No. 846,960. PATENTED MAR. 12, 1907.

T. W. SMALL.

CIRCUIT CLOSING MECHANISM.

APPLICATION FILED JAN. 26, 1906.

3 SHEETS—SHEET 1.

Fig. 1.

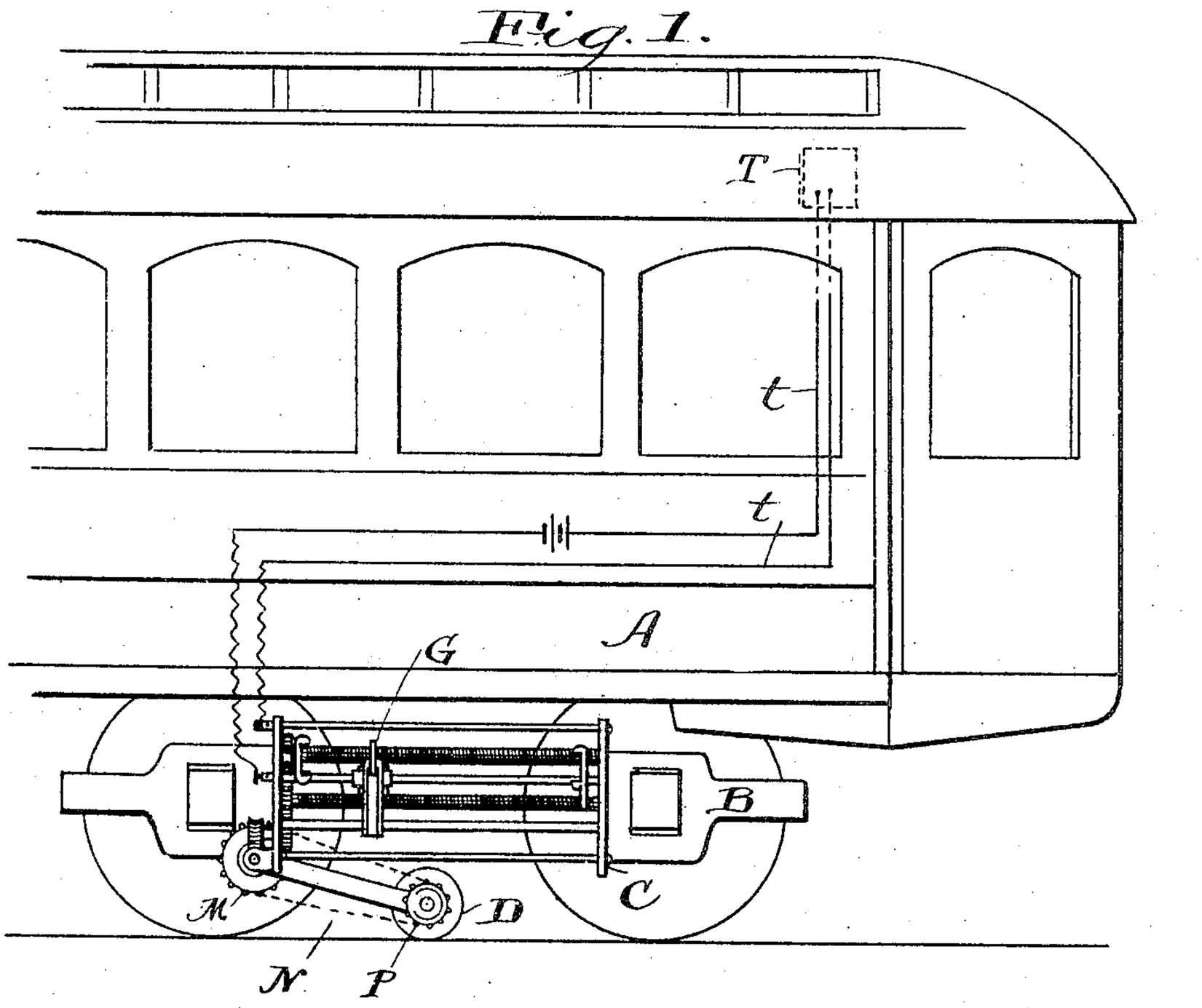
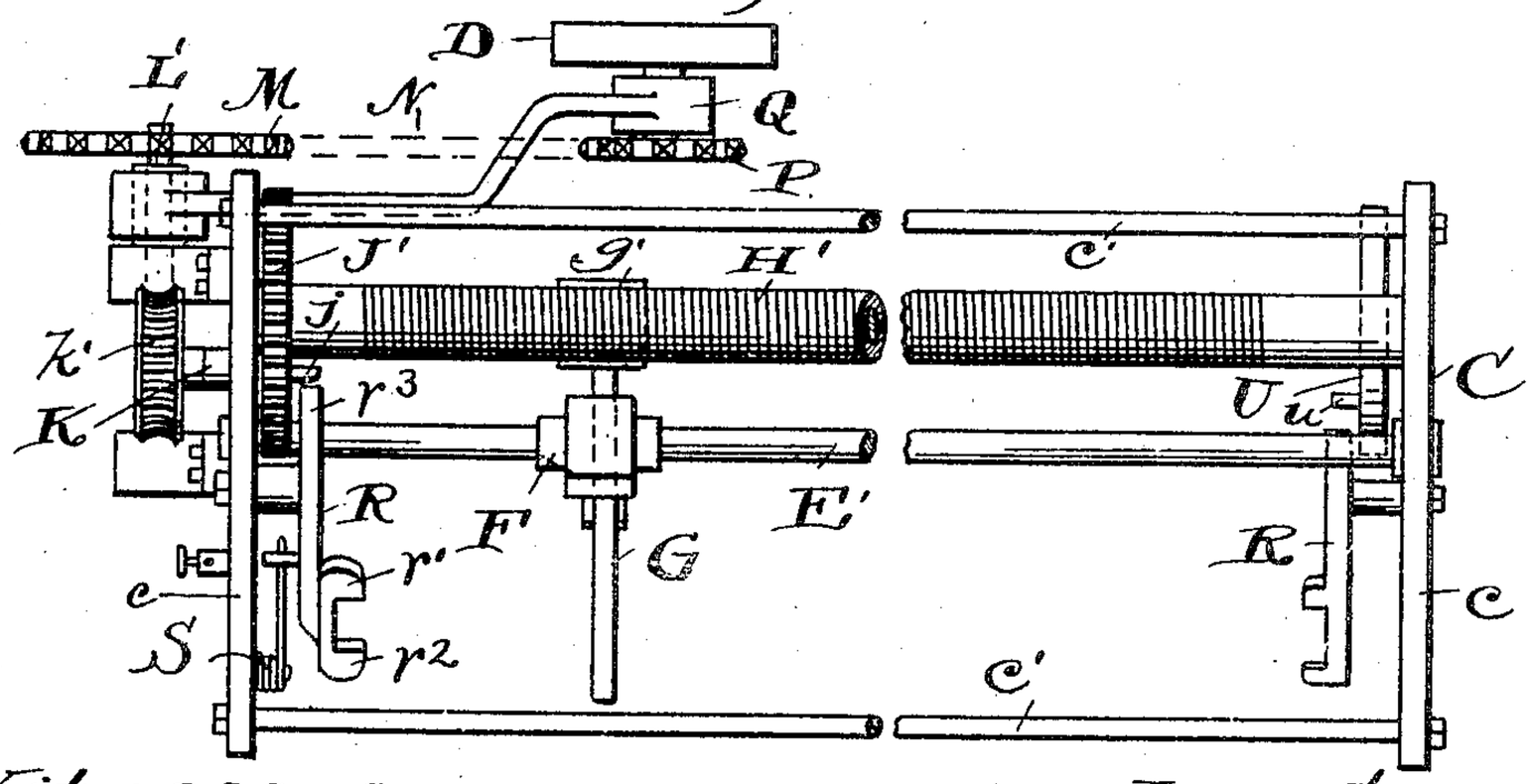


