

(No Model.)

2 Sheets—Sheet 1.

E. CHABEAULT.

CLOSED CONDUIT SYSTEM FOR ELECTRIC RAILWAYS.

No. 509,651.

Patented Nov. 28, 1893.

Fig. 1

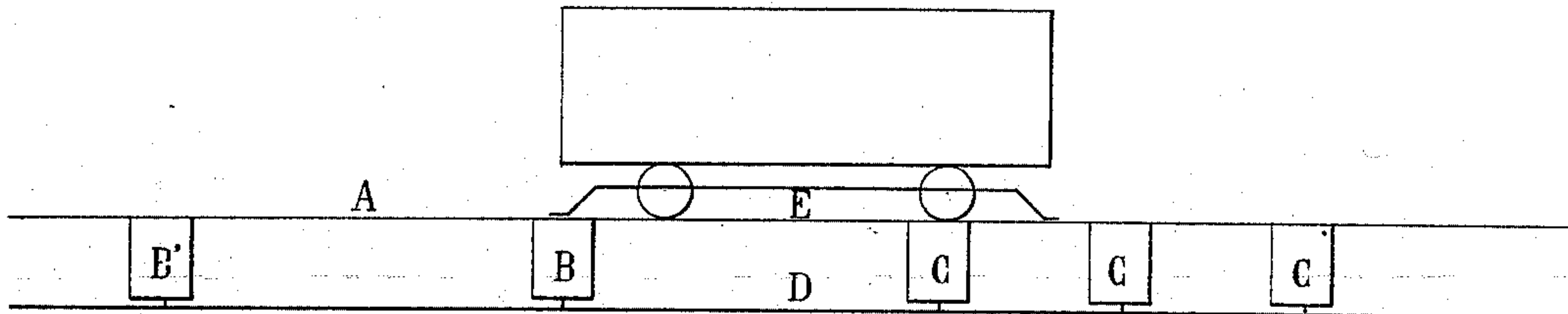


Fig. 2

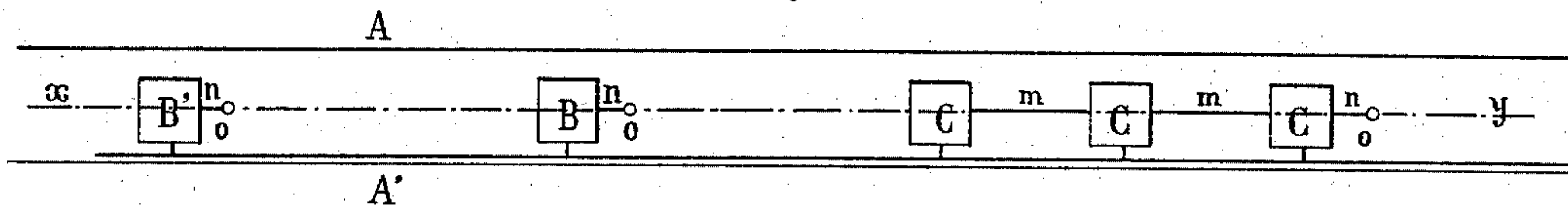


Fig. 3

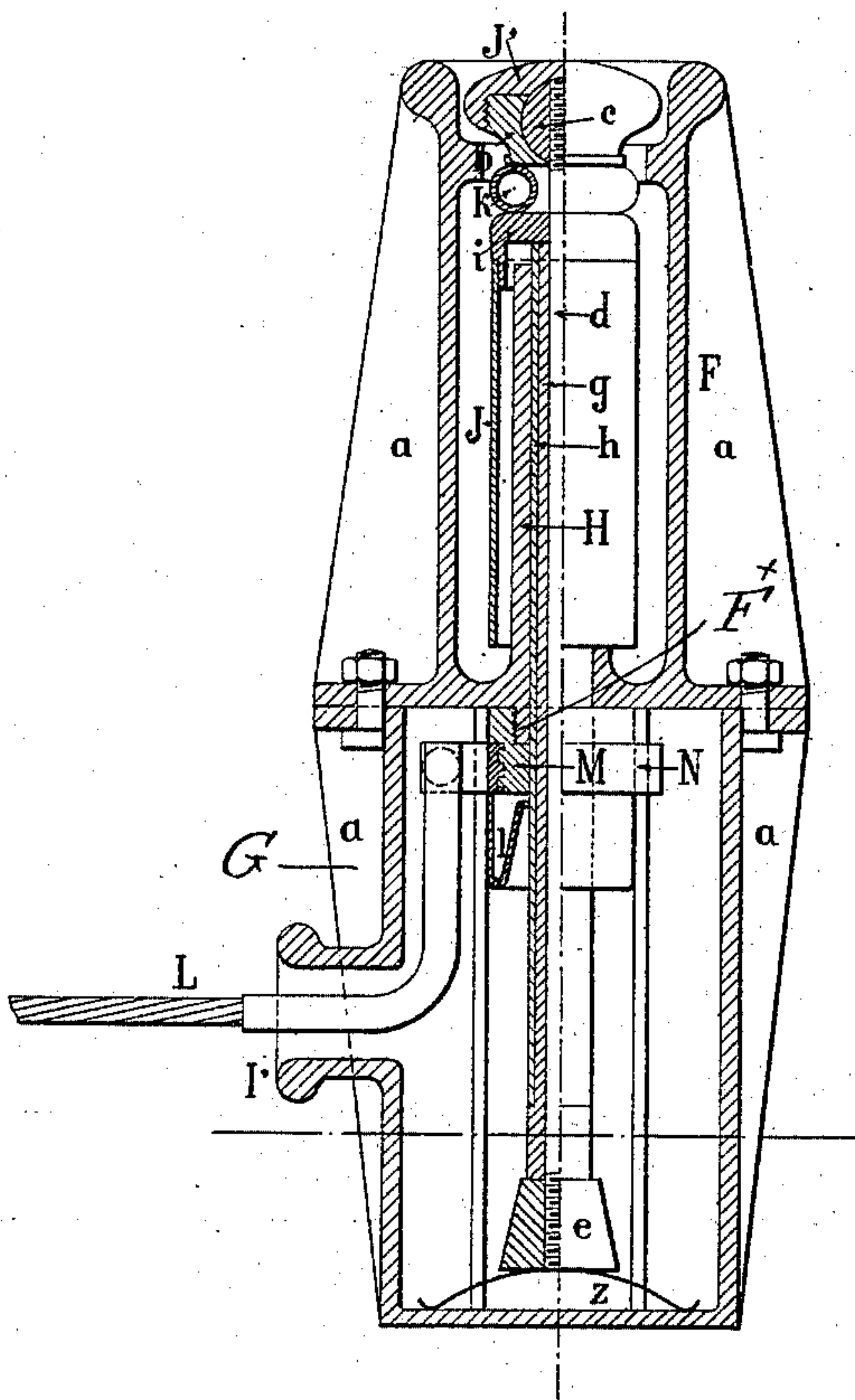
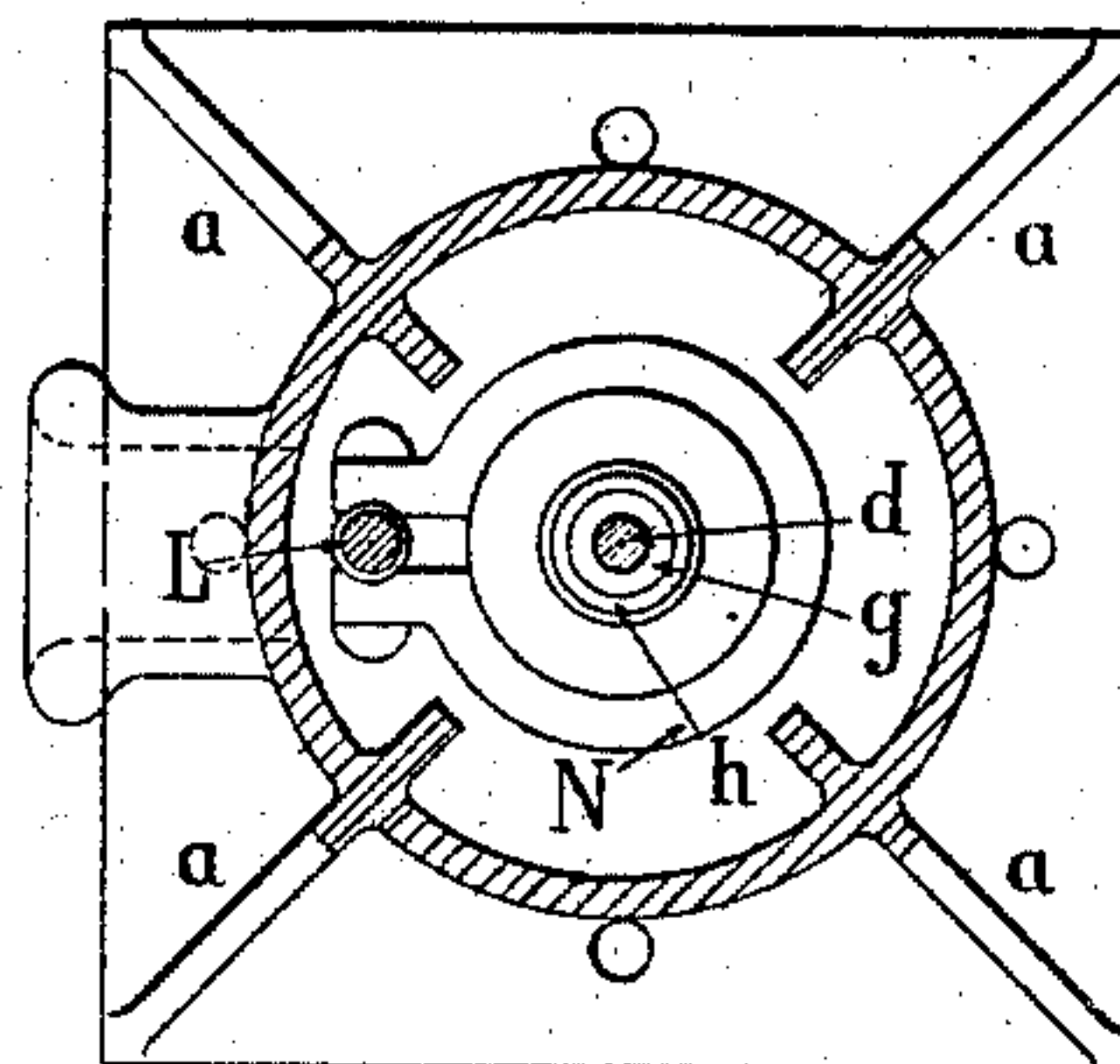


Fig. 4



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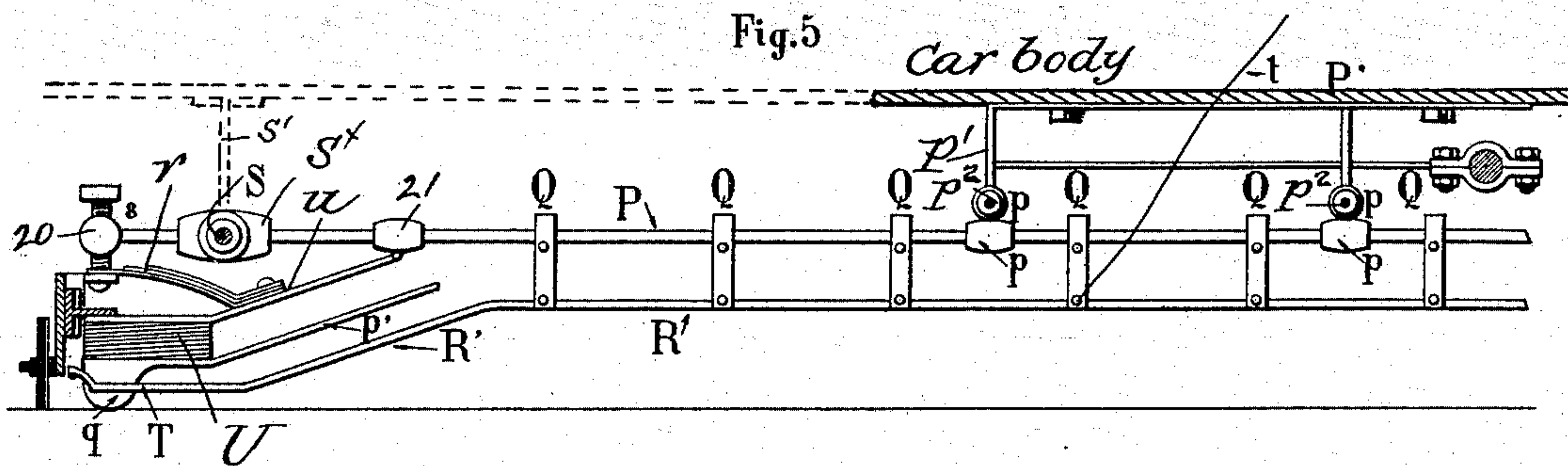


Fig. 8

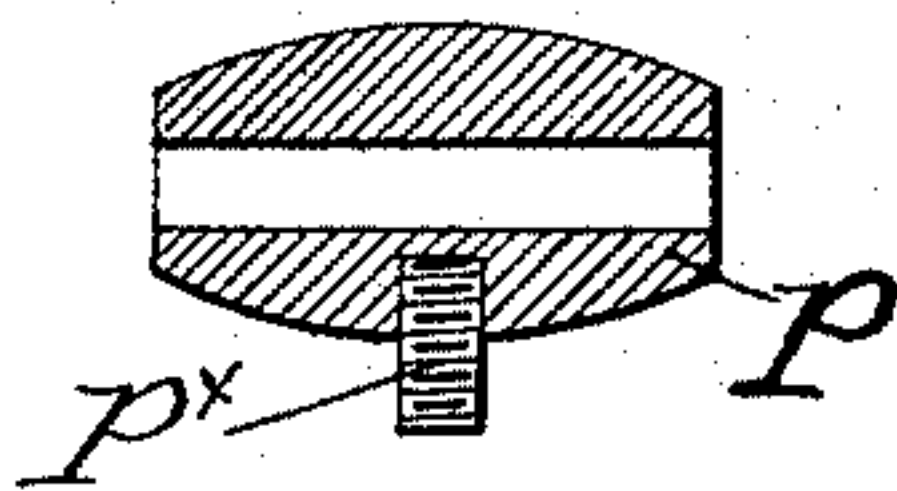


Fig. 9

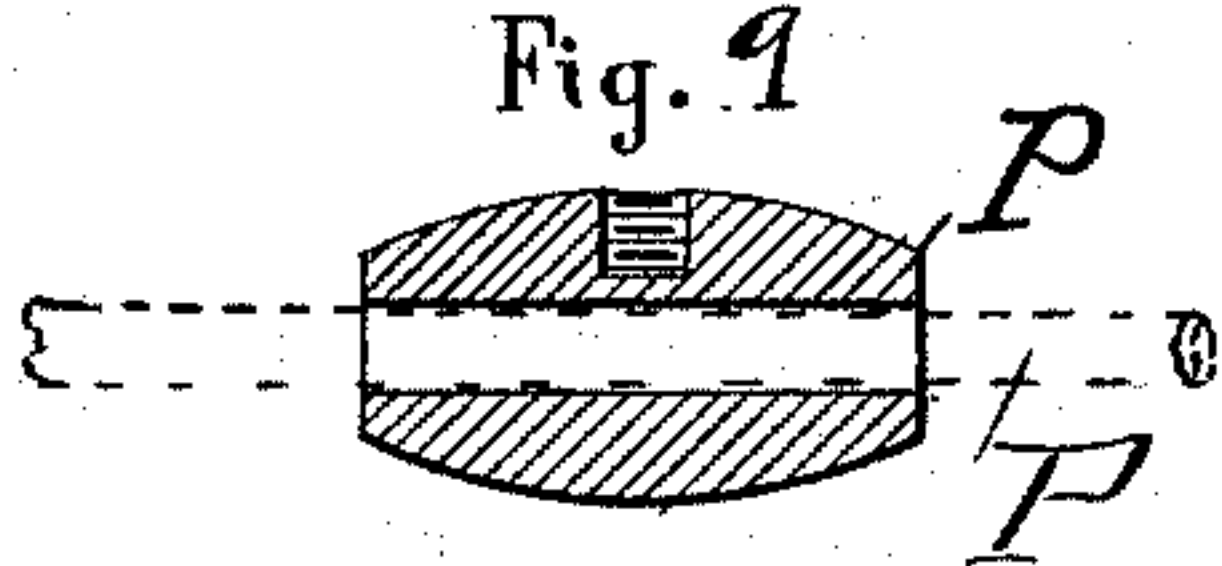


Fig. 7

