

(No Model.)

3 Sheets—Sheet 1.

E. M. BENTLEY.  
ELECTRIC RAILWAY.

No. 426,580.

Patented Apr. 29, 1890.

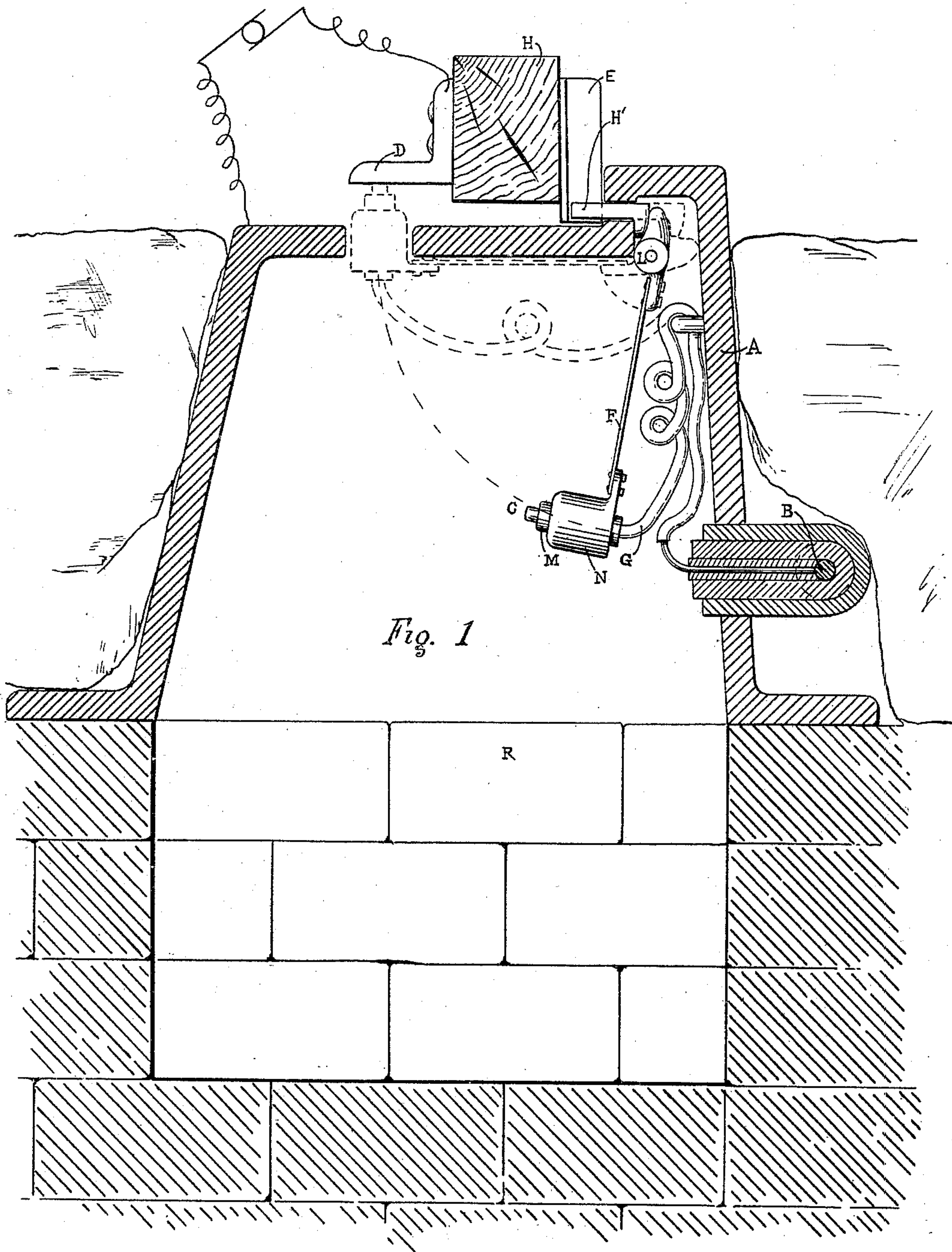


Fig. 1

WITNESSES.

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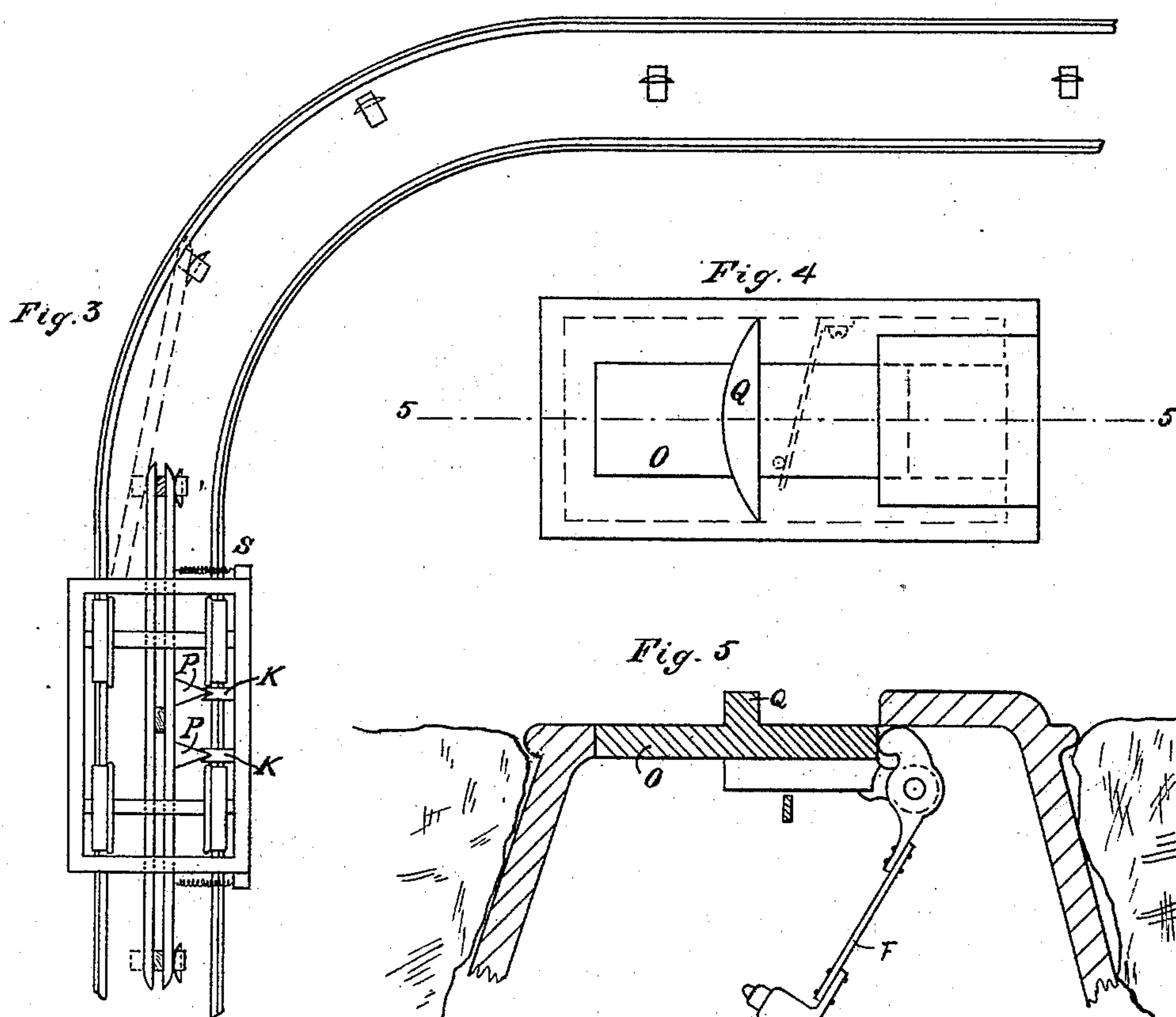
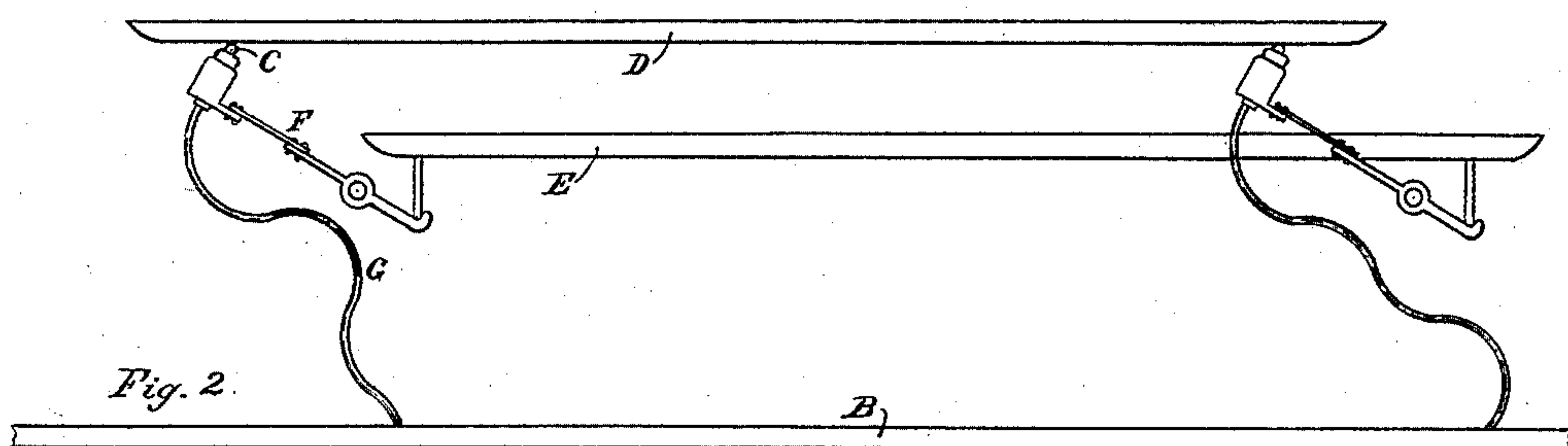
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WITNESSES

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FIG. 6.

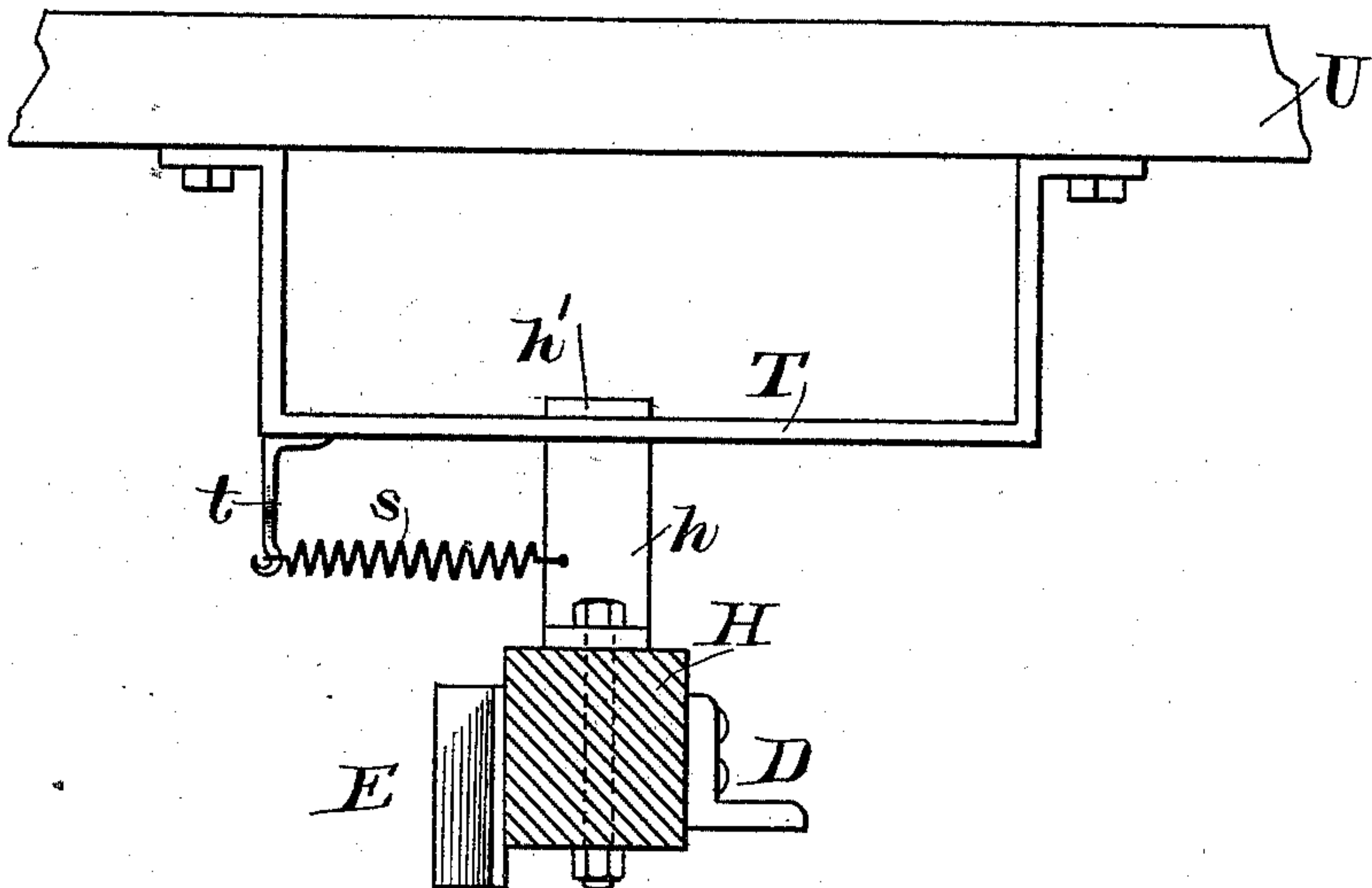
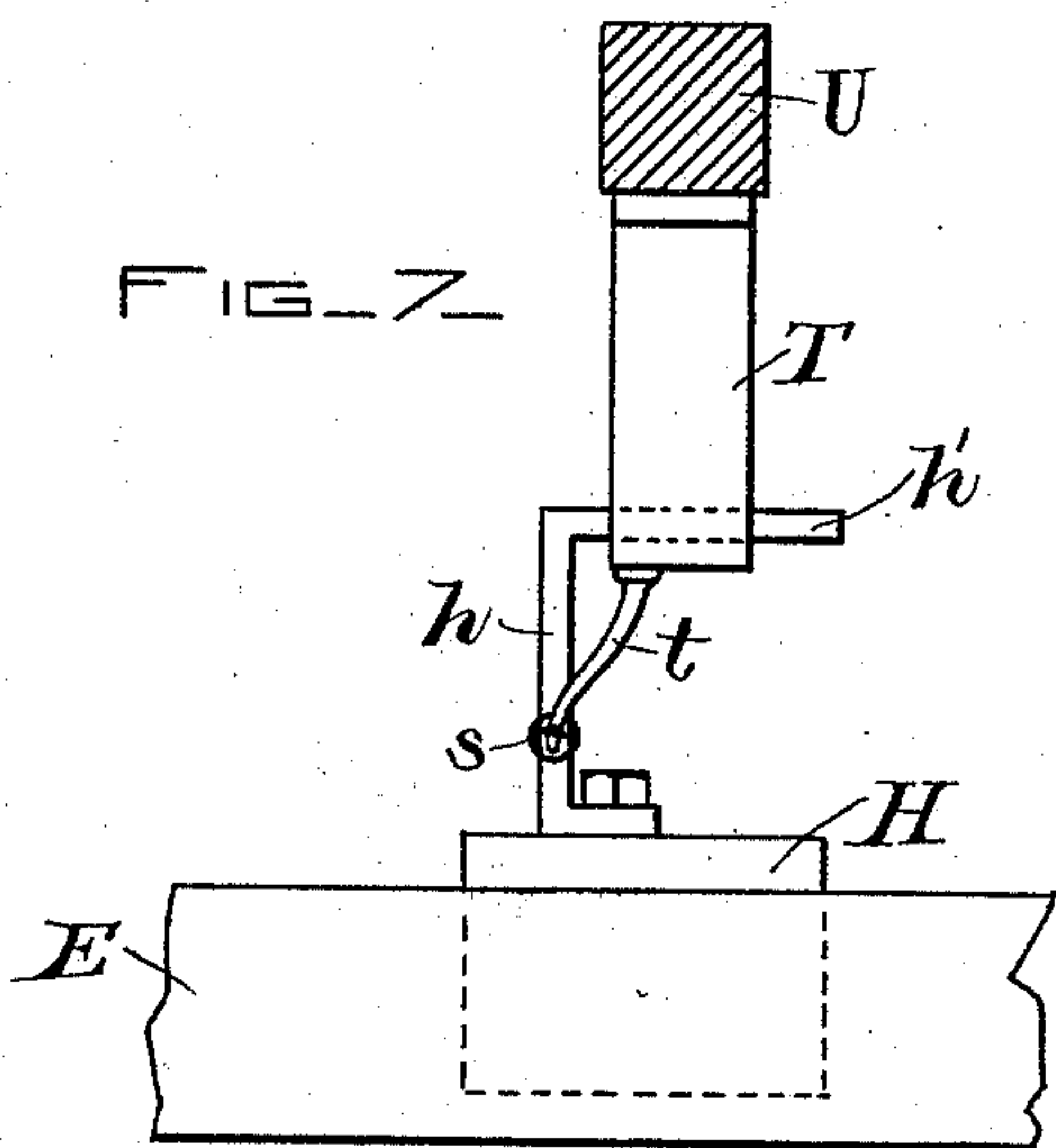


FIG. 7.



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INVENTOR:

*Edward M. Bentley*  
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ATTYS.



# UNITED STATES PATENT OFFICE.

EDWARD M. BENTLEY, OF NEW YORK, N. Y.

## ELECTRIC RAILWAY.

SPECIFICATION forming part of Letters Patent No. 426,580, dated April 29, 1890.

Application filed January 20, 1888. Serial No. 261,357. (No model.)

*To all whom it may concern:*

Be it known that I, EDWARD M. BENTLEY, a citizen of the United States, residing at New York, in the county of New York, State of New York, have invented certain new and useful Improvements in Electric Railways, of which the following is a specification.

My invention relates to electric railways; and it consists in devices whereby the main supply-conductor can be completely inclosed and insulated throughout its length except at intervals where it is exposed, and at these exposed points a connection is made between it and a contact-conductor of a length substantially equal to the distance between two exposed points and carried by an electrically-propelled vehicle. It is illustrated in the accompanying drawings, wherein—

Figure 1 is a transverse section through a contact or junction box. Fig. 2 is a diagram of the connection at two successive junction-boxes. Fig. 3 is a plan of the apparatus on a curve. Fig. 4 is a plan of a junction-box. Fig. 5 is a section on the line 5 5 of Fig 4, and Figs. 6 and 7 are respectively end and side views, showing the means of connecting the contact-conductor to the car.

In the drawings B is the main supply-conductor, which is completely inclosed and insulated except at intervals of about fifteen feet, where there is an exposed point or contact and a contact-box inclosing it.

D is a contact-conductor, slightly longer than the intervals between the exposed points. It is suspended from a traveling vehicle by insulators H and is connected to one terminal of the propelling-motor of the vehicle. At each junction-box provision is made for establishing a connection between the exposed point in the box and the contact-conductor D as the vehicle moves along.

In Fig. 1 F is a lever pivoted at L and carrying at its lower end a metallic contact-piece C, which is connected to the main conductor B by the flexible insulated wire G. The point C is insulated from the lever F by a bushing M.

A represents the walls of the box which extends through the paving, flush with the street-surface, and connects with a drainage pit or pits R located below the pavement.

On the top of the box is an opening adapted to receive the socket N at the end of the lever F.

H' is a trip extending horizontally through an opening in an offset of the box where it is readily accessible from the surface of the street. The inner end of this pin bears against the shorter arm of lever F and when forced in throws the lever up into the position shown by the dotted lines. In this position of lever F the contact-pin C is raised above the surface of the roadway through the openings in the junction-boxes, where it may come into contact with D and be held against it by the resiliency of the spring forming the longer arm of lever F.

E is a circuit-controller, carried by the vehicle and corresponds in length with conductor D, from which it is insulated. This circuit-controller is carried by the vehicle in such a position that it will strike the outer end of trip H' and forcing it inward throw the pin C against the conductor D. By this means an electric connection is established between the inclosed conductor B and the motor of the vehicle.

The conductor D is of such a length that it will be in contact with two successive pins C at the same time, so that the connection between the motor and the supply-conductor is constantly maintained. The other terminal of the motor may be connected with a similar apparatus, so as to be in connection with a corresponding supply-conductor, or the return-circuit may be through the rails or the metallic inclosure of conductor B.

In Fig. 2 the conductor D is shown diagrammatically in contact with two points C. When in its normal position, as shown in Fig. 1, the contact-point C is out of the path of travel of the contact device and in a position inaccessible thereto. It is also out of line with the opening in the top of the box, and any water or other substance which may enter said opening falls into the pit R, where it may be taken out at will without having caused any leakage or other trouble with the electrical arrangements. If desired, a cover may be provided for this opening, which will be operated by the circuit-controller E simultaneously with the trip H'. This is shown



in Figs. 4 and 5, in which O is a sliding cover which takes the place of the trip H'. It is operated by a projection Q, which extends into the path of circuit-controller E. In passing around a curve the length of the circuit-controller and contact-conductor makes it necessary that the boxes be placed nearer together and in a curve which is eccentric to the curve of the track, as is shown in Fig. 3. It will be seen from this figure that the circuit-controller is firmly held in an operative position by the springs S, which constantly tend to draw it to one side of the vehicle, so that the T-shaped points P may rest in corresponding sockets K. In rounding a curve the circuit-controller will take the position shown in dotted lines, while the trips H or the offsets Q will have their corners rounded to meet the controller.

The means for connecting the contact device and circuit-controller to the vehicle are more clearly shown in Figs. 6 and 7. They are attached to opposite sides of an insulating block or blocks H, from which there extends upwardly the arm h, provided with an angle portion h', which rests upon and is free to slide along the strap T, attached to a suitable portion U of the car structure. A spring s, connected at its respective ends to a bracket t and the arm h, normally holds the contact device and controller in the position shown in Fig. 3.

I claim—

1. In an electric railway, an insulated supply-conductor supplied with a series of movable exposed contacts normally in circuit with the supply-conductor, but out of the path of travel of the contact device, in combination with a contact-conductor attached to a vehicle on the railway and of a length equal to the distance between the said exposed contacts, and means controlled by the presence of the vehicle for successively bringing said contacts into engagement with the traveling contact device.

2. The combination, in an electric railway, of an insulated supply-conductor supplied with a series of movable exposed contacts normally housed in a position inaccessible to the contact device, but brought successively into engagement with the same as the vehicle travels over the railway.

3. The combination, in an electric railway, of an insulated supply-conductor supplied with a series of movable contacts, a contact device attached to the vehicle upon the railway, and a circuit-controller distinct from the said contact device for successively establishing an electrical connection between the supply-conductor and contact device through the said contacts.

4. The combination, in an electric railway, of an insulated supply-conductor provided with a series of movable contacts normally arranged out of the path of travel of the contact device, with a mechanical circuit-con-

troller attached to the car and successively bringing said contacts into engagement with the contact device as the vehicle travels over the railway.

5. The combination, with the inclosed insulated supply-conductor exposed at intervals, of an inclosing-box for the exposed points provided with an opening, a contact-conductor carried by a vehicle and of a length equal to the distances between two exposed points, and a circuit-controller projecting the exposed contacts through the openings in the boxes into electrical connection with the contact-conductor.

6. The combination, with the inclosed insulated supply-conductor exposed at intervals, of a series of contact-boxes inclosing the exposed points, a cover for each of said boxes, an electrically-propelled vehicle, a projection from said vehicle for withdrawing the covers, and means for projecting the exposed contacts through the openings in the boxes into electrical connection with the contact device in circuit with the propelling-motor.

7. The combination, with the insulated supply-conductor exposed at intervals, of a series of boxes inclosing the exposed points and provided with pits and placed flush with the surface of the roadway, an electrically-propelled vehicle, and means for maintaining an electrical connection between the said vehicle and the exposed points of the supply-conductor through openings in the boxes inclosing the said points.

8. The combination, in an electric railway, with a drainage pit or pits below the street-pavement and a series of boxes communicating therewith and extending through the pavement flush with the street-surface, of an insulated supply-conductor provided with exposed contacts at intervals, which are housed in said boxes, as described.

9. The combination, with insulated conductor B, of the box A, flush with the surface of the roadway and provided with an opening, a movable conductor-point, actuating devices therefor carried by a vehicle, an electric motor on the vehicle, and means for establishing an electrical connection between the said motor and the said supply-conductor through the opening in box A.

10. The combination, with the insulated supply-conductor B, provided with conductor-points at intervals, each of which is connected to the supply-conductor by a wire G, of a series of boxes A, inclosing the conductor-points, and means for lifting the points through openings in the boxes, as described.

11. The combination of an insulated supply-conductor provided with a series of movable exposed contacts housed underground and a corresponding series of trips therefor, readily accessible at the street-surface, with a circuit-controller attached to a traveling vehicle for actuating said trips, and thereby establishing an electrical connection between



the exposed contacts and the contact device in circuit with the propelling-motor.

12. The combination, in an electric railway, of an insulated supply-conductor, a series of 5 movable exposed contacts for establishing an electrical connection between the supply-conductor and the propelling-motor, and flexible conducting-wires between the supply-conductor and contacts.

10 13. The combination, with a curved railway-track, of a supply-conductor exposed at intervals, a series of contact-boxes inclosing the exposed points of said conductor and placed in a curve eccentric to the railway- 15 track, a vehicle, a contact-conductor carried by said vehicle, of a length equal at least to the distance between two exposed points, and means for maintaining an electrical connection between the said contact-conductor

and the exposed points of the supply-con- 20 ductor.

14. The combination, with a curved railway-track, of an insulated supply-conductor exposed at intervals, a series of contact-boxes 25 for said exposed points placed in a curve along said track, and a contact-conductor carried by a vehicle, and movable laterally relatively thereto for maintaining the electrical connection between the said vehicle and the exposed points of the supply-con- 30 ductor.

In witness whereof I have hereunto subscribed my name this 19th day of December, 1887.

EDWARD M. BENTLEY.

Witnesses:

ROBT. W. BLACKWELL,  
JULIEN M. ELLIOT.