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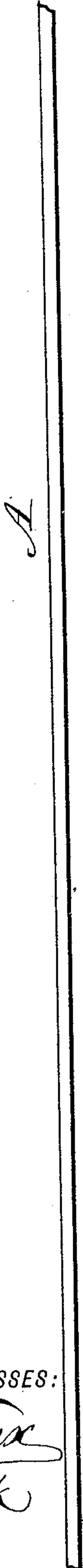
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J. W. RIGGS.  
RAILWAY SIGNAL.

No. 408,671.

Patented Aug. 6, 1889.

*Fig. 1*



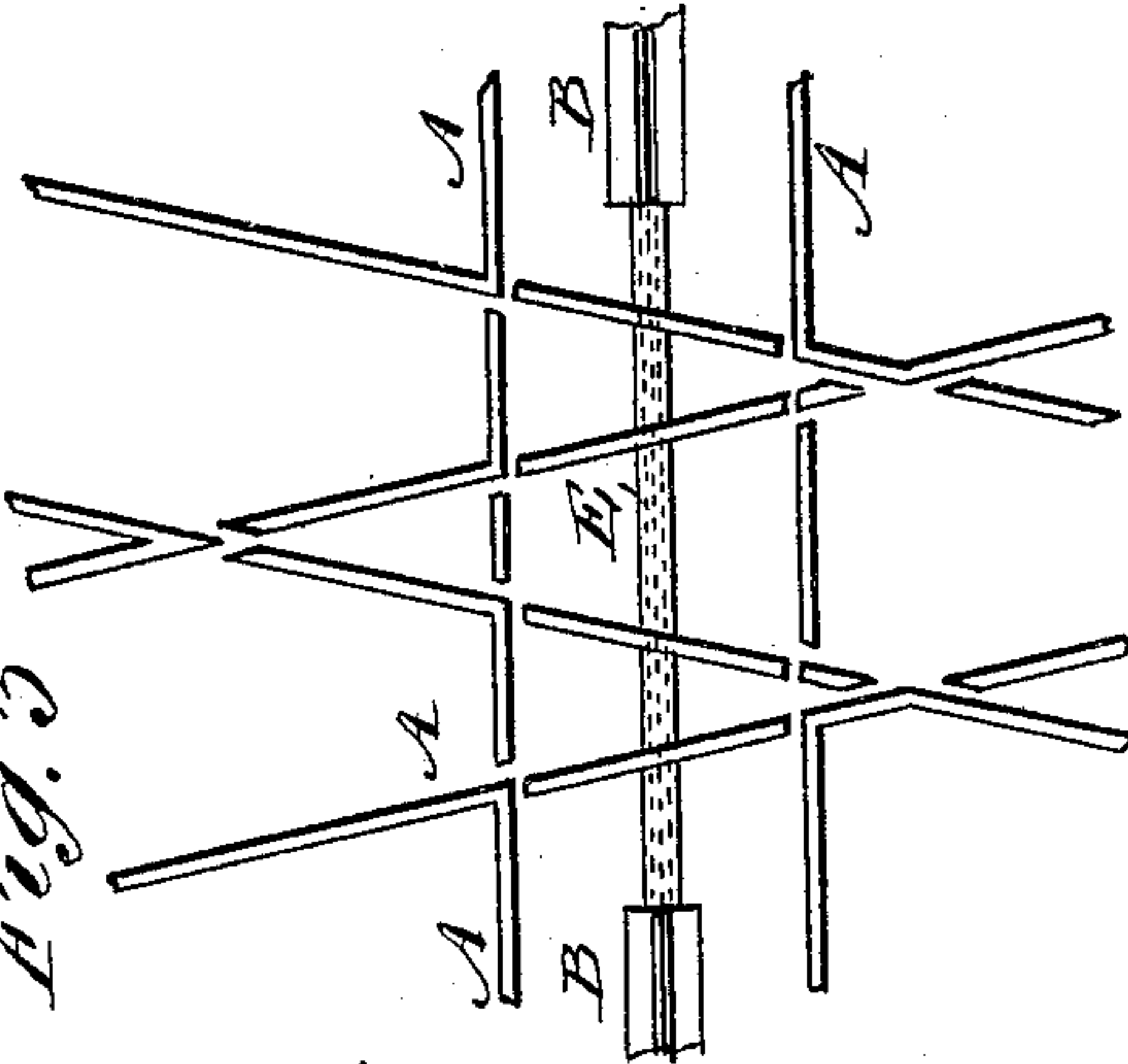
*B*



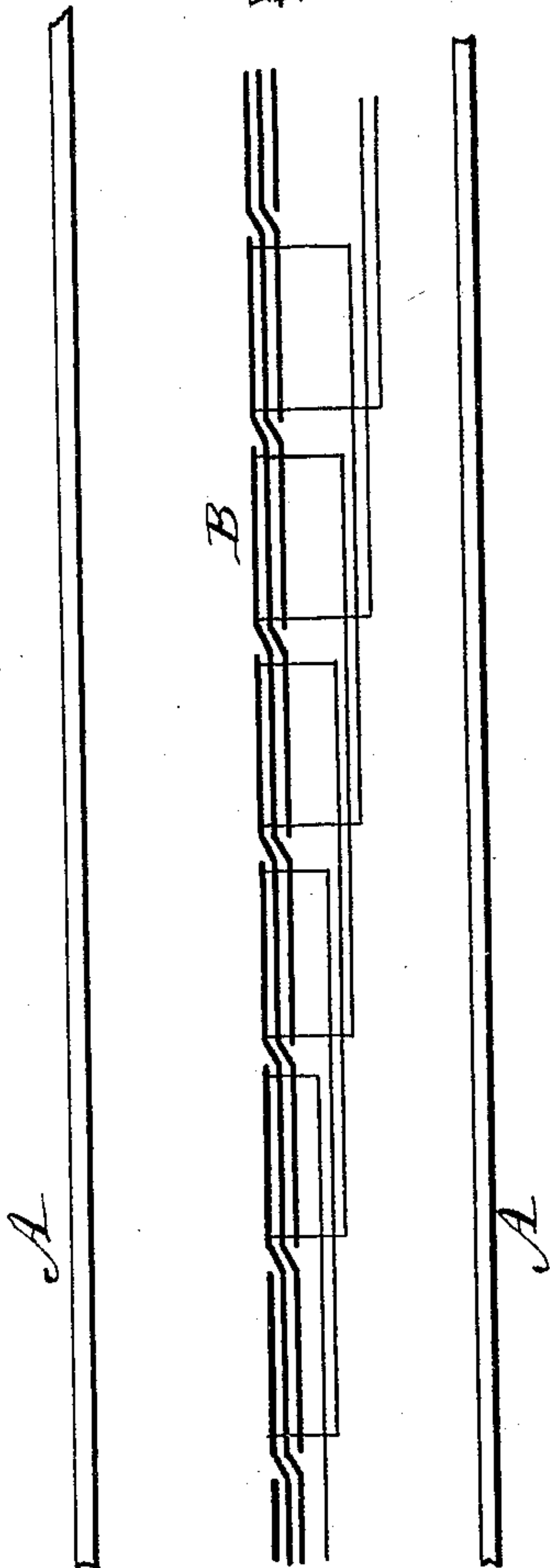
*A*



*Fig. 3*



*Fig. 2*



WITNESSES:

*C. Neveu*  
*Co. Sedgwick*

INVENTOR:

*J. W. Riggs*  
BY *Munn & Co*

ATTORNEYS.

(No Model.)

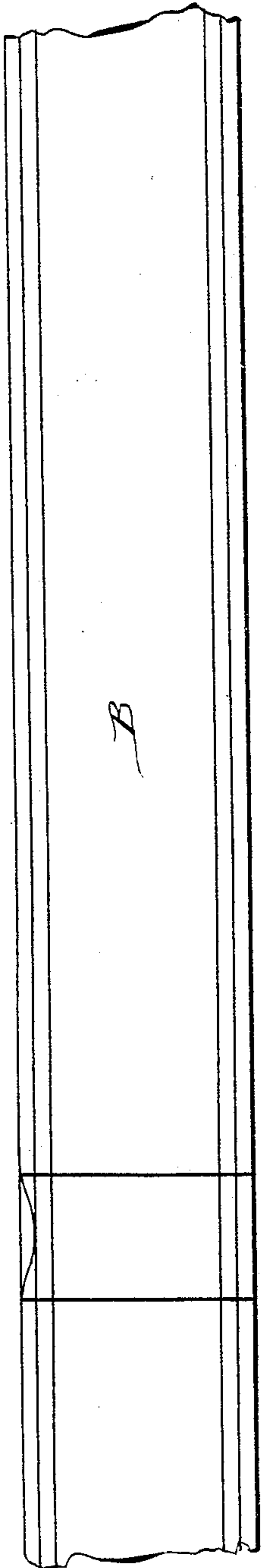
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Fig. 4



WITNESSES:

*C. Newell*  
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Fig. 5

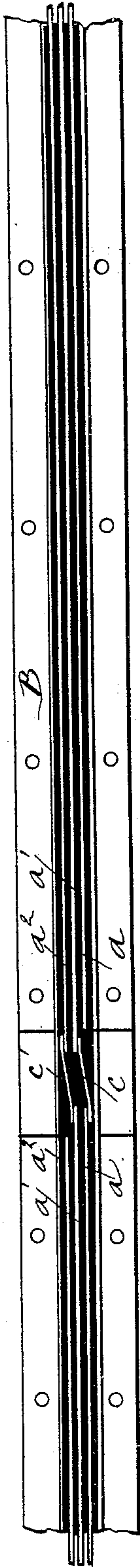


Fig. 7

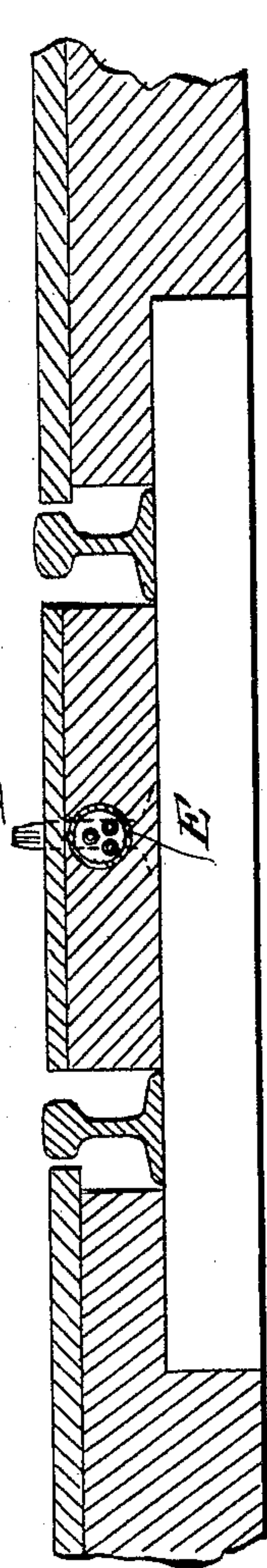


Fig. 8

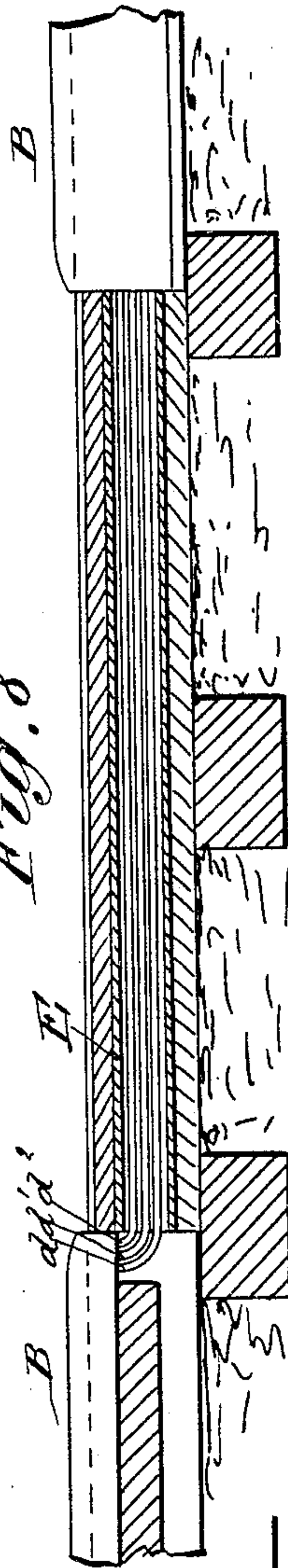
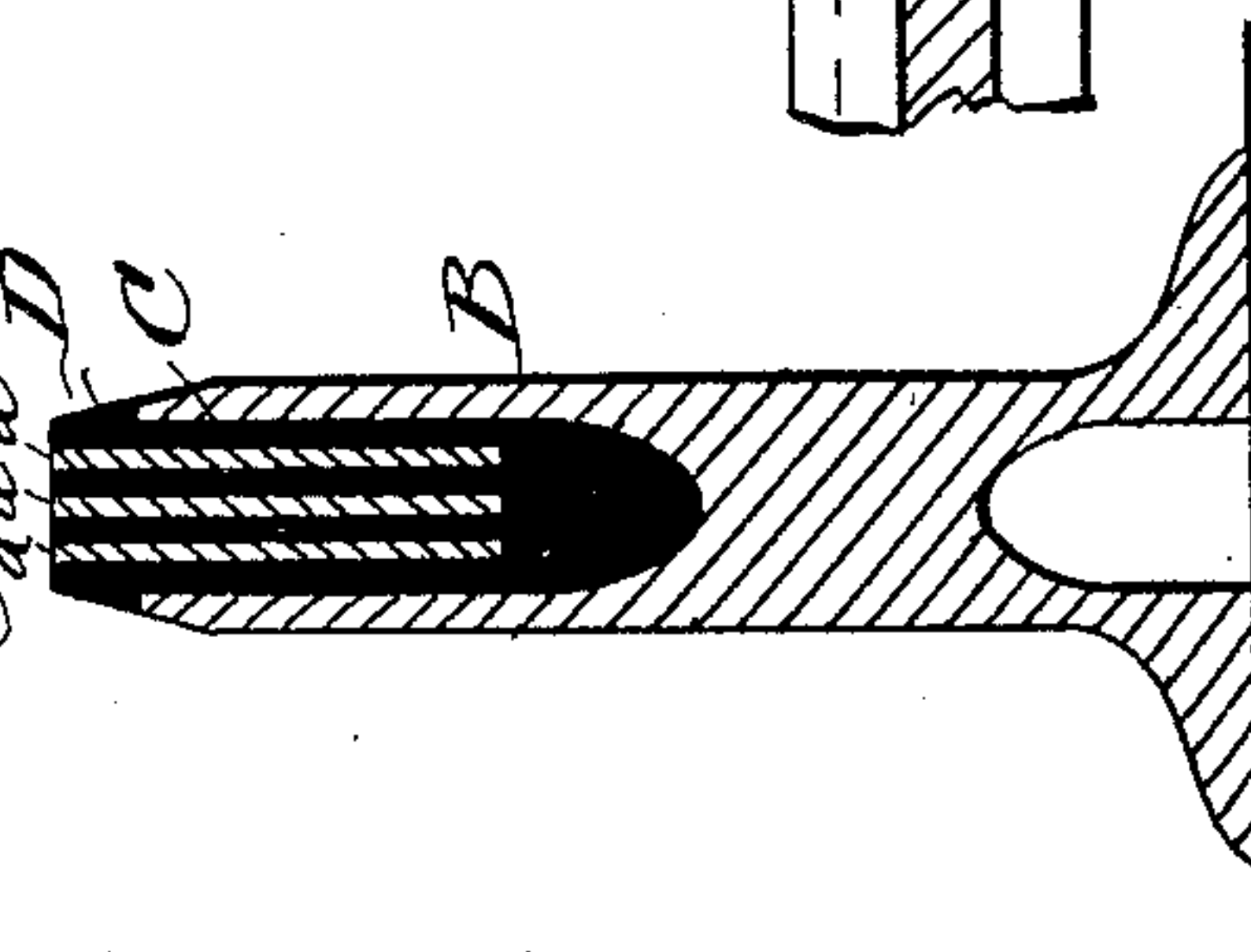


Fig. 6



INVENTOR:

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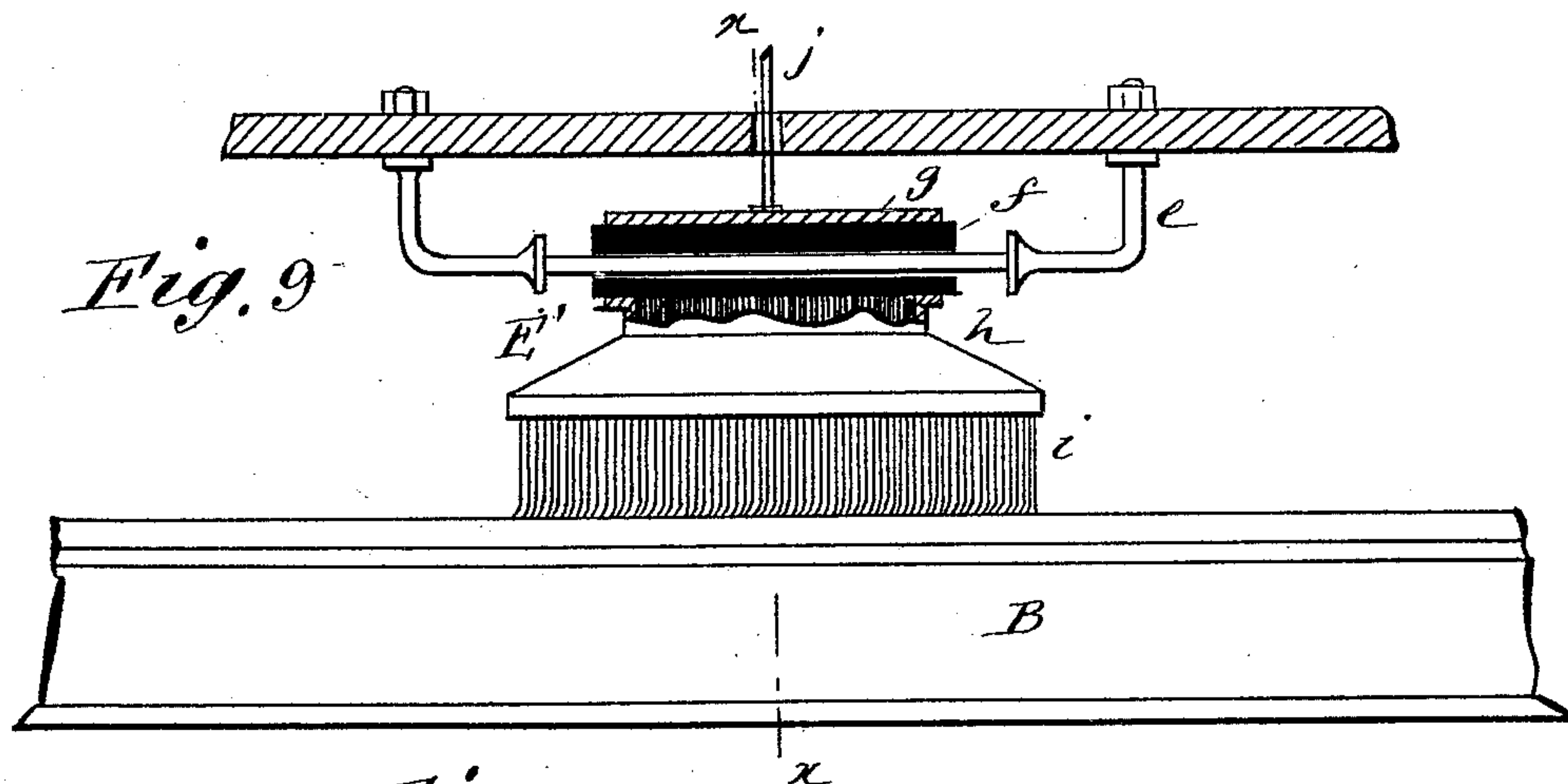
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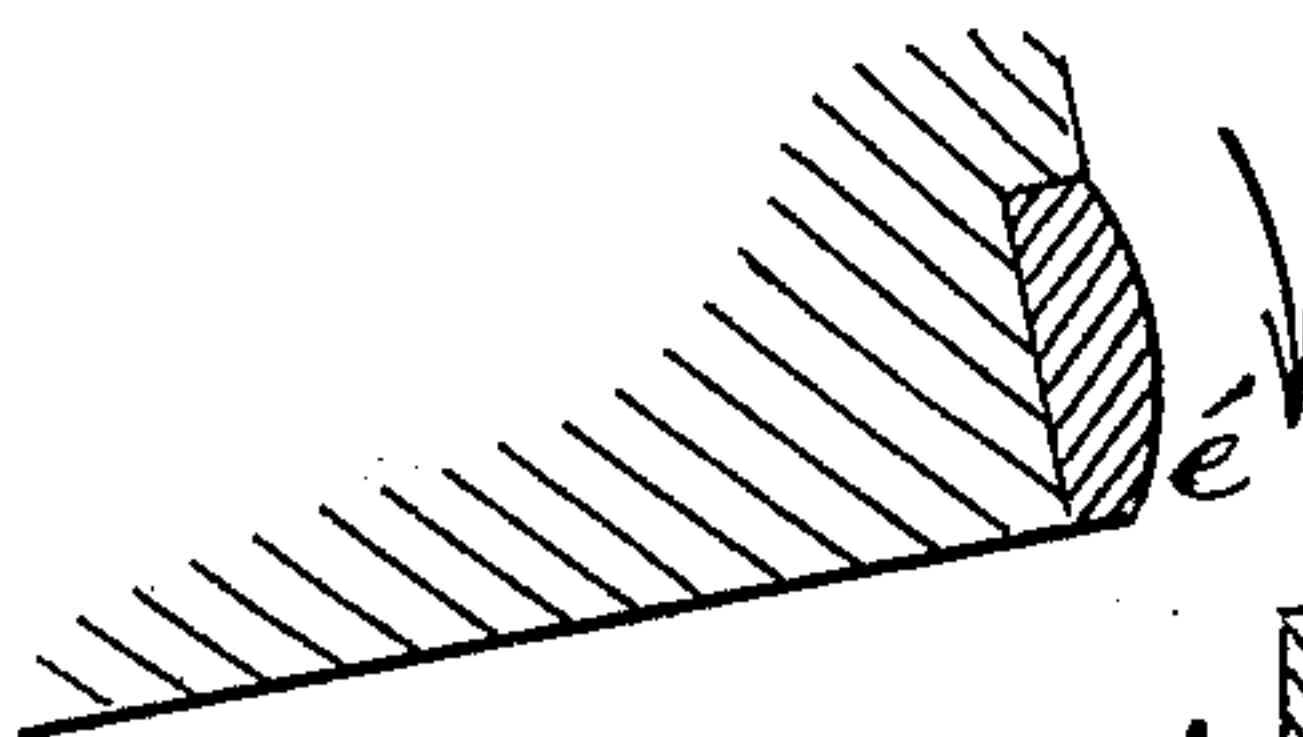
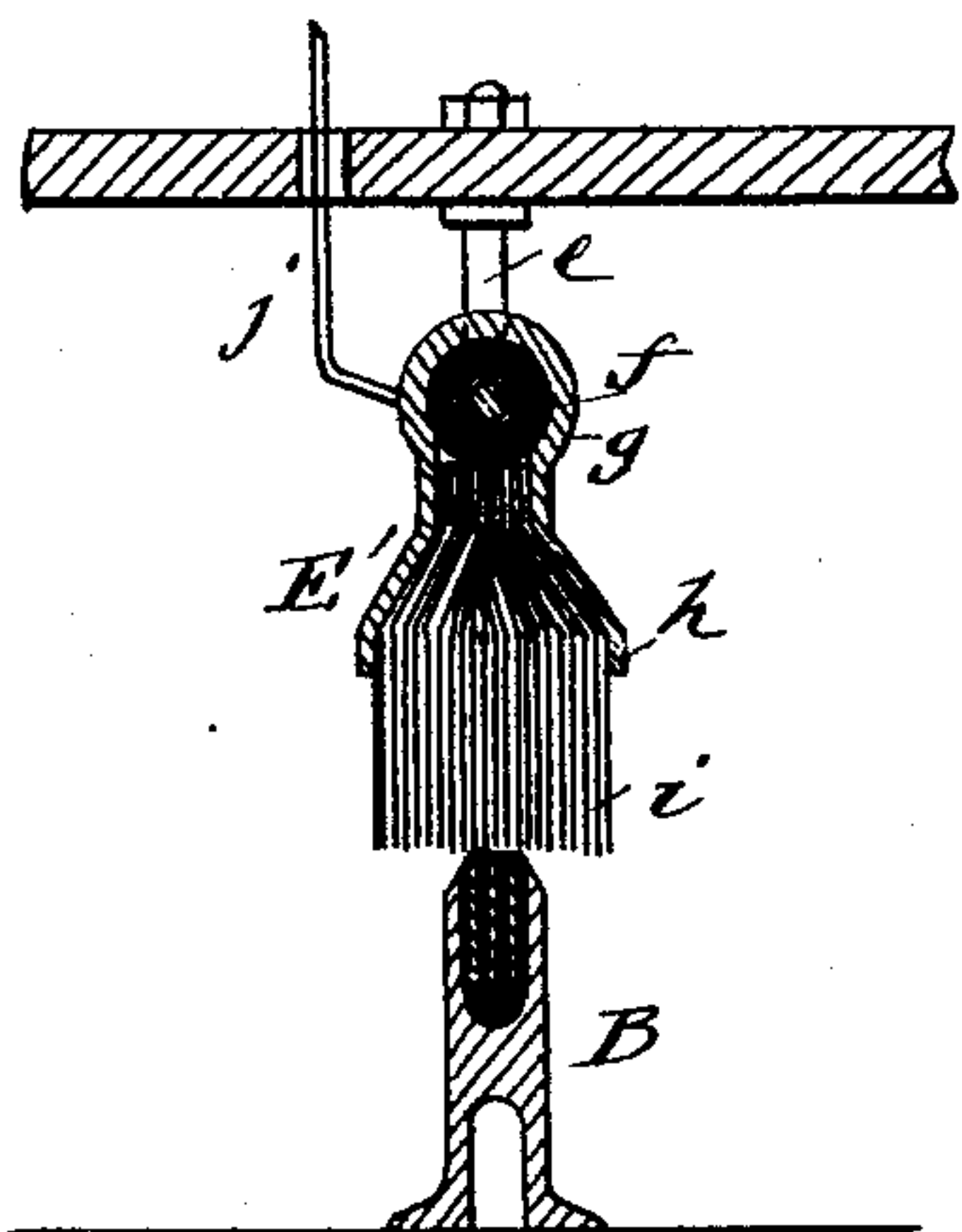
J. W. RIGGS.  
RAILWAY SIGNAL.

No. 408,671.

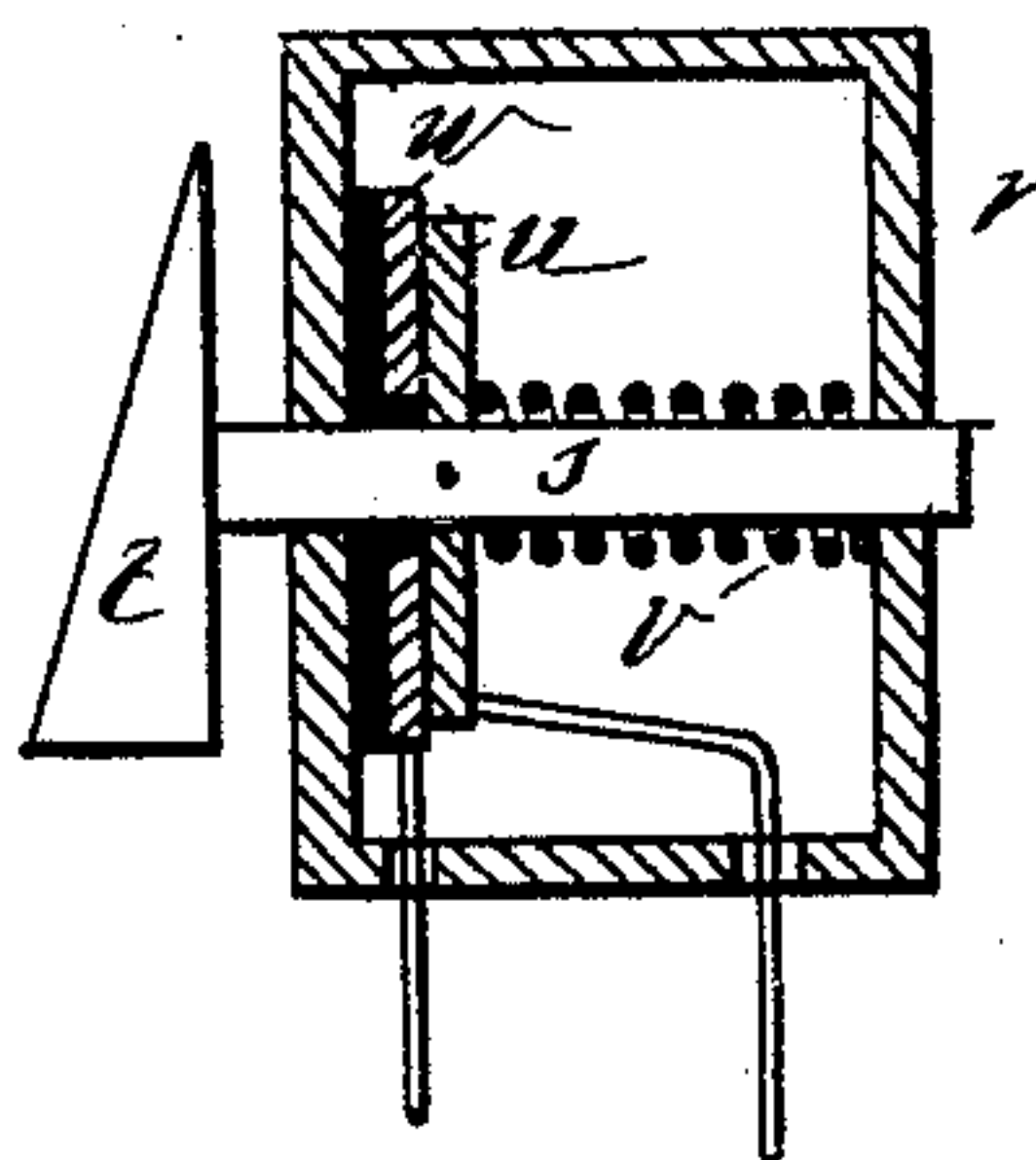
Patented Aug. 6, 1889.



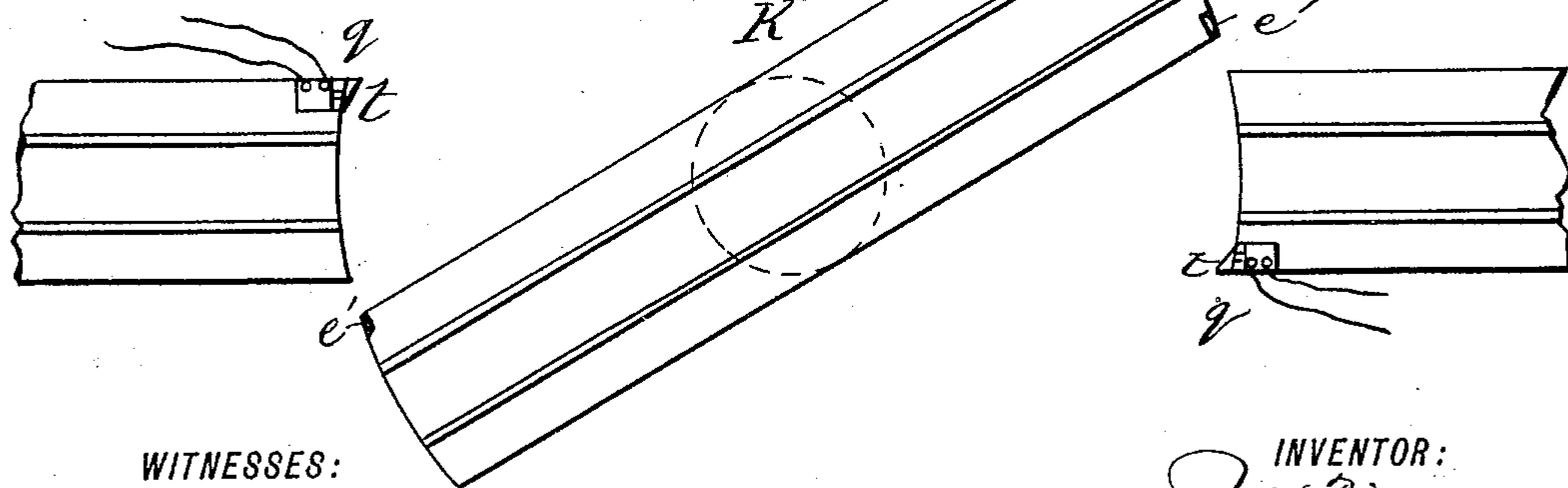
*Fig. 10*



*Fig. 12*



*Fig. 11*



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(No Model.)

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J. W. RIGGS.  
RAILWAY SIGNAL.

No. 408,671.

Patented Aug. 6, 1889.

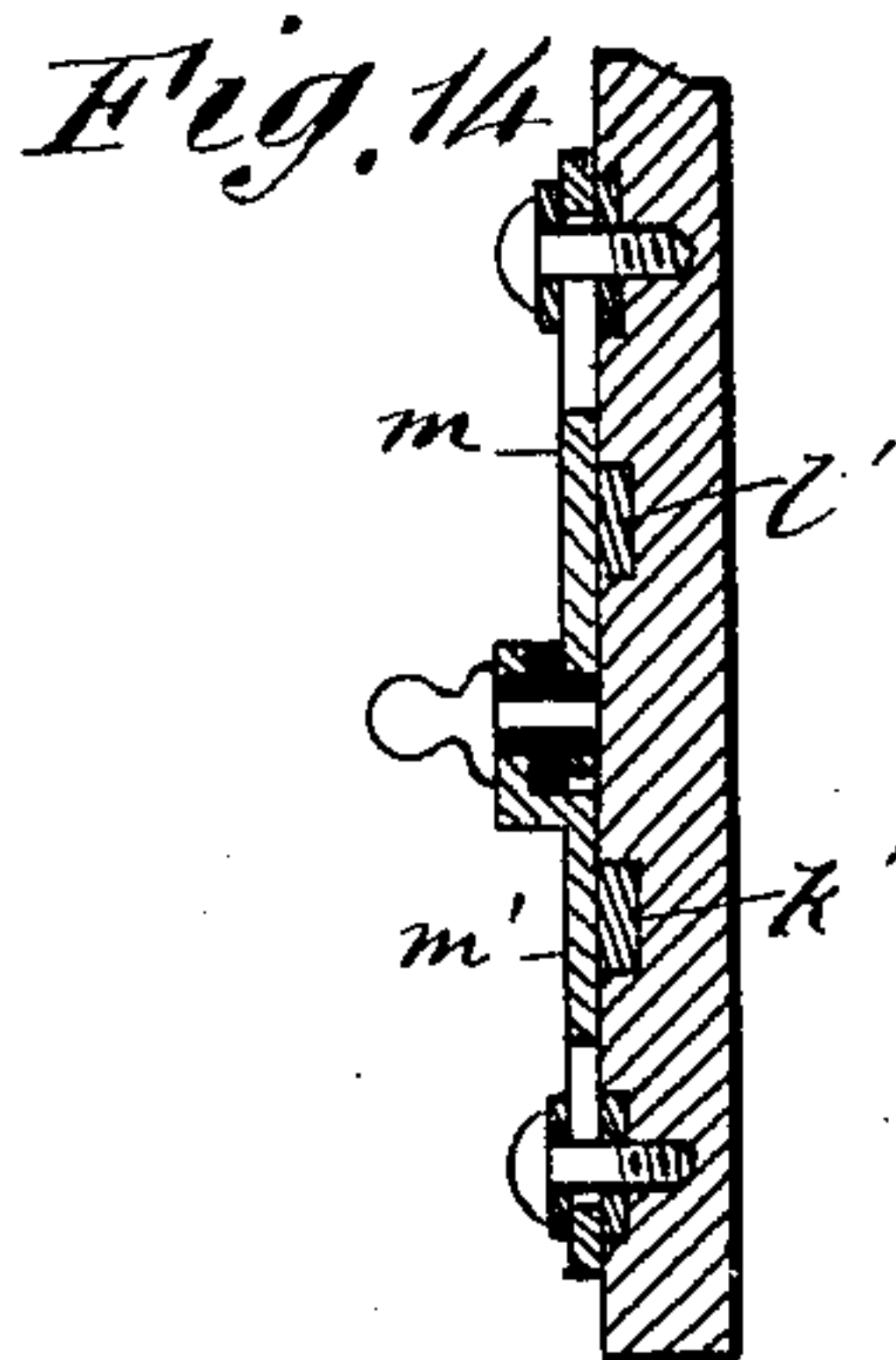
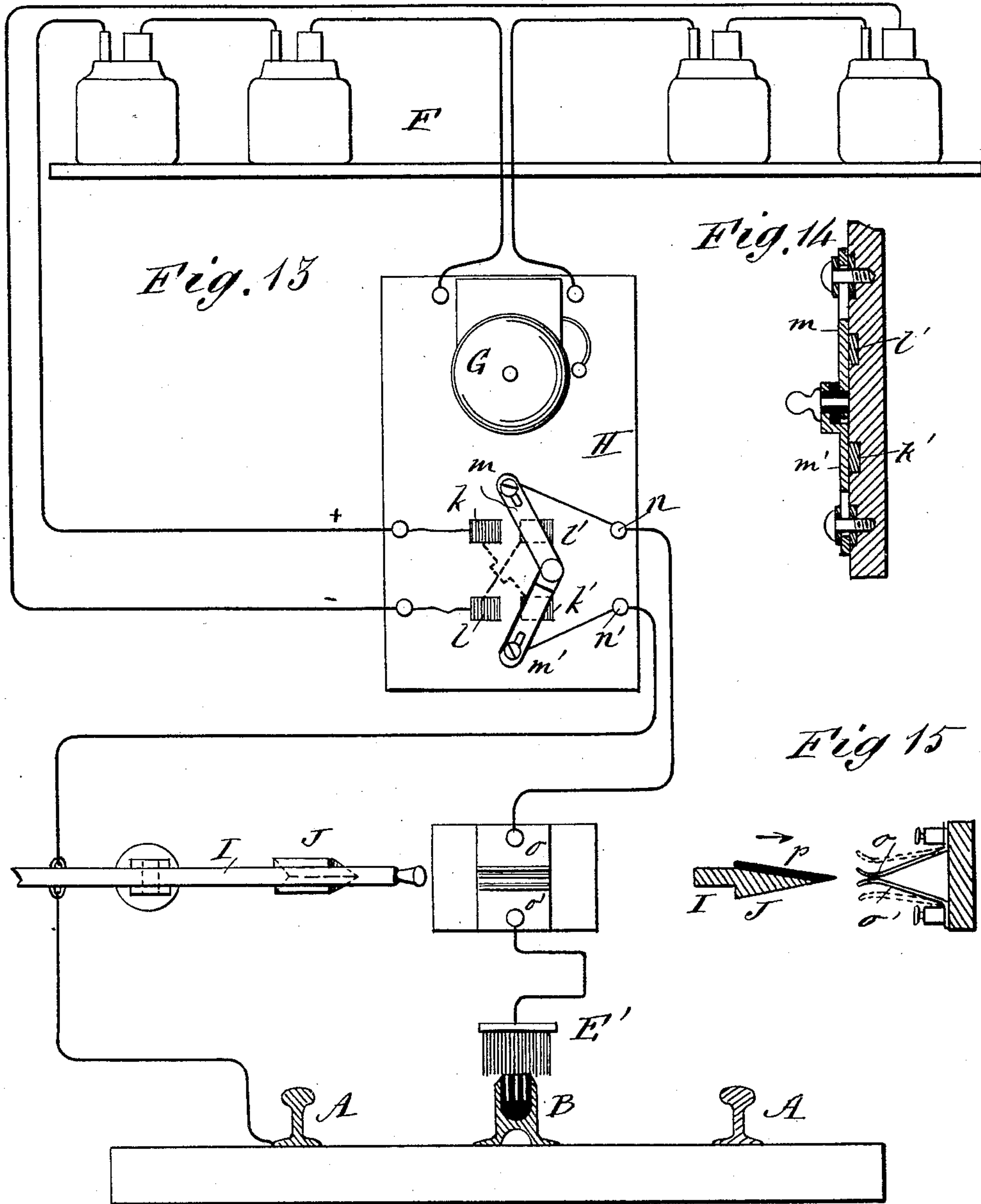


Fig 15

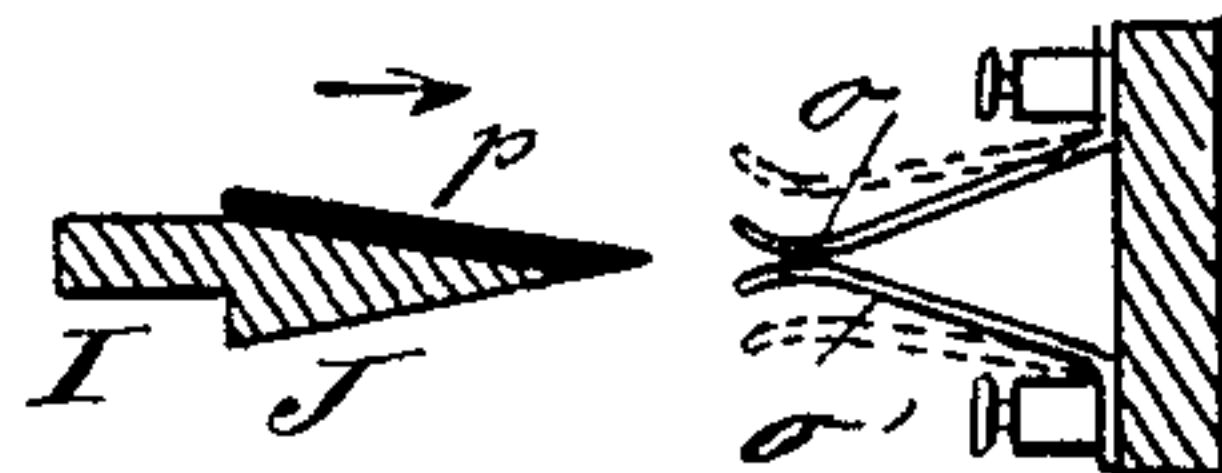
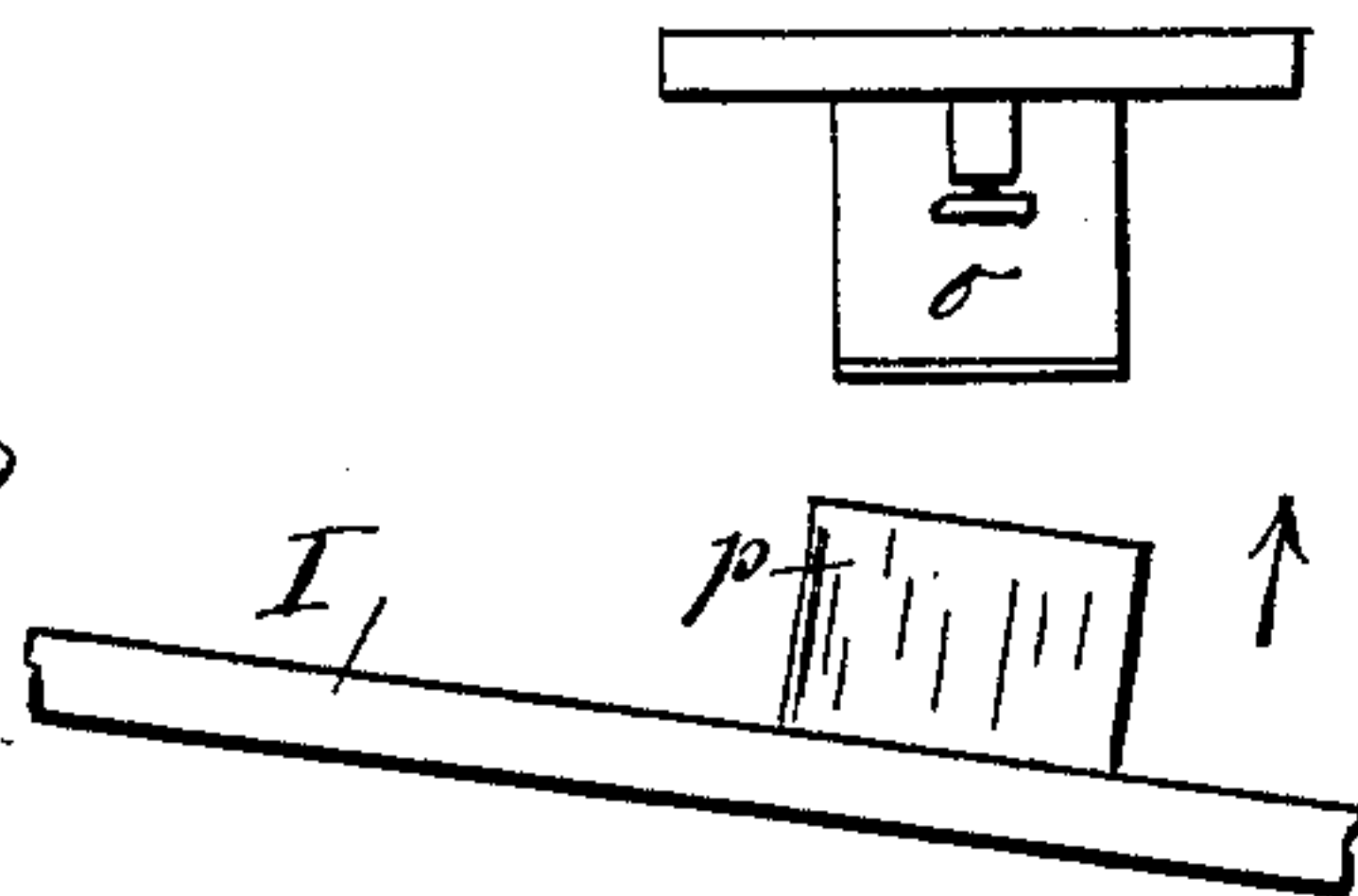


Fig. 16



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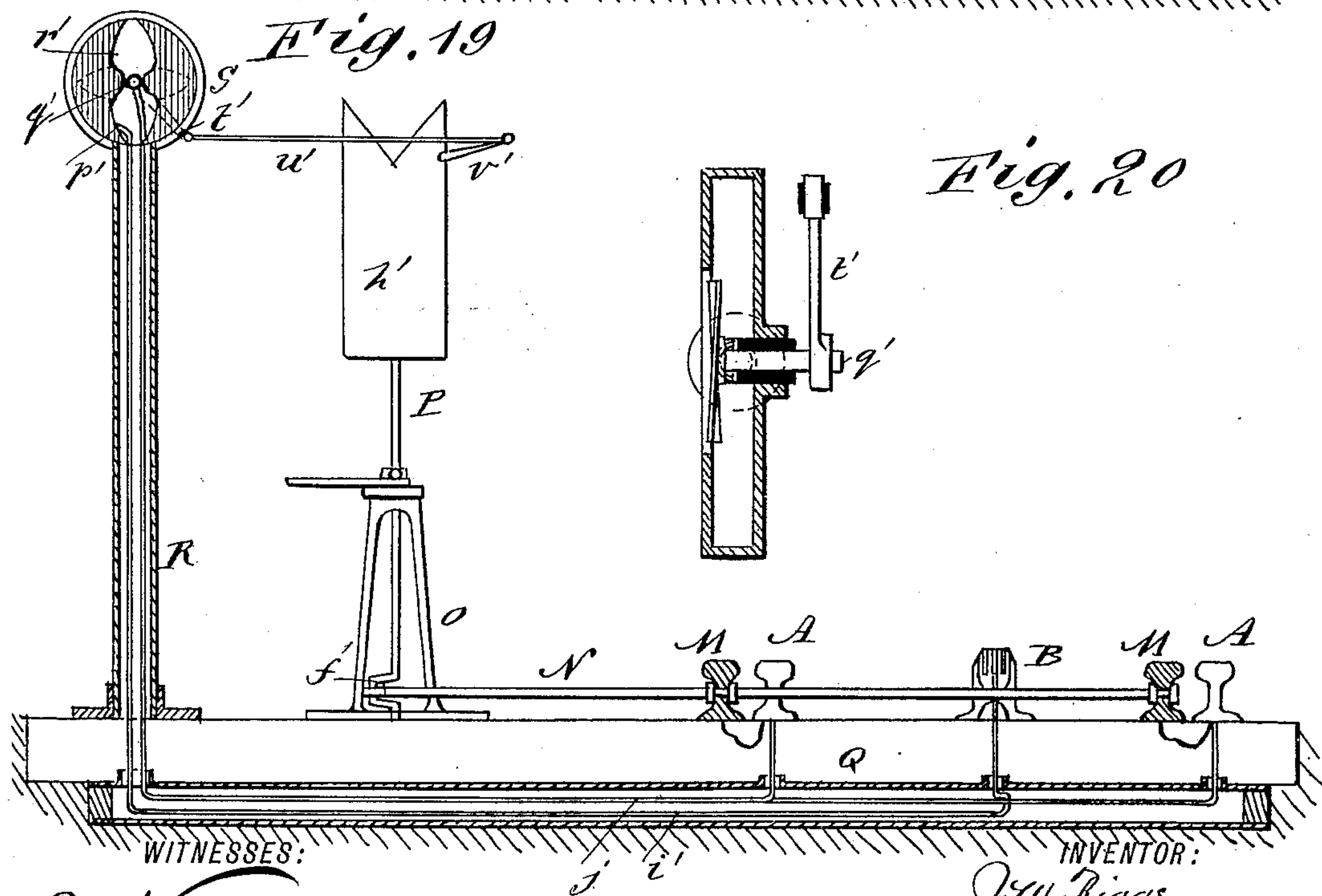
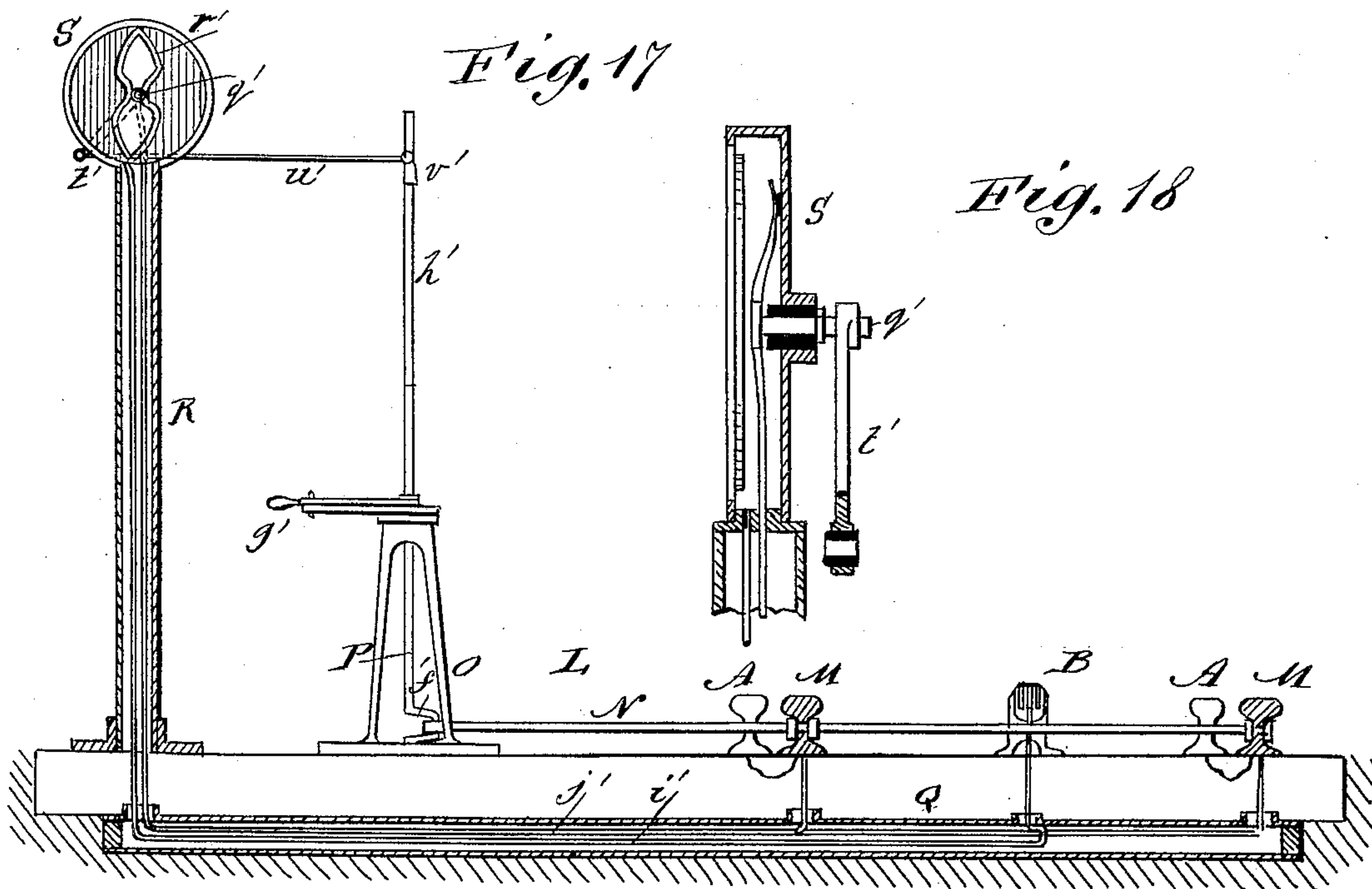
(No Model.)

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J. W. RIGGS.  
RAILWAY SIGNAL.

No. 408,671.

Patented Aug. 6, 1889.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

JOSEPH W. RIGGS, OF ST. PAUL, ASSIGNOR TO THE RIGGS ELECTRIC TRAV-  
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## RAILWAY-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 408,671, dated August 6, 1889.

Application filed September 13, 1888. Serial No. 285,292. (No model.)

*To all whom it may concern:*

Be it known that I, JOSEPH W. RIGGS, of St. Paul, in the county of Ramsey and State of Minnesota, have invented a new and Improved Railway-Signal, of which the following is a specification, reference being had to the annexed drawings, forming a part thereof, in which—

Figure 1 is a diagram of a section of track and the conductor. Fig. 2 is a diagram of the track and conductor, showing the circuit as completed through the trains. Fig. 3 is a diagram showing the arrangement of the conductor at a crossing. Fig. 4 is an enlarged side elevation of the conductor. Fig. 5 is an enlarged plan view of the same. Fig. 6 is a transverse section of the same. Fig. 7 is a transverse section of the track and conductor at a crossing. Fig. 8 is a longitudinal section of the same. Fig. 9 is a side elevation, partly in section, of the brush for taking the current from the conductor. Fig. 10 is a transverse section taken on line  $xx$  in Fig. 9. Fig. 11 is a plan view of a swing-bridge, showing the arrangement of the circuit-closers. Fig. 12 is a sectional plan view of the bridge-circuit closer. Fig. 13 is a diagrammatic view of alarm devices carried by the locomotive. Fig. 14 is an enlarged sectional view of the current-reversing switch. Fig. 15 is an enlarged sectional view of the switch operated by the throttle-valve lever. Fig. 16 is a plan view of the same. Fig. 17 is a sectional side elevation of the switching mechanism, showing the switch in one position. Fig. 18 is an enlarged vertical section of the electric switch. Fig. 19 is a side sectional elevation of the switch in a reverse position, and Fig. 20 is a horizontal section of the electric switch.

Similar letters of reference indicate corresponding parts in all the views.

The object of my invention is to construct a simple and effective railway-signal to be used for signaling from one train to another in case of accident and for the prevention of collisions and derailment at draw-bridges and switches.

The invention consists in the particular construction and arrangement of parts, as

hereinafter fully described, and pointed out in the claims.

Between the track-rails  $A A$  is located a central rail  $B$ , having in the upper edge thereof a groove  $C$ , in which are placed three conductors  $a a' a^2$ , preferably formed of flat plates of iron or steel, placed edgewise in the groove  $C$ , and separated from each other and from the grooved track-rail  $B$  by an insulating-filling  $D$ . The conductors  $a a' a^2$  are arranged in groups of three each of convenient and suitable length, two of the conductors of each group being connected with two of the next succeeding group, as shown in Figs. 1, 2, and 5, the conductor  $a$  of the first group being connected by a wire or conductor  $c$  with the conductor  $a'$  of the second group, and the conductor  $a'$  of the first group is connected by a wire or conductor  $c'$  with the conductor  $a^2$  of the second group, and so on throughout the entire series of conductors. By this arrangement it will be seen that one bar of each section has its terminal at the end of the said section, the second bar has its terminal at the end of the second section, and the third bar its terminal at the end of the third section.

At the crossings the conductors upon one side are connected with the conductors upon the opposite side of the crossing by wires  $d d' d^2$ , which extend under the highway or other railway through a pipe  $E$ . At the ends of the sections of the rail  $B$  the upper edges of the conductors (at their ends) and the connecting-strips  $c c'$  are concaved or cut away, as shown in Fig. 4, to prevent the brush which takes off the current from catching the ends of the conductors  $a a' a^2$ .

The rail  $B$  is somewhat higher than the regular track-rails  $A A$ , but is not sufficiently high to be struck by the pilot or by any part of the locomotive or car. From the pilot or from some car of the train is suspended a loop  $e$ , upon which is placed an insulating-sleeve  $f$ , which carries a metallic sleeve  $g$ , to which is attached the metallic brush-back  $h$  of the brush  $E'$ , which is filled with elastic steel and copper wires  $i$ , arranged in electrical communication with the back  $h$  and adapted to brush along the upper end of the conducting-



5 rail B, as shown in Figs. 9 and 10. The sleeve *g* is connected with an electrical conductor *j*, which extends to the cab of the locomotive, and is connected with the alarm mechanism, presently to be described.

10 Each locomotive is provided with the devices shown in Fig. 13, which are arranged for sending and receiving an alarm. In the circuit of the battery *F* is placed the electric bell *G*, and wires extend from the battery *F* to the switch contact-points *k l*, the positive current passing to the contact-point *k* and the negative to the point *l*. The point *k* is connected electrically with the point *k'*, and the point *l* is connected electrically with the point *l'*, the said connections being crossed, as indicated in dotted lines in Fig. 13.

20 To the base *H*, which supports the bell *G* and the contact-points *k k' l l'*, are pivoted the switch-arms *m m'*, which are connected with each other mechanically, but not electrically, so that they may both move simultaneously. The pivot of the switch *m* is connected with the binding-post *n*, and the pivot of the switch *m'* is connected with the binding-post *n'*.

30 Upon the locomotive-boiler and opposite the path of the throttle-valve lever *I* are supported a pair of contact-springs *o o'*, which are insulated from each other, the contact-spring *o* being connected with the binding-post *n*, the contact-spring *o'* being connected with the brush *E'*. Upon the throttle-valve lever *I* is secured a metallic wedge *J*, having an insulating-face *p*. A wire connects the throttle-valve lever *I* with the binding-post *n'*, and the throttle-valve lever is also connected with the ground through the truck-wheels and the rail *A*.

40 At every swing-bridge *K* there are two contact-breakers *q*, each consisting of a box *r*, through which passes a rod *s*, carrying upon its outer end a beveled head *t*, and having within the box a collar *u*, which, together with the rod *s*, is pressed by a spring *v* so as to bring the said collar *u* into contact with the contact-piece *w*. One wire of the circuit of the conducting-rail B is connected with the collar *u*. The other wire is connected with the contact-piece *w*. The contact-breakers *q* are arranged upon the approach of the swing-bridge *K* at diagonally-opposite corners of the bridge, and these corners of the bridge are provided with striking-plates *e'* for engaging the heads *t* as the bridge is closed.

60 The railway-track switch *L* consists of the switch-rails *M*, the rod *N*, connected with the switch-rails, and the switch-stand *O*, provided with a vertical rod *P*, having a crank *j'* for receiving the rod *N*, with a hand-lever *g'* for turning the shaft *P*, and with a plate *h'* for indicating in the usual way whether the switch is open or closed.

65 Under the track is laid a pipe *Q*, which contains two conductors *i' j'*. The conductor *i'* is connected with the central conducting-

70 rail B, and the conductor *j'* is connected with the main-track rails *A*. The pipe *Q* and the conductors *i' j'* extend beyond the switch-stand *O*, and the said conductors *i' j'* extend upwardly through a vertical iron pipe *R*, the conductor *i'* being connected with the contact-plate *p'* and the conductor *j'* being connected electrically with the shaft *q'* in the case *S*.

80 The case *S* is provided with glass sides, and in it is placed an arm *r'* upon the shaft *q'*, which also serves as an electric switch-arm. To the shaft *q'* is secured an arm *t'*, which is connected by a connecting-rod *u'* with an arm *v'*, attached to the plate *h'*, so that when the said plate *h'* is turned the arm *r'* is also turned. When the switch is set so that the main track is straight, the arm *r'* is free from contact with the stationary plate *p'*; but when the switch is turned the arm comes in contact with the plate and closes the circuit, so that the signal upon the cars will indicate danger. The main rails and the switch-rails are connected electrically.

90 The operation of my improved railway-signal is as follows: The switch-arms *m m'* being arranged on the contact-points *k l* on all the trains going in one direction (say east) and the switch-arms upon all the trains going west being on the contact-points *k l*, the circuit remains open so long as three of the conductors *a a' a''* are touched by only one brush; but when a train carrying another brush approaches within the length of three of the said conductors a connection is made which completes the circuit between them, which runs from one of the conductors *a, a',* or *a''* of the rail B to the brush *E'*, thence to the springs *o' o* on the locomotive, to the switch-arm *m*, through the contact-point *l'*, thence to contact-point *l*, thence to one pole of the battery, through the bell *G* back to the contact-point *k*, thence to the contact-point *k'*, switch-arm *m'*, binding-post *n'*, throttle-lever *I* into the track *A* or ground, and in a reverse direction through the same devices carried by the trains, so that the bell *G* on both trains is rung, notifying the engineers of the two trains that they are both on the same section of track. The engineers of the trains, in shutting off steam by means of the throttle-valve lever *I*, break the circuit between the springs *o o'*, which movement instantly acts with all intent and purpose as the closing together of the plates in the bridge and switch-boxes or the laying of an iron bar from one rail of the track to the conducting-bars—it closes the circuit—so that if another train happens along it will get the alarm.

125 By means of my improved conductor I am enabled to divide the track up into sections without the necessity of any complicated switches or track-instruments.

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

1. In a railway-signal, a compound con-



ductor consisting of three parallel flat bars or plates placed edgewise in sections and embedded in an insulating material except at their upper exposed edges, one bar or plate of each section having its terminal at the end of said section, the second bar or plate having its terminal at the end of the second section, and the third bar or plate having its terminal at the end of the third section, substantially as set forth.

2. In a railway-signal, a compound conductor consisting of a support provided in its top with a longitudinal vertical groove having a filling of insulating material, and the flat paralleled spaced plates embedded edgewise in said material in sections, with their upper edges only exposed, one bar or plate of each section having its terminal at the end of said section, the second bar or plate having its terminal at the end of the second section, and the third bar or plate having its terminal at the end of the third section, substantially as set forth.

3. In a railway-signal, the combination, with the car and the compound conducting-rail B, of the brush  $E'$ , formed of the metallic back  $h$ , the wires  $i$ , the insulating-sleeve  $f$ , the metallic sleeve  $g$ , and the loop  $e$ , suspended from the bottom of the car and adapted to support the brush in the position of use, substantially as specified.

4. In a railway-signal, the combination of the compound conductor having three parallel conductors arranged in sections connected

together, as described, a metallic brush  $E'$ , the pivoted switch-arms  $m m'$ , connected together and one of them connected to the brush, the contact-points  $k k' l l'$ , the points  $k k'$  and  $l l'$  being connected together, the battery  $F$ , connected to the contact-points  $k l$ , and the bell  $G$ , connected to the battery, substantially as described.

5. In a railway-signal, the combination of the compound conducting-rail B, having three parallel conductors in each section connected by diagonal connections, as described, the metallic brush  $E'$ , the switch-arms  $m m'$ , the contact-points  $k l k' l'$ , the battery  $F$ , the alarm-bell  $G$ , the contact-springs  $o o'$ , and the circuit-opening wedge  $J$ , provided with the insulating-surface  $p$ , substantially as specified.

6. In a railway-signal, the combination, with the circuit-wires, of the springs  $o o'$ , insulated from each other, the throttle-valve lever  $I$ , and the wedge  $J$ , provided with the insulating-surface  $p$ , the springs  $o o'$  being arranged in the path of the wedge  $J$ , substantially as specified.

7. In a railway-signal, the combination, with the electrical conducting-rail B and switch-stand  $O$ , of the branch conductors  $i' j'$ , shaft  $q'$ , provided with the arm  $t'$ , the arm  $r'$ , the rod  $u'$ , and arm  $v'$ , attached to the switch-stand, substantially as specified.

JOSEPH W. RIGGS.

Witnesses:

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L. E. OGLE.