No. 651,112. Patented June 5, 1900.

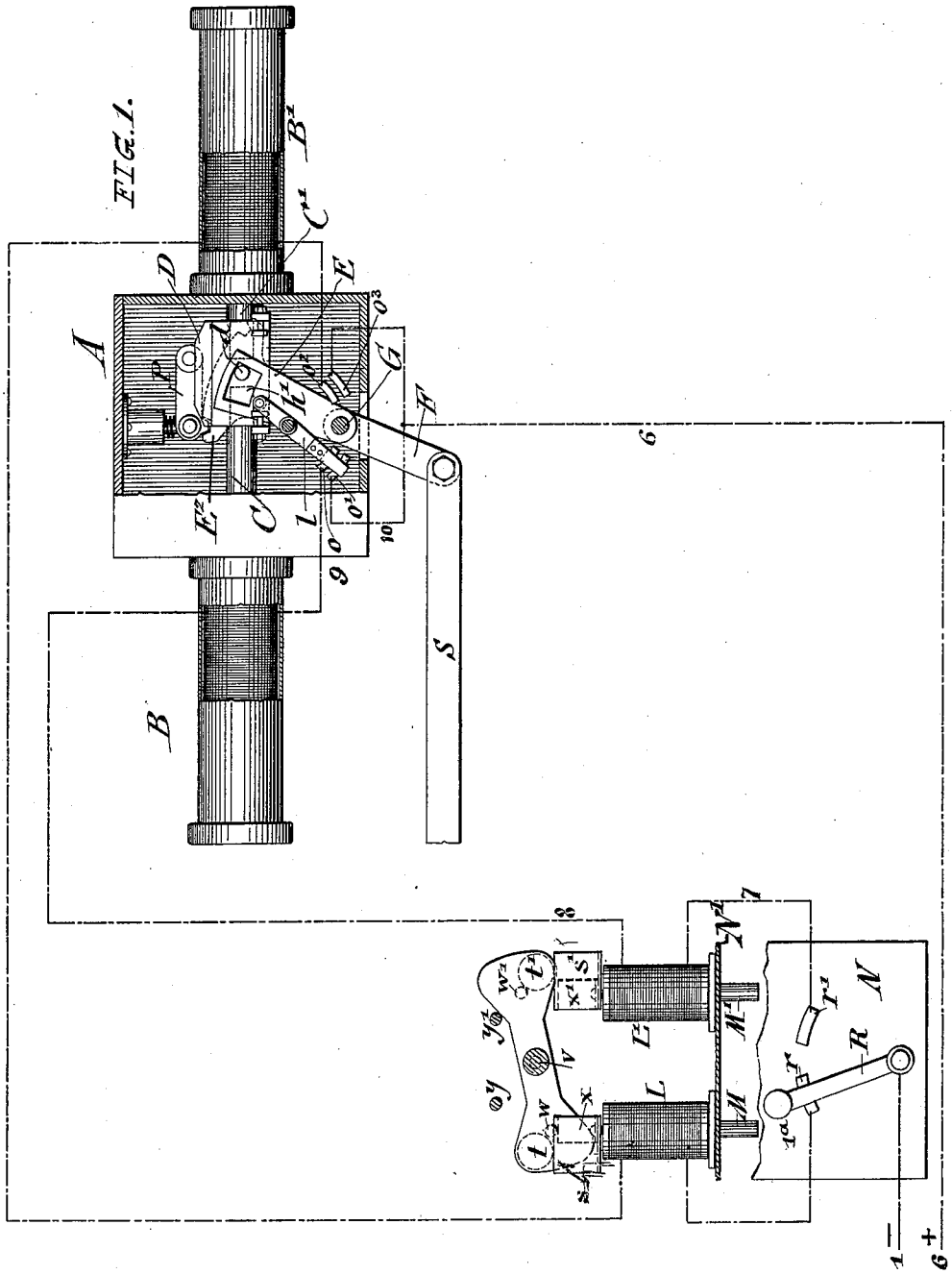
H. A. GORN.