Fig. 2.



Witnesses.
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H. R. Sullivan

Inventor:
Thomas W. Small,
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Thurston & Bates Woodward

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3 SHEETS—SHEET 2.

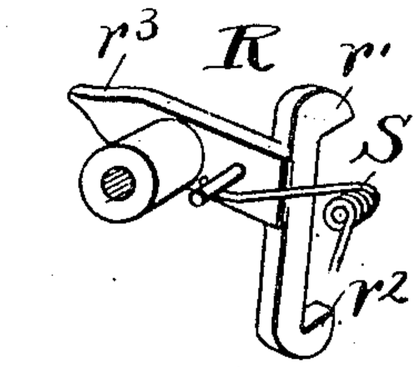
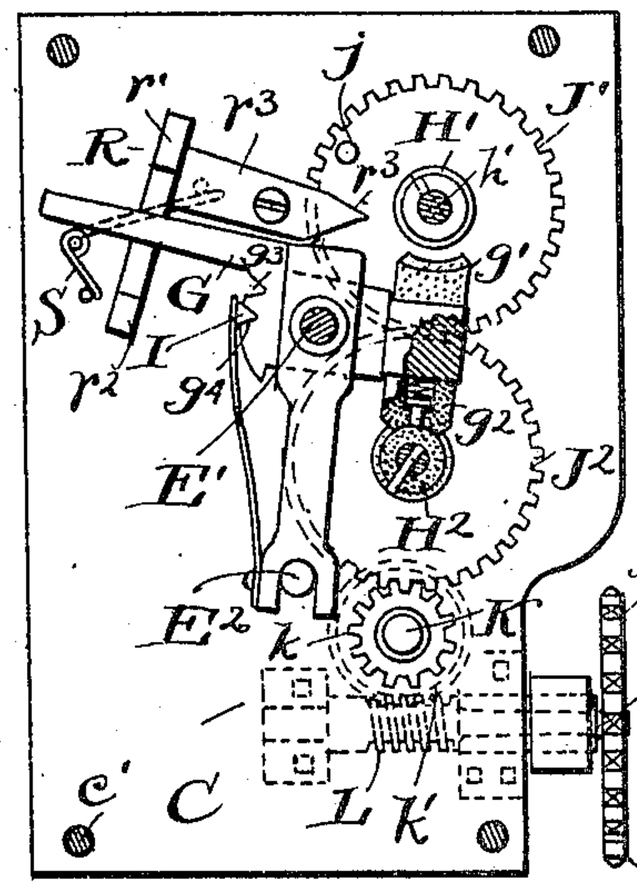


Fig. 5.



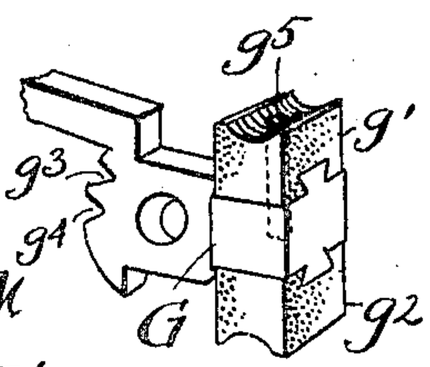


Fig. 6.

Fig. 4.

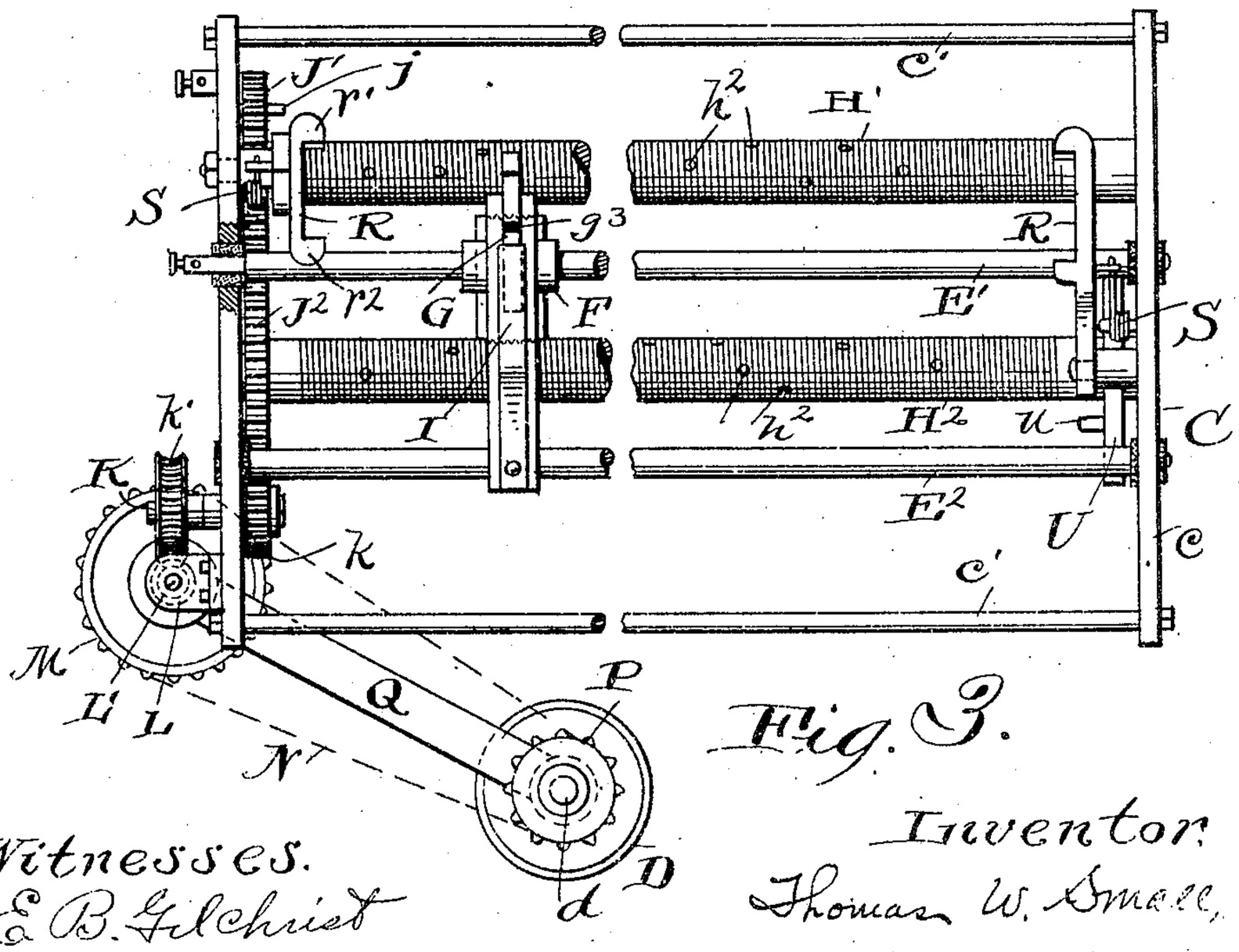


Fig. 3.

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3 SHEETS—SHEET 3.

Fig. 7.

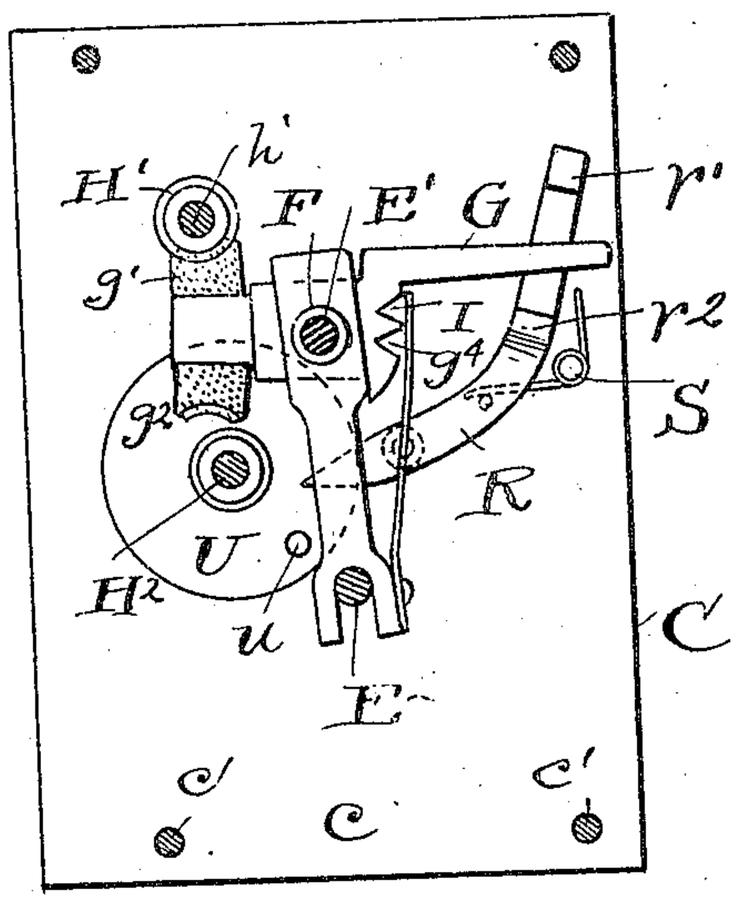
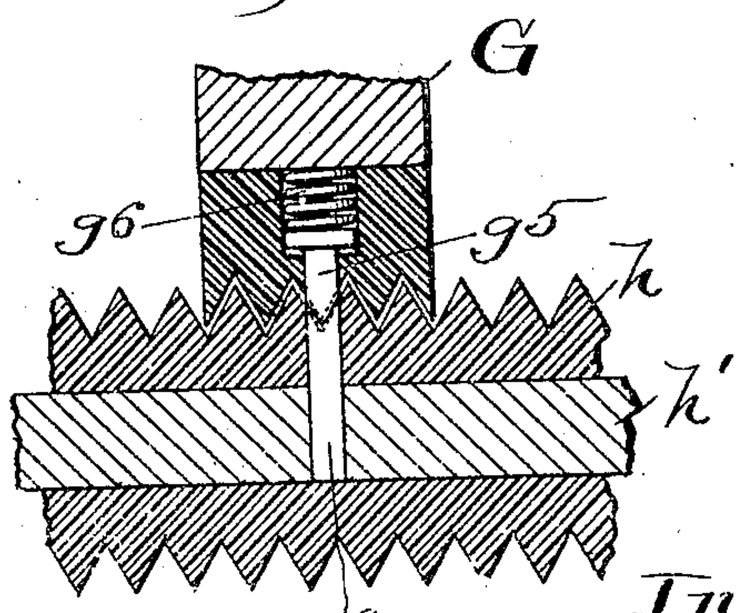


Fig. 8.



Witnesses.
E. B. Gilchrist
H. R. Sullivan

Inventor
Thomas W. Small
By his Attorneys
Thurston, Bates & Woodward

UNITED STATES PATENT OFFICE.

THOMAS W. SMALL, OF CLEVELAND, OHIO, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE ACME AUTOMATIC STREET INDICATING COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

CIRCUIT-CLOSING MECHANISM.

No. 846,960. Specification of Letters Patent. Patented March 12, 1907.

Application filed January 26, 1906. Serial No. 298,086.

To all whom it may concern:

Be it known that I, THOMAS W. SMALL, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Circuit-Closing Mechanism, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

The object of this invention is to provide a simple and efficient mechanism for automatically and periodically making electric contacts.

The invention, which has a variety of uses, is well adapted for operating various indicators. As shown herein, it is embodied in a device designed for actuating indicators in street-cars, the mechanism being arranged for the particular route over which the car travels.

The driving mechanism for my circuit-closer is the subject-matter of my copending application, Serial No. 330,563, filed August 14, 1906.

The present invention is concerned with the circuit-closing device itself. It is more fully hereinafter described, and its essential characteristics set out in the claims.

In the drawings, Figure 1 is a side elevation of a portion of a railway-car with my invention attached. Fig. 2 is a plan of my mechanism, partly broken away. Fig. 3 is a side elevation of the same. Fig. 4 is a vertical cross-section through the same. Fig. 5 is a perspective view of one of the reversing-dogs. Fig. 6 is a perspective view of the traveling contact-head. Fig. 7 is a cross-section looking in the direction opposite to Fig. 4. Fig. 8 is an enlarged section of one of the screws and coöperating nut.

As shown in the drawings, A represents the body of a street-car; B, one of the longitudinal members of a truck of the car. Secured to this member B is my contact mechanism, carried by a suitable frame C and driven by a measuring-wheel D, which runs along the track as the car moves.

The frame C is shown as composed of plates *c c* at the opposite ends of the device and distance-rods *c'*. Extending between these plates *c c* are a pair of rods E' E², insulated from them. Slidable on these rods is a cross-head F, on which is pivoted a bar G. On the rear end of this bar are a pair of partial nuts *g' g²*. Journaled between the frame-plates are a pair of screws H' H². Between these screws stand the two nuts referred to, the nuts being in such position that but one of them can engage with a screw at a time. In the bar G are formed a pair of detent-notches *g³ g⁴*, with which coöperates a detent-spring I, operating to hold either nut in engagement with its screw, while allowing a properly-applied force to shift the bar to release such engagement and bring the other nut into engagement with the other screw. On the screws are a pair of meshing spur-gears J' J², with the latter of which meshes the pinion *k* on the shaft K. On the other end of this shaft is the worm-wheel *k'*. Meshing with this worm-wheel is a worm L, on the shaft L' of which is a sprocket-wheel M. This sprocket-wheel is connected by a sprocket-chain N with the sprocket-wheel P, rigid on the shaft *d* of the measuring-wheel D, which runs along the track. The shaft *d* is journaled in the floating frame Q, which is pivoted concentrically with the worm-shaft L'.

From the construction just described it follows that as the car travels along the track the wheel D rotates, measuring the distance and driving the screws at a much reduced speed, causing the cross-head to travel just in proportion to the travel of the car, the cross-head starting adjacent to one frame-plate when the car starts from one end of the route and reaching the other end of its travel when the car reaches the other end of the route. The cross-head is thus, in effect, a miniature car traveling along a miniature route corresponding to the route the car travels. It follows, therefore, that whenever the car is at a certain street the nut will be at a corresponding definite point on the screw. The nuts are made of fiber, and in each of them is a metallic pin *g⁵* in electric connection with the bar itself, the pin being pressed outward by a spring *g⁶* bearing against the bar G. The screws are made of fiber sleeves *h* around steel shafts *h'*, and set radially in these sleeves and in engagement with the shafts are metallic pins *h²*, which are positioned according to the streets, so that when the car is about to reach a street the pin *g⁵*

in the fiber nut will engage the pin in the sleeve and cause a contact. One of the circuit-wires is connected to the guide-bar E′ and the other to the frame of the machine. The circuit when closed may operate suitable electric street-indicating mechanism, as illustrated conventionally in Fig. 1, the indicator being designated T and the circuit-wires *t t*. The screws turn in opposite directions, so that the cross-head travels in one direction or the other, according to which nut is in engagement. To cause the change of engagement from one screw to the other automatically when the car reaches the end of its route, I provide the following mechanism:

Pivoted to the inner side of each frame member *c* is a dog R, having a pair of jaws r' and r^2. A spring S holds this dog in intermediate position, so that as the cross-head travels the forward end of the bar G comes between the jaws r' and r^2. A rearward projection r^3 of the dog stands in the path of a pin *j*, carried by the spur-gear J′ on the shaft H′ at one end, or of a pin *u*, carried by a collar U on the shaft H^2 at the other end. The result is that the two dogs are oscillated for every rotation of the screws. When the cross-head is in an intermediate position, this movement of the dogs is idle; but when either screw has brought the cross-head substantially to an extreme position the forward end of the bar G stands between the jaws of the dog, so that the succeeding oscillation of the dog swings the bar to cause the engagement of the other screw, wherefore the cross-head travels in the opposite direction.

The result of the described construction is that as the car travels back and forth over its route the cross-head, automatically moving and reversing, travels backward and forward along its path, making a contact before each street or station is reached.

In placing the contact-pins h^2 in the screw-sleeves I have found it convenient to first run the car with my mechanism attached over the route without these pins, stopping the car at each point where it is desired to have the contact made and making a mark at the point on the screw which the pin g^5 in the fiber nut is then engaging. After the round trip has been made in this way the pins h^2 are inserted in the two screws at the positions marked and the device is ready for operation. It will be seen that by this method of operating the indicator it is unnecessary to equip the track or road-bed with special devices to close the circuit. Each car is equipped for its own route with the proper indicator and contact-maker. If the car be changed to another route, it is a simple matter to change the indicator and contact-maker. The measuring-wheel has very light work to do and will not slip on the track. It will continue to properly record the distance whenever the car moves, whether the car-wheels rotate or slide.

My mechanism is above described as applied to a street-car. It is evident, however, that it has many uses, and the contacts on the screws need not be located with particular reference to any street or other route, but simply according to the time it is desired to have elapse between successive closings of the cicuit.

I claim—

1. The combination of a rotatable screw having a threaded portion of insulating material and an interior electric conductor, contact-pins carried by the threaded portion in electric connection with said conductor, a traveling nut adapted to mesh with the threaded portion and having a contact coöperating with the contacts on the thread of the screw.

2. The combination of a pair of screws, means adapted to rotate such screws, a traveling member adapted to engage either screw and thereby move in either direction, and contacts, one of which is carried by said traveling member and others of which are insulatingly carried by the threaded portions of said screws.

3. The combination of a pair of screws, a member adapted to be driven in one direction by one screw, and in the opposite direction by the other, means for automatically changing the engagement from one screw to the other as the member reaches the end of its travel, a contact device carried by the member, a series of coöperating contacts insulatingly carried by the threads of the screws, and means for rotating the screws.

4. The combination of a pair of screws having insulating-threads, a member adapted to be driven in one direction by one screw, and in the opposite direction by the other, means for automatically changing the engagement from one screw to the other as the member reaches the end of its travel, contacts controlled by such travel and carried in part by the threaded portion of the screws, there being hand-operated means for changing the engagement from one screw to the other intermediate of the ends thereof.

5. The combination of a pair of screws having insulating-threads, a member extending between the screws and carrying two partial insulating-nuts, means for rotating the screws in such direction as to cause the member to travel in opposite directions, means for shifting said member at the end of its travel to withdraw one nut from its screw and bring the other nut into engagement with the other screw, and contacts carried by the threaded portions of the screws and by said member.

6. The combination of a pair of rotatable screws parallel with each other, a head slidably guided parallel with the screws, a piv-

oted arm carried by said head, nuts carried by said arm adapted to engage one screw or the other, means for temporarily holding said arm in either extreme position, means operating to engage said arm at the end of its travel to shift the one nut out of engagement with its screw and the other nut into engagement with the other screw and contacts insulatingly carried by the threads of said screws and by said nuts.

7. The combination of a pair of screws, means for rotating them, a pair of movable dogs near the opposite ends of the screws, means for actuating said dogs periodically, contact-making means adapted to engage either screw, and means actuated by said dogs for shifting the contact-making means whenever it arrives at the end of its travel.

8. The combination of a pair of screws, mechanism for rotating them, a contact-controlling device driven by said screws in one direction or the other according to the screw engaged, a pair of pivoted dogs near the opposite ends of the screws, said dogs being periodically actuated as the screws rotate, mechanism carried by the contact-maker and adapted to come into engagement with either dog at the end of the travel of the contact-maker, whereby said mechanism is shifted to change the engagement from one screw to the other.

9. In a contact-making device, the combination of a rotatable screw composed of a metal shaft and insulating threaded sleeve surrounding the same, metallic pins extending from the periphery of the screw into said shaft, a traveling nut adapted to mesh with the screw and carrying a contact adapted to successively engage the pins in the insulating-sleeve.

10. The combination of a frame, a rod insulatingly carried thereby, a slidable cross-head mounted on said rod, a nut on said cross-head and carrying a contact, a screw having a metallic shaft and an insulating threaded sleeve around the same, contact-pins passing through said sleeve and into engagement with the shaft, means for rotating said screw, and binding-posts, one in electric connection with the screw and the other with said insulating-rod.

11. The combination of a pair of screws, means for rotating them, a pair of dogs near the opposite ends of the screws, means for actuating said dogs periodically, contacts insulatingly carried by the threaded portions of said screws, a coöperating contact-maker adapted to engage the thread of either screw and be driven thereby, and means actuated by said dogs for shifting the contact-maker whenever it arrives at the end of its travel.

12. The combination of a rotatable screw comprising a metallic core and an insulating threaded sleeve, radial contact-pins carried by such sleeve and engaging such core, a traveling contact adapted to operate in the thread-groove and be driven thereby longitudinally of the screw and coöperate with the contact-pins as they present themselves.

13. The combination of a pair of screws each including a shaft and an insulating threaded sleeve carried thereby, means adapted to rotate such screws, an insulating traveling member adapted to engage either screw and be thereby moved in either direction, and contacts, one of which is carried by said traveling member, and others of which are carried by the threaded portions of said screws.

14. The combination of a pair of screws, each including a shaft and an insulating threaded sleeve carried thereby, an insulating member adapted to be driven in one direction by one screw and in the opposite direction by the other, means for automatically changing the engagement from one screw to the other as the member reaches the end of its travel, a contact device carried by the threaded sleeve and engaging the shaft, and means for rotating the screws.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

THOMAS W. SMALL.

Witnesses:
B. E. MERWIN,
F. H. TALBOT.