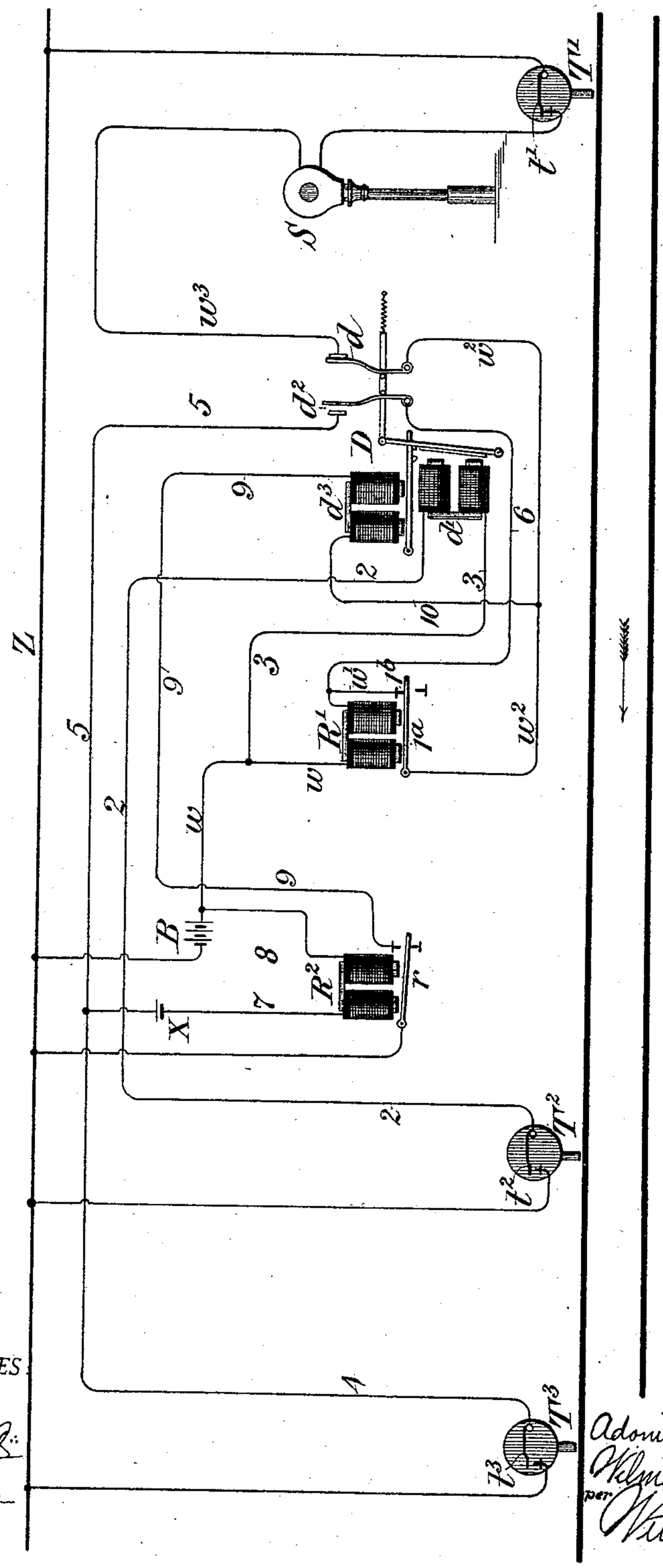
(No Model.)

A. J. WILSON & W. W. SALMON.

ELECTRIC SIGNALING SYSTEM.

No. 490,761. Patented Jan. 31, 1893.



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UNITED STATES PATENT OFFICE.

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ELECTRIC SIGNALING SYSTEM.

SPECIFICATION forming part of Letters Patent No. 490,761, dated January 31, 1893.

Application filed September 14, 1892. Serial No. 445,861. (No model.)

To all whom it may concern:

Be it known that we, ADONIRAM J. WILSON, residing at Port Chester, in the county of Westchester and State of New York, and WILMER W. SALMON, residing at Chicago, county of Cook, State of Illinois, citizens of the United States, have jointly invented a certain new and useful Improvement in Electric Signaling Systems, of which the following is a specification.

The present invention relates to automatic electric block signals for railways, and has for its general object, to improve and simplify the operation, and to maintain with certainty the warnings on every occasion of danger, with the minimum cost of plant and supervision. It has more especial reference to that class of signaling systems where the train sets the signal at danger upon entering, and clears such signal when leaving the guarded section, and one of the special results attained by the improvement in this connection is the postponement of the final clearing of the signal until the last portion of the train has passed out of the section.

Another important result is that if a second train enters the section while the first is standing with some of its wheels within and some of its wheels beyond the section, the second train will put the signal to danger and the signal will not thereafter be cleared by the succeeding wheels of the first train.

A further beneficial result is that if a second train runs past the danger signal and thus enters the section while another train is upon it, although the signal will be cleared by the first train in leaving the section, it will be again set to danger by the second train when it strikes the second track instrument in the section.

The present improvement consists in an arrangement of circuits and mechanism whereby the above results are attained, for full comprehension of which reference must be had to the accompanying drawing, forming part of this specification, the same being a diagrammatical representation of one block, or guarded section, and its overlap, constructed according to our present improvement.

T′, T², T³ are any suitable track instruments situated respectively at the entrance of the block and at the commencement of the overlap on the next succeeding block, and at the end of the block.

S is the signal controlling the block, situated at or near its entrance. The main signaling circuit is from battery B to wire *w*, coils of relay R′, wire *w′*, armature 1ª, wire w^2, spring *d* of double circuit instrument D, wire w^3, through signal S, normally closed spring t' of track instrument T′, and common wire Z to battery. Thus the relay R′ is held closed and the signal S normally at clear, there being no train upon the block.

Upon a train entering the block and proceeding in the direction indicated by the arrow in the drawing, the operation by its wheels of the track instrument T′, momentarily opens the spring t' breaking the main signaling circuit at that point, thus demagnetizing the relay R′, allowing its armature 1ª to fall, and thus establishing a permanent break at the point 1ᵇ, demagnetizing the signal magnet (not shown) and causing the signal S to fall by gravity to danger. The train on passing through the block and operating track instrument T², closing the normally open spring t^2, forms a circuit from common battery wire Z through spring t^2, wire 2, lower magnets d' of double circuit instrument D, wire 3 and wire *w* to battery. This closes spring d^2 and opens *d*. The closing of d^2 so nearly completes what we call the "clear-circuit," that by a succeeding track instrument the clear circuit may be operated and the signal may be again set to clear while the opening of spring *d* introduces a break in the main signaling circuit which would send the signal to danger independently of the operation of track instrument T′.

When the train reaches the track instrument T³ at the end of the overlap, and closes spring t^3 it makes three circuits, one of which is as follows:—From common battery wire Z through spring t^3, wire 4, wire 5, through closed spring d^2 of double circuit instrument D, wire 6, through coils of relay R′, wire *w* to battery. This energizes the magnets of relay R′ and causes the drawing up of armature 1ª, and closing the point 1ᵇ of that relay. This

circuit is the "clear circuit." It closes the permanent break at 1^b in the main signaling circuit. Nevertheless the main signaling circuit is not completely closed thereby since a break still exists at the spring *d*. The closing of spring t^3 also forms a circuit from common battery wire Z through spring t^3, wire 4, wire 7, magnets of shunt relay R^2, and wire 8 to battery B. (A supplementary battery X of one or two cells is preferably employed to assist in counteracting the resistance offered by the adjoining wires 5, 4, spring t^3 &c.) This energizes the magnets of relay R^2, draws up armature *r* and forms another and secondary and shunt circuit as follows:—From common battery wire Z through armature *r* of relay R^2, wire 9 upper magnets d^3 of double circuit instrument D, wire 10, wire w^2, armature 1^a, wire *w'*, coils of relay R', wire *w*, to battery B. The formation of this latter circuit energizes upper magnets d^3 of double circuit instrument D, and reverses the positions of springs d^2 and *d*, restoring them to their normal condition as seen in the drawing, *i. e.*, d^2 open and *d* closed, and thus finally closes all breaks in the main signaling circuit, while it at the same time shunts or short-circuits the current from the signal, and thus effectually prevents clearing of the signal so long as the spring t^3 is closed.

From the above it will be seen that the first wheel of the first train striking track instrument T^3, will unlock the double-circuit instrument D, thus breaking the "clear circuit" 4, 5, 6 &c. at the spring d^2, and causing the current to take the course from wire 4, wire 7, coils of relay R^2, and wire 8 to battery,—and so long as spring t^3 is closed, (or a cross of any kind is on the line between clear wire 4 and common wire Z) it will be understood that the shunt circuit (from wire Z, through armature *r*, wire 9, magnets d^3 of D, wires 10 and w^2, armature 1^a, coils of signal relay R', and wire *w* to battery) is complete, and short-circuits the entire battery between the lines named. This effectually prevents any current from passing through the signal instrument, and insures the maintenance of the signal at danger so long as any of the wheels of the train are passing over track instrument T^3, or the wires 4 and Z are crossed. When the train has passed T^3, the spring t^3 opens and thus breaks the circuit through the shunt relay R^2, letting its armature *r* fall and by sending the current from the battery B through *w*, R', *w'*, 1^a, w^2, *d*, w^3 and the signal instrument, the signal is drawn up and held at clear. This breaking of the clear wire by the first end of the first train going out of the overlap at T^3, instead of depending upon its being done by the first end of the second train entering the block at T', differentiates our system from all other block signaling systems known to us. Should a train in passing partly off the overlap stop immediately after some of its wheels had operated the track instrument T^3 and thus cleared the signal S, a second train entering the section while the first train was thus stopped with some of its wheels beyond and some within the section, would send the signal to danger; and when the remaining wheels of the first train passed over the track instrument T^3 they would not clear the signal since the clear circuit would have been broken by the first wheels of the first train. The second train would thus be protected by the danger signal which would not clear until this second train had passed out of the section. Furthermore, should a following train enter the block while the signal was at danger, although the preceding train on the overlap would clear the signal when it passed T^3, the second train will set it at danger directly such latter train reaches T^2, by breaking the main signaling circuit at *d* of the double circuit instrument D as already described.

An economical advantage of our present improvement is that the main signaling circuit from the battery through the signal relay and signal instrument is operatively complete while using two wires only from the signal to the battery-house.

Although we have herein described and shown our improved signaling system as arranged in connection with a normally closed circuit, and to be operated through the medium of track instruments, if preferred, a normally open circuit may be employed, or rail circuits may take the place of the track instruments, and the apparatus and line connections be correspondingly varied, and other variations of details may be made according to the judgment of the constructing engineer without departing from the essential points of the invention.

It will further be understood that our invention may be employed in conjunction and connection with other systems, devices and inventions not inconsistent therewith.

What we claim and desire to secure by Letters Patent is as follows:

1. In a railway block signaling system, the combination of a main signaling circuit,—a circuit controller in said main circuit operated by a moving train and located at the entrance of a guarded block or section,—a circuit breaker in said main circuit,—a clear circuit controlling said circuit breaker,—a circuit controller located at the exit end of the guarded block or section, operating said clear circuit and operated by the train,—and a device for breaking the clear circuit connected with and also controlled by the said clear circuit controller, substantially as set forth.

2. The combination of a main signaling circuit,—a circuit controller in said main circuit operated by a moving train and located at the entrance of a guarded block or section,—a circuit breaker in said main circuit,—a clear circuit controlling said circuit breaker,—a circuit changer in both the signaling and the clear circuits,—an electro-magnet controlling

said circuit changer and controlled by a device located within the guarded block or section and operated by the moving train,—a circuit controller located at the exit end of the block and adapted to be operated by the moving train and thus operate the clear circuit and the said circuit changer whereby the clear circuit and the signal circuit are restored to normal, substantially as set forth.

3. The combination of a railway signaling circuit, a circuit controller in said circuit operated by a moving train and located at the entrance end of a guarded block,—a circuit breaker in said circuit,—a clear circuit controlling said circuit breaker,—a circuit changer in both the signaling and the clear circuits,—an electro-magnet controlling said circuit changer and controlled by a device operated by the moving train and located within said guarded block,—a circuit controller located at the exit end of said block and operated by the moving train,—to energize the clear circuit, and also a secondary circuit thereby operating an electro magnet controlling said circuit changer, whereby the clear circuit and signal circuit are restored to normal and whereby the signal circuit is shunted as long as the said circuit controller at the exit end of the block is in an active state of operation, substantially as set forth.

4. In a railway signaling system, the combination with the main signaling circuit having signaling relay R′ and circuit controller t', t^2 and t^3, operated by a moving train, of a clear circuit including said signaling relay, a double circuit instrument or circuit changer D in both the signaling and clear circuits, operated by said circuit controller t^2, and a shunt circuit having shunt relay R^2 controlled by said circuit controller t^3, arranged to operate substantially as set forth.

5. In an electric block signaling system a normally closed signal circuit adapted to maintain a signal normally at safety, and including a normally closed circuit controller operated by a magnet R′, a circuit controller located at the entrance of a block adapted to be operated by a train to throw the signal to danger, a clear circuit including the magnet R′, a circuit controller for said clear circuit adapted to be operated by a train, a normally closed circuit breaker included in the signal circuit, a normally open circuit closer included in the clear circuit, a circuit controller adapted to be operated by a train and located within the block but near the end thereof, and a circuit for said circuit controller adapted to open the circuit breaker of the signal circuit and close the circuit closer of the clear circuit, a normally open circuit adapted to restore the said circuit closer and the said circuit breaker to normal and including the circuit controller operated by the magnet R′, and means for closing the said normally open circuit as long as the circuit controller located at the end of the block is being acted upon, substantially as and for the purpose set forth.

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