ELECTRIC CONTROLLER FOR RAILWAY SWITCHES.

(Application filed Oct. 19, 1899.)

(No Model.) 2 Sheets—Sheet 1.

FIG. 1.



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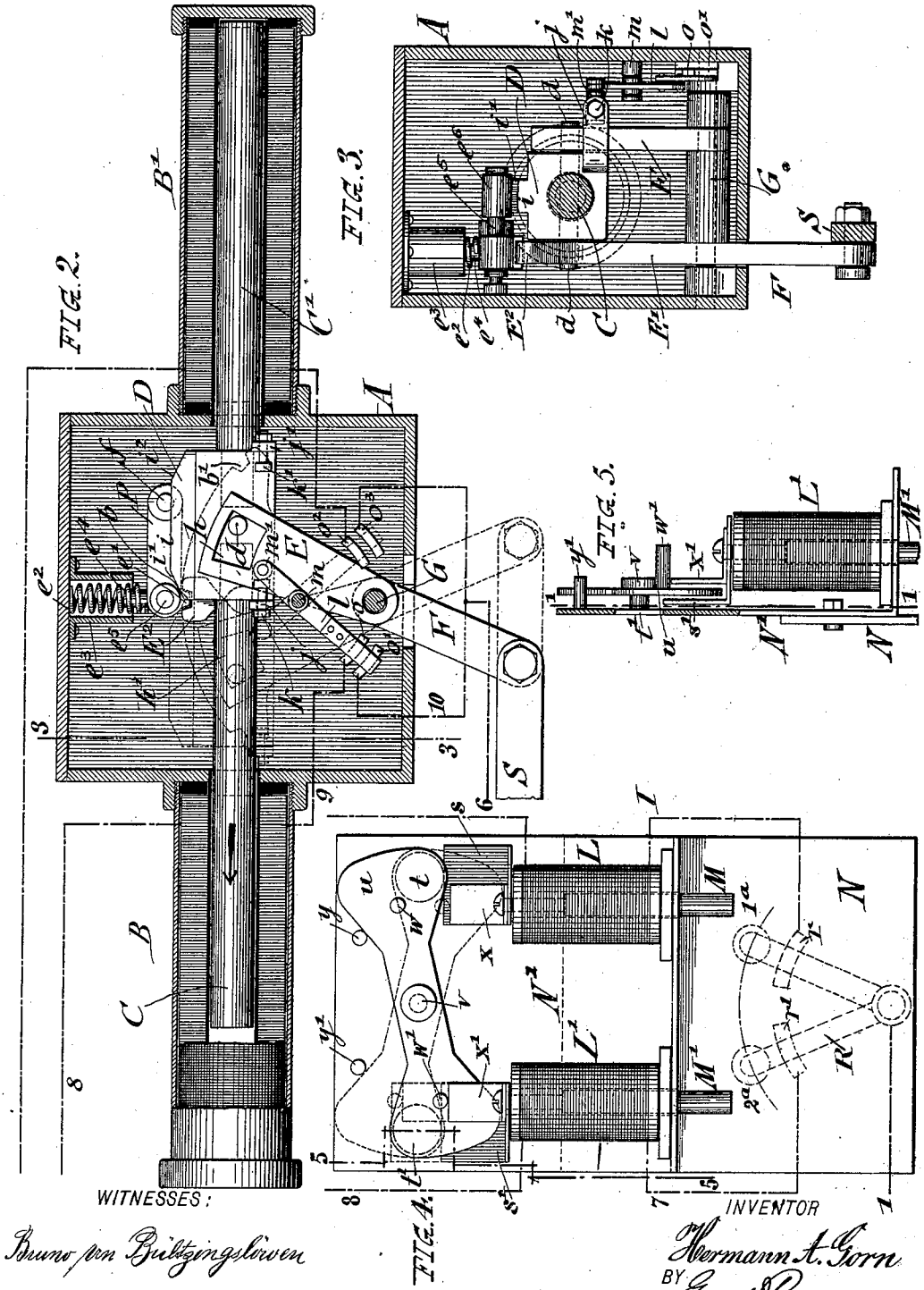


FIG. 2.

FIG. 3.

FIG. 5.

FIG. 4.

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UNITED STATES PATENT OFFICE.

HERMANN A. GORN, OF NEW YORK, N. Y.

ELECTRIC CONTROLLER FOR RAILWAY-SWITCHES.

SPECIFICATION forming part of Letters Patent No. 651,112, dated June 5, 1900.

Application filed October 19, 1899. Serial No. 734,067. (No model.)

To all whom it may concern:

Be it known that I, HERMANN A. GORN, a citizen of the United States, residing in the city of New York, borough of Bronx, and State of New York, have invented certain new and useful Improvements in Electric Controllers for Railway-Switches, of which the following is a specification.

This invention has reference to an improved apparatus for electrically controlling railway-switches from a distant point in such a manner that the switch can be readily operated in connection with a visual indicator placed at a convenient point for observance by the operator, so that he is informed of the action of the switch; and the invention consists, first, in the specific construction of such controller; secondly, in its combination with a hand-switch and indicator, and, thirdly, in the construction of the indicator by which the proper action of the controller is indicated, as will be fully described hereinafter and finally pointed out in the claims.

In the accompanying drawings, Figure 1 represents a front elevation of my improved electric controller for railway switches, signals, &c., shown with parts broken away, the indicator-plate being broken away on line 1 1, Fig. 5. Fig. 2 is a vertical longitudinal section of the controller, drawn on a larger scale. Fig. 3 is a vertical transverse section of the same on line 3 3, Fig. 2; Fig. 4, a rear elevation of my improved indicator, also drawn on a larger scale; and Fig. 5 is a vertical transverse section on line 5 5, Fig. 4.

Similar letters and numerals of reference indicate corresponding parts.

Referring to the drawings, A represents the iron casing of my improved electric controller. B B′ are solenoids which are supported on the side walls of the casing A and which are arranged, preferably, horizontally in line with each other, and C C′ are the cores of the solenoids B B′, said cores being connected by a cross-head D, which is made of non-magnetic material and arranged to slide between two parallel arms E E′, which form the upper ends of a lever F, that is fulcrumed to a shaft G at the lower part of the casing A. The lower end of the lever F extends through a slot in the casing to the outside of the same and is connected by a rod S or any other suitable means with the railway-switch which is to be operated by my improved electric controller. The flat parallel arms E E′ of the lever F are provided with openings h h', which are made of arc shape, as shown in Fig. 2. Into the arc-shaped openings h h' extend the ends of pins or gudgeons d, that are attached to the cross-head D. The rear arm E′ is provided with a segmental enlargement E^2 at its upper end, which is provided with notches b b', as shown in dotted lines in Fig. 2. When in the position shown, the notch b is engaged by the nose e' of a pawl P, which is held in engagement with the notch b by means of a helical spring e^2, that is seated in a socket e^3 and on a pin e^4 on the opposite side of the pawl. The pawl P is applied to a pivot f and is provided at its opposite end, near its nose e, with a pin e^5, which carries an antifriction-roller e^6. The cross-head D is provided on its upper surface with a rib i, that is provided at its ends with inclines i' i^2, so as to form a straight-line cam. The pawl P retains the lever F in position. The cross-head D is further provided with projections j j', carrying adjusting-screws k k', said screws serving to throw a circuit-changing lever l, which has its fulcrum at m. The upper end of the circuit-changing lever l is provided with an antifriction-roller m', which abuts against the head of the screw k, while its opposite longer end is placed in contact with stationary contact-plates o o' when it is in one position and with similar symmetrically-arranged contact-plates o^2 o^3 when in its second position. These contact-plates o o' o^2 o^3 are upon the side of the box supposed to be removed in Fig. 2; but for convenience in understanding the controller construction their position is indicated by showing them in this figure.

The electric controller so far described is placed in electric connection with a visual indicator I, which comprises two solenoids L L′ and indicating mechanism connected with their cores. These solenoids are preferably located in vertical position. The cores M M′ of the solenoids L L′ are provided at their upper ends with plates s s'. The solenoids L L′ are mounted on a bracket N′ at the rear of a plate N, which is provided with openings t t'. Above the solenoids is arranged a double segment u, which is fulcrumed at v to the

plate N. The plates $s\,s'$ are preferably painted in red color on the side facing the openings $t\,t'$ adjacent to the bracket N'. To the face side of the supporting-plate N are applied contact-plates $r\,r'$, over which moves a hand-switch R, by which the current is conducted into the solenoid L or L', according as the switch-lever R is placed in position with the contact-plate r or r'. The stop-pins $y\,y'$ limit the movement of the segment u.

The double segment u is provided with pins $w\,w'$, which are located immediately above studs $x\,x'$, that are located at the upper ends of the cores M M' of the solenoids L L'. The double segment u may be painted white on its lower half and at its upper half green on one end and on the other end green on the lower and white on the upper half.

The operation of my improved electric-circuit controller is as follows: When the hand-switch R of the indicator I is moved from its position on the contact-plate r as shown at 1^a in dotted lines in Figs. 1 and 4 to the position 2^a, Fig. 4, the current will pass then from the main-line wire over wire 1, hand-switch R, contact-plate r', wire 7, through the solenoid L', wire 8, solenoid B, wire 9, contact-plate o, circuit-changing lever l, contact-plate o, wire 10, and wire 6 back to the return main wire. This will cause the core C of the solenoid B to be drawn in the direction of the arrow shown in Fig. 2, so that the nose of pawl P is lifted from its notch b. The cross-head D, which is moved in the direction as indicated by the arrow, engages by its pin d the lever F at the sides of the openings $h\,h'$ of the parallel arms E E' and, continuing in this direction, carries the lever F over into the position shown in dotted lines in Fig. 2, so that thereby the rod S of the switch will be operated and moved into its second position. The notch b' on the rear arm E' arriving below the nose of the pawl P, the incline i^2 on the cross-head D will permit the nose of the pawl P to enter the notch b', in which it is held by the helical spring e^2, so that the lever F will be firmly retained in position, together with the switch or signal operated by it. When the cross-head D has reached the incline, it will also quickly move, by means of the projection j' and adjusting-screw k', the circuit-changing lever l into the position indicated in dotted lines, so that it forms contact with the plates $o^2\,o^3$, while the contact with the plates $o\,o'$ is interrupted. The circuit-changing lever l thus acts as a circuit-breaker upon the actuation of the controller. The current and the motion of the core C under the influence of the solenoid B are thereby interrupted.

The action of the indicator is as follows: Before the shifting of the hand-switch R let it be supposed that the segment u is in the position indicated in full lines in Fig. 4 and the color shown through the openings $t\,t'$ green. Upon turning the hand-switch R from the position 1^a to 2^a the current is sent through the solenoid L'. The core rises, turning the segment into the position indicated in dotted lines, so that white appears in the opening t, and the plate s', of red color, appears opposite the opening t'. So long as the current passes through this solenoid the core and plate s' will remain raised and the color in the opening t' will be red; but as soon as the circuit-changing lever under the movement of the cross-head has broken the circuit by passing from contact-plates $o\,o'$ to $o^2\,o^3$ the core M' will fall and the red-colored plate s' will disappear and disclose the white of the segment, indicating that the operation of the switch has completely and successfully taken place. This entire operation occupies but a short time, so that the red plate appears only momentarily before the opening. Nevertheless by reason of the construction of the controller it cannot disappear until the movement of the railway-switch has taken place. Should, however, when the hand-switch is operated the indicator fail to be operated, which would be evidenced by the color remaining the same as before in both openings $t\,t'$, the circuit is broken. It is also apparent that if upon operating the hand-switch the red-colored plate appears opposite one opening, the color opposite the other opening changing at the same time and the red plate remaining raised, it follows that the circuit is intact, but that there is trouble with the switch or that for some cause it cannot be operated by the controller. Upon turning the hand-switch R back to the position 1^a the operation described will be performed in the opposite direction and the railway-switch shifted back to its original position.

The use of double contact-plates o, o', o^2, and o^3, by which the circuit-changing lever interrupts the circuit through the solenoids of the controller, is of importance for the reason that the core of the solenoid has to work to the end of its travel under full load, so as to fully turn the railway-switch. To accomplish this, it is necessary that the electric current be sustained in the solenoid until only a short time before the end of the stroke of the core. For this reason the double contact-plates are employed and a lever l of sufficient length to contact with each, so as to produce thereby the quick opening and the quick closing of the circuit. The adjusting-screws $k\,k'$ render possible the fine adjustment of the action of the circuit-changing switch relatively to the movement of the cores, so that the current is not broken until the movement of the railway-switch is safely completed, and yet is cut off just before the end of the stroke of the cores, so that shock to the controller is avoided.

It is well known that all electric appliances are started only with some difficulty when under full load. This difficulty is overcome in my improved construction. When the nose e' of the pawl P rests in the notch b, the antifriction-roller e^6 of the pin e^5 does

not contact with the incline *i'*. The core C will consequently start free or with no resistance except its own friction in the solenoid. When the incline *i'* strikes against the antifriction-roller e^6, the core will have already attained considerable momentum, and its speed will not be reduced because the resistance to its forward movement is gradually applied. When the cross-head D has been so far moved that the pin *d* strikes against the lever F, the solenoid will have acquired its full strength and will exert a strong pull upon the core, so that the switch to which the controller is connected will be reliably operated.

The advantages of my improved controller are that by its use it is possible to operate the railway-switch in a very effective and reliable manner at a considerable distance from the operating-tower. The solenoid responds immediately with its full strength, so as to oscillate the circuit-changing lever. As soon as the hand-switch is shifted and the railway-switch actuated the circuit-changing lever is shifted quickly to its second position by the contact of the set-screws of the cross-head with the antifriction-roller at its upper end, the release from one set of contact-plates and the engaging of the other set of contact-plates taking place without sparking, as the full strength of the current is still passing through the coil of the solenoid. The spring-pawl engages the cross-head of the cores when the same arrives in proper position relatively to the solenoids and relocks thereby the solenoid-cores until the railway-switch is to be operated again. The hand-switch is then brought back from its position 2^a to the position 1^a, when the same operation of the circuit-controller, but with reversed order, will be accomplished.

The visual indicator that is operated by the closing of the circuit by the hand-switch shows the attendant whether the operation has been performed or not. In case the indicator should not respond, but show the same color as before, he then knows that the circuit is broken or that for some reason the circuit-controller cannot properly perform its work, after which he will immediately examine the circuit-controller, circuit, and switch connections, so as to restore the same to their proper working condition.

My improved electric controller is applicable not only to railway-switches, but also to railway-signals, or, in fact, any other appliances which are to be electrically changed from one position to another and in which it is desired to know at once whether the proper action of the appliance has taken place.

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

1. A system of railway-switch control, consisting of an electric controller connected with the switch to be operated, and located in a normally-open electric circuit, a hand-switch for closing said circuit for actuating the controller and throwing the railway-switch, and a circuit-breaker connected with the controller for automatically opening said circuit upon the actuation of the controller, substantially as set forth.

2. A system of railway-switch control, consisting of an electric controller connected with the switch to be operated, and located in a normally-open electric circuit, a visual indicator located in said circuit, a hand-switch for closing said circuit for actuating the controller and throwing the railway-switch, and simultaneously actuating said visual indicator, and a circuit-breaker connected with the controller for automatically opening said circuit upon the actuation of the controller, substantially as set forth.

3. The combination, with two solenoids located axially in line with each other, of two cores, a cross-head of non-magnetic material connecting said cores, a fulcrumed lever connected with the switch to be operated, means on said cross-head for engaging said lever, and means for locking said cores when arriving at the end of their strokes in either direction, substantially as set forth.

4. The combination of two solenoids located axially in line with each other, cores in said solenoids, a cross-head of non-magnetic material connecting said cores, a fulcrumed lever connected with the switch to be operated, means for connecting said cross-head with said lever, means for locking the cross-head when the cores arrive at either end of the stroke, and a circuit-changing lever operated by said cross-head when the cores are at the ends of their stroke, substantially as set forth.

5. The combination of two solenoids arranged axially in line with each other, cores in said solenoids, a cross-head of non-magnetic material connecting said cores, a fulcrumed lever connected with the switch to be operated, the upper ends of said lever being connected with said cross-head, and a circuit-changing lever operated by said cross-head when the cores arrive at either end of their stroke, substantially as set forth.

6. The combination, with two solenoids arranged axially in line with each other, of cores in said solenoids, a cross-head of non-magnetic material connecting said cores, said cross-head being provided with a straight-line cam having inclines at its end, a fulcrumed lever connected with said cross-head and adapted to operate the railway-switch, and a spring-actuated pawl provided with an antifriction-roller and adapted to engage notches in the upper ends of said lever so as to lock the cross-head and lever when the cores arrive at either end of their stroke, substantially as set forth.

7. The combination of the two solenoids arranged axially in line with each other, cores in said solenoids, a cross-head of non-magnetic material connecting said cores, said cross-head being provided with pins or gud-

geons at their opposite sides, and a fulcrumed lever connected with the switch to be operated, and formed of two parallel arms at its upper end, said arms having openings into which the pins or gudgeons of the cross-head project for operating said lever, substantially as set forth.

8. The combination of two solenoids arranged axially in line with each other, a core in each solenoid, a cross-head of non-magnetic material connecting the inner ends of said cores, a straight-line cam having inclines at its ends located on said cross-head, a fulcrumed lever formed of two parallel arms engaging pins or gudgeons on said cross-head, one of said arms being provided with segmental enlargements having notches at its end, and a pivoted and spring-actuated pawl provided with a nose for engaging said notches and with an antifriction-roller for engaging the inclines at the ends of the straight-line cam, substantially as set forth.

9. The combination, with two solenoids arranged axially in line with each other, of a core in each solenoid, a cross-head of non-magnetic material connecting the inner ends of said cores, said cross-head being provided with set-screws at its opposite ends, a fulcrumed lever connected at one end with the cross-head and at its opposite end with the switch to be operated, a circuit-changing lever, the upper end of which is adapted to be engaged by the set-screws of the cross-head, the two pairs of contact-plates engaged by the opposite longer end of the circuit-changing lever, substantially as set forth.

10. The combination, with an electric controller and a switch operated by the same, of a hand-switch for operating said controller, and a visual indicator composed of solenoids, the cores of which operate an oscillating indicator-segment, and color-signals on said segment for indicating whether the apparatus of the controller has performed its function and a color-signal actuated by the cores for indicating danger in case of non-performance of its work, substantially as set forth.

11. The combination, with an electric controller and a switch operated thereby, of a hand-switch for switching the current in different directions through said controller, a visual indicator composed of solenoids in circuit with said switch and controller, cores in said solenoids, a signal-segment actuated by said cores, danger-signals actuated by said cores and adapted to be shown during the passage of the current through the solenoids, and means in said controller for maintaining the circuit upon failure of the railway-switch to operate, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

HERMANN A. GORN.

Witnesses:
PAUL GOEPEL,
J. H. NILES.