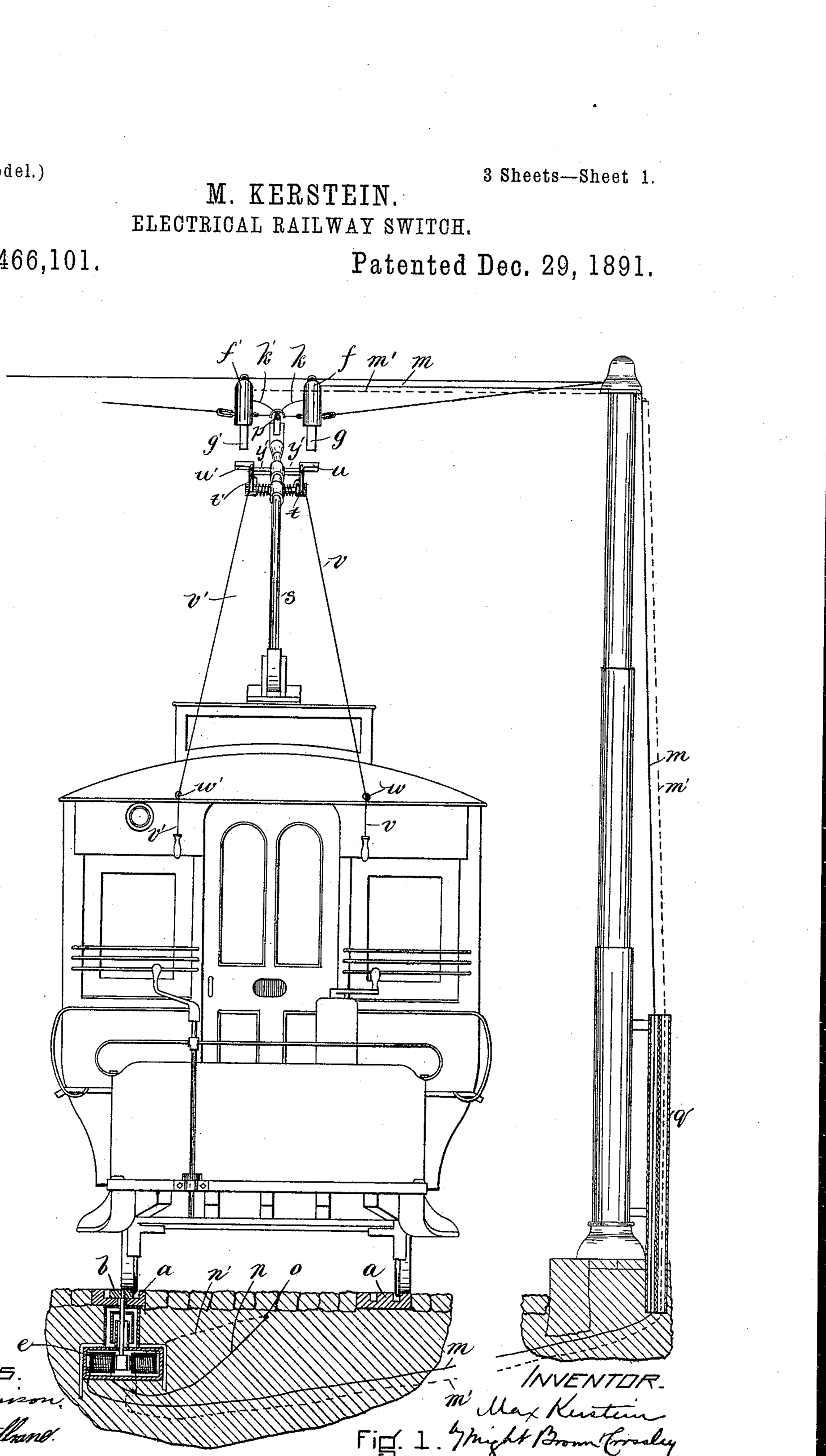
(No Model.) 3 Sheets—Sheet 1.

M. KERSTEIN.

ELECTRICAL RAILWAY SWITCH.

No. 466,101. Patented Dec. 29, 1891.



WITNESSES.
A. D. Harrison.
B. A. McSloane.

Fig. 1.

INVENTOR.
Max Kerstein
by Wright Brown Quinby & Otts.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.)

3 Sheets—Sheet 2.

M. KERSTEIN.

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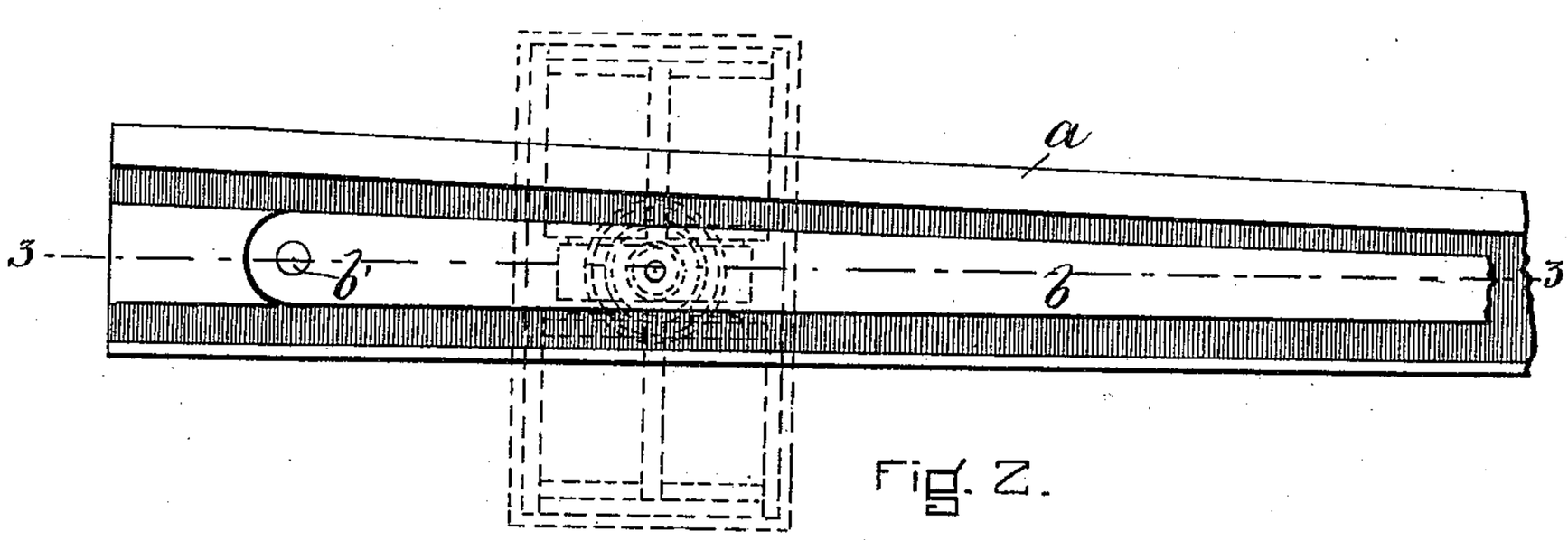

Fig. 2.

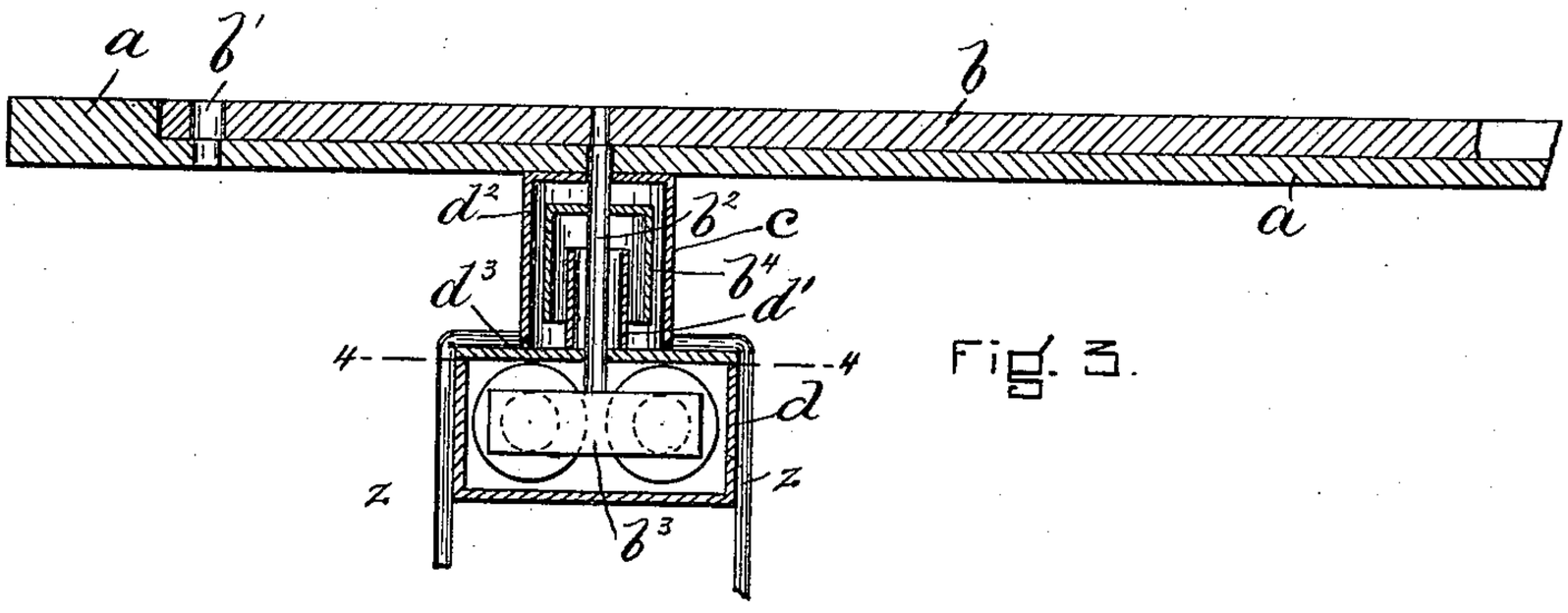

Fig. 3.

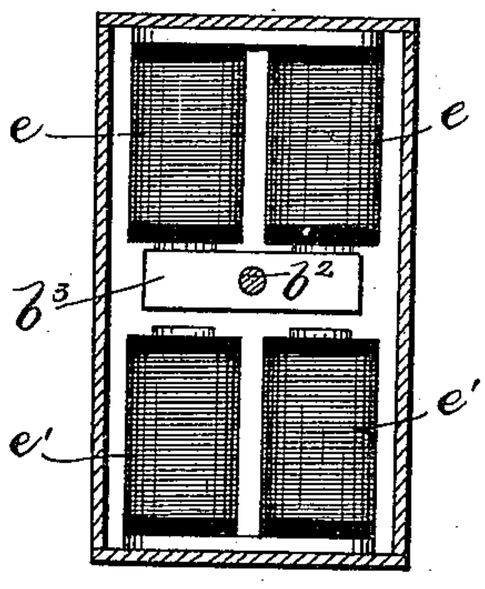

Fig. 4.

WITNESSES.
A. D. Harrison.
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(No Model.) 3 Sheets—Sheet 3.

M. KERSTEIN.

ELECTRICAL RAILWAY SWITCH.

No. 466,101. Patented Dec. 29, 1891.

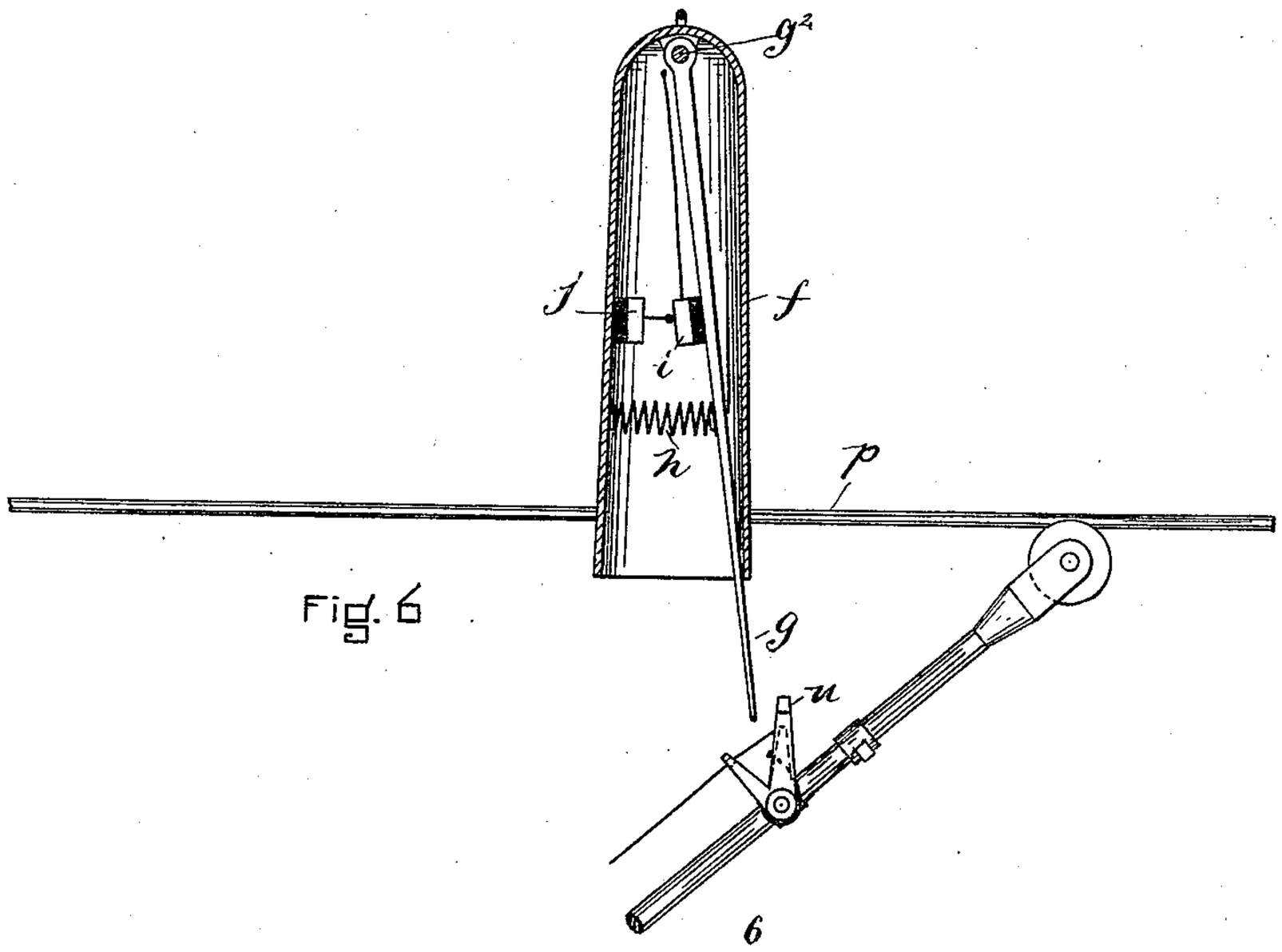

Fig. 6

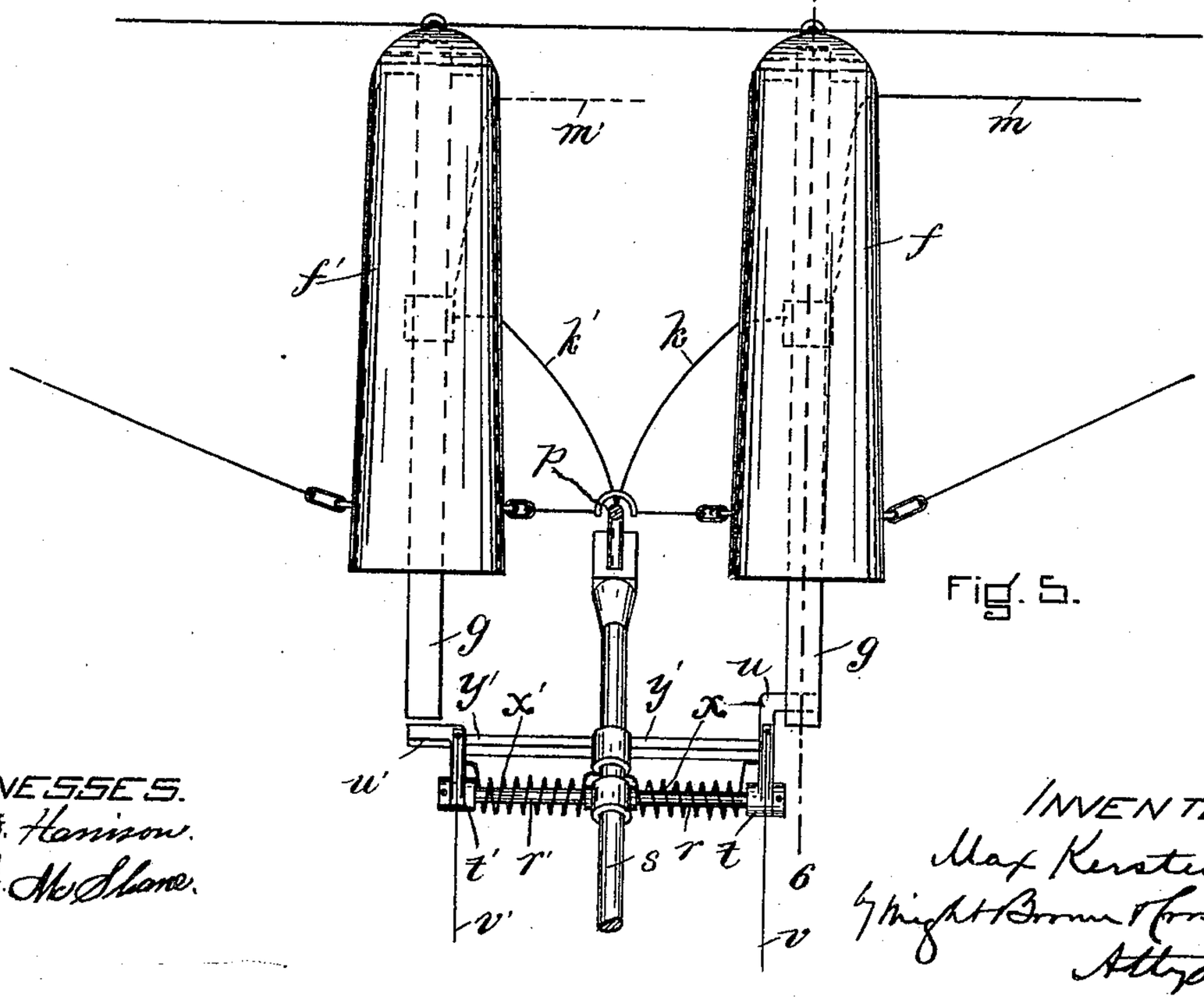

Fig. 5.

WITNESSES.
A. D. Harrison.
B. A. McSloane.

INVENTOR.
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Attys.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

MAX KERSTEIN, OF BOSTON, MASSACHUSETTS, ASSIGNOR OF TWO-THIRDS TO HENRY CRAMER AND ROBERT FABERY, OF SAME PLACE.

ELECTRIC-RAILWAY SWITCH.

SPECIFICATION forming part of Letters Patent No. 466,101, dated December 29, 1891.

Application filed May 16, 1891. Serial No. 392,947. (No model.)

To all whom it may concern:

Be it known that I, MAX KERSTEIN, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Electrical Railway-Switches, of which the following is a specification.

This invention has for its object to provide a switch for electric street-railways which shall be operated by electricity and means whereby the same may be operated by an attendant on a car running on said railway.

The invention consists in contact making and breaking devices on a fixed support above the car, one part of which is electrically connected with the trolley-wire and the other with an electro-magnet located below the switch and adapted to operate the switch-rail when energized, a device on the trolley-arm of the car adapted to cause said contact-maker above the car to close the circuit and energize said magnet, and devices by which said device on the trolley-arm may be controlled and operated by an attendant on the car, all of which I will now proceed to describe.

In the accompanying drawings, forming a part of this specification, Figure 1 represents an end elevation of a car and of a portion of the trolley system and a sectional view of a portion of the rails, taken at a switch, and of a portion of the street below the same, showing my improvements applied thereto. Fig. 2 represents a top plan view of one rail of the track, having the pivoted switch member attached thereto. Fig. 3 represents a section on line 3 3 of Fig. 2. Fig. 4 represents a section taken on the line 4 4 of Fig. 3, looking downwardly. Fig. 5 represents a front view of the upper end of the trolley-arm of the car, showing also the casings supported by the trolley system that contain my improved contact making and breaking devices for operating the switch. Fig. 6 represents a section on line 6 6 of Fig. 5 and a side view of the upper end of the trolley-arm.

The same letters of reference indicate the same parts in all the figures.

In the drawings, a a represent the rails of a street-railway track, and b represents the movable switch member of said rail, pivoted at b' to the rail a in the usual manner.

b^2 represents a pin or stud affixed to and projecting downwardly from the movable member b. The arm or stud b^2 is provided at its lower end with an armature b^3. The stud or arm b^2 projects down through a slot in the rail a and through similar slots in a cover or shield c and in casing d, located below the switch. The casing d contains the electro-magnets e e', between which the armature b^3 is located. Said casing is provided in its upper side with a slot, through which the arm b^2 passes, said slot permitting a movement of said arm from side to side. Surrounding the slot in said casing is an upwardly-extending flange d'. The arm b^2 is provided with an annular flange b^4, which projects downwardly outside of the flange d' and surrounds the same.

c represents a casing or shield which incloses the flanges d' and b^4 and rests on or is attached to the top of the casing d. Said shield c is provided with a slot in its upper surface similar to that in the top of the casing d and serving a similar purpose. The shield c is provided near its junction with the casing d with a series of outlets d^3. The object of the flanges d' and b^4 and shield c is to prevent moisture from entering the casing d and affecting the magnets therein contained. It will be seen that if any moisture reaches the interior of the shield c through the slot in the top thereof it will be deflected by the flange b^4 and will run down and out of the outlets d^3. On the other hand, if from any cause moisture should rise in the shield c from the bottom it will be seen that said moisture will be prevented from flowing down into the casing d by the flange d', surrounding the opening of said casing.

From the foregoing it will be seen that when the magnets e e are energized the armature b^3 will be attracted thereto, thus through the stud or arm b^2 moving the movable switch member b to the left as viewed in Fig. 1 or against the outer side of the rail a. When, on the other hand, the magnets e' e' are energized, the armature and movable switch-rail will be caused to move to the right as

viewed in Fig. 1 or against the inside of the rail *a*.

f f' represent two casings or shields, which are supported by suitable parts of the trolley system in suitable relation to the trolley-wire, one on each side thereof. The casing *f* is provided with a lever *g*, pivoted at g^2 to an ear on the interior of said casing, said lever being normally held in the position shown in Fig. 6 by means of a spring *h*. Affixed to and insulated from said lever *g* is a contact-piece *i*, which coincides with another contact-piece *j*, which is affixed to and insulated from the casing or shield *f*. The contact-piece *j* is electrically connected with the trolley-wire *p* by a wire *k*, and the contact-piece *i* is similarly connected by the wire *m* with one end of the coil-wire of the magnets *e*. The other end of the coil-wire of said magnets *e* is connected by a wire *n* with the wire *o*, which is buried in the road-bed between the tracks.

It will be obvious from the above description that when the lever *g* in the shield *f* is moved so as to bring its contact-piece *i* against the contact-piece *j* in said shield the circuit will be closed, and a current from the trolley-wire *p* will flow over the wire *k* through the contact-pieces *j* and *i*, over the wire *m* through the magnets *e* and wire *n*, and to ground by the wire *o*, thus energizing the magnets *e* and causing the armature to be attracted thereby and to move the switch-rail to the left, as before described.

The casing or shield *f'* is provided with a lever *g'*, a spring holding the same in inoperative position, contact-pieces on said lever and on the casing and wire *k'* connecting the contact-piece on the casing with the trolley-wire *p*, all as in the casing or shield *f* above described. A wire *m'* connects the contact-piece on the lever *g'* with the magnets *e'*, and a wire *n'* connects said magnets with the wire *o*, said wires performing the same function for the magnets *e'* that the wires *m* and *n* do for the magnets *e*. For the sake of clearness the wires *m* and *n* are shown in full lines in Fig. 1, while the wires *m'* and *n'* are shown in dotted lines in said figure. It will be seen that when the contact-pieces on the casing *f'* and the lever *g'* are brought together the circuit is closed and the current will energize the magnets *e'*, thus causing the switch-rail *b* to move to the right, as before described. The wires *m m'* may be supported by any suitable means on one of the standards or uprights of the trolley system and may be inclosed in a conduit *q* for some distance above the ground, being arranged in said conduit in such manner that they are kept insulated from each other, as shown in Fig. 1.

r r' represent two studs or arms affixed to the trolley-arm *s*, near the upper end thereof, and projecting at right angles thereto. On the outer ends of said arms *r r'* are mounted, respectively, bell-crank levers *t t'*. The rear arms of said bell-crank levers *t t'* are respectively provided with outwardly-extending pieces *u u'*, while the front arms of said levers are provided with holes through which pass the cords *v v'*, one end of each cord being attached to the rear arm of each lever, while the other ends of said cords are brought down to the front of the car and are there provided with suitable handles and engaged in suitable hooks *w w'*, which hold them in place. The cord *v* operates the lever *t* and the cord *v'* the lever *t'*.

x x' represent springs arranged on the arms *r r'* and having one end attached to or supported by the said arms or the trolley-arm, while their outer ends bear on the levers *t t'* in such a way as to throw said levers back against cross bars or arms *y y'*, projecting from the trolley-arm *s* at a point above the arms *r r'*, the said levers being thus held by said springs in their normal or inoperative position. I have here shown the springs *x x'* as made in one piece, said spring being passed under the trolley-arm at the center of its length and having its ends *x x'* wound around the arms *r r'* and passed in front of the rear arms of the levers *t t'*, the stress of said spring tending to force said levers backwardly, as shown and described. The levers *t t'* are so arranged on the trolley-arm that their projecting portions *u u'* are directly under the ends of the levers *g g'*. When the trolley-arm *s* is in its normal position with relation to the trolley-wire *p* and the levers *t t'* are in their normal position, the arms *u u'* of said levers will pass under the ends of the levers *g g'* without touching the latter. Supposing, however, that the operator on the car desires to operate the switch so as to throw the movable rail over to the left as viewed in Fig. 1, he pulls the cord *v* just before he reaches the switch and holds the same. This causes the arm *u* of the lever *t* to be moved upwardly into line with the lever *g*, so that as the car moves along the track toward the switch the said arm *u* will strike the lever *g* and will cause its contact-piece *i* to come into contact with the piece *j*, thus closing the circuit and causing the movable rail member *b* to move to the left, as already described. Whenever the arm *u* has struck the lever *g* and moved the same, as above described, it may be released and will be carried back to its inoperative position by its spring *x*.

When the operator desires to move the switch-rail to the right, he pulls and holds the cord *v'*, the operation being carried out as already described. The shields or casings *f f'*, with the levers *g g'* projecting therefrom, are arranged at such a position with relation to the switch that they may be operated and will move the switch-rail before the forward wheels of the car reach said switch. Hooks *w w'* are provided at each end of the car, and the cords *v v'* are readily removed from said hooks, so that when the trolley-arm is swung around at the end of a trip in one direction the cords *v v'* will swing with the said arm

and may be engaged with the hooks at the other end of the car.

I may make various changes in the construction and arrangement of parts of my invention without departing from the nature and spirit thereof.

To provide for the escape of water that may find its way into the casing d^2, I provide pipes z z, arranged to conduct water from said casing to a sewer or other receptacle.

I claim—

1. In an electric street-railway switch, the combination, with the movable switch member, of an armature-carrying arm or stud projecting downwardly from the same, an armature thereon, electro-magnets on opposite sides of said armature adapted when energized to attract the said armature and thus move the said movable switch member, the trolley-wire, trolley-arm, contact-levers supported by the trolley-wire and adapted to be electrically connected therewith, the said contact-levers being electrically connected with the said electro-magnets, and movable arms on the trolley-arm to move the contact-levers to close the circuit and energize one or the other of the electro-magnets, as set forth.

2. In an electric street-railway switch, the combination, with the movable switch member, of an armature-carrying arm or stud projecting downwardly from the same, an armature thereon, electro-magnets on opposite sides of said armature adapted when energized to attract the said armature and thus move the said movable switch member, contact-making or circuit-closing levers and fixed contact-pieces wherewith the same co-operate, suitably supported by the trolley-wire-supporting system, said levers being normally held out of their circuit-closing position, connections between said contact-making parts and the trolley-wire and between said parts and the said magnets, whereby when the circuit is closed by one of said levers one of the magnets is energized and when the circuit is closed by the other lever the other magnet is energized, and devices on the car whereby when the car is running past said contact-making levers either of them may be caused at the will of the operator to make contact and close a switch-operating circuit, as set forth.

3. In an electric street-railway switch, the combination, with the movable switch member, of an armature-carrying arm or stud projecting downwardly from the same, an armature thereon, electro-magnets on opposite sides of said armature adapted when energized to attract the said armature and thus move the said movable switch member, contact-making or circuit-closing levers and fixed contact-pieces wherewith the same co-operate, suitably supported by the trolley-wire-supporting system, said levers being normally held out of their circuit-closing position, connections between said contact-making parts and the trolley-wire and between said parts and the said magnets, whereby when the circuit is closed by one of said levers one of the magnets is energized and when the circuit is closed by the other lever the other magnet is energized, and devices supported by the trolley-arm of the car, which are normally held out of the path of said contact-making levers, and connections extending therefrom to a suitable point on the car, whereby the said devices may be operated by an attendant on the car and caused to strike said contact-making levers and move them to their circuit-closing position, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 12th day of May, A. D. 1891.

MAX KERSTEIN.

Witnesses:
EWING W. HAMLEN,
C. F. BROWN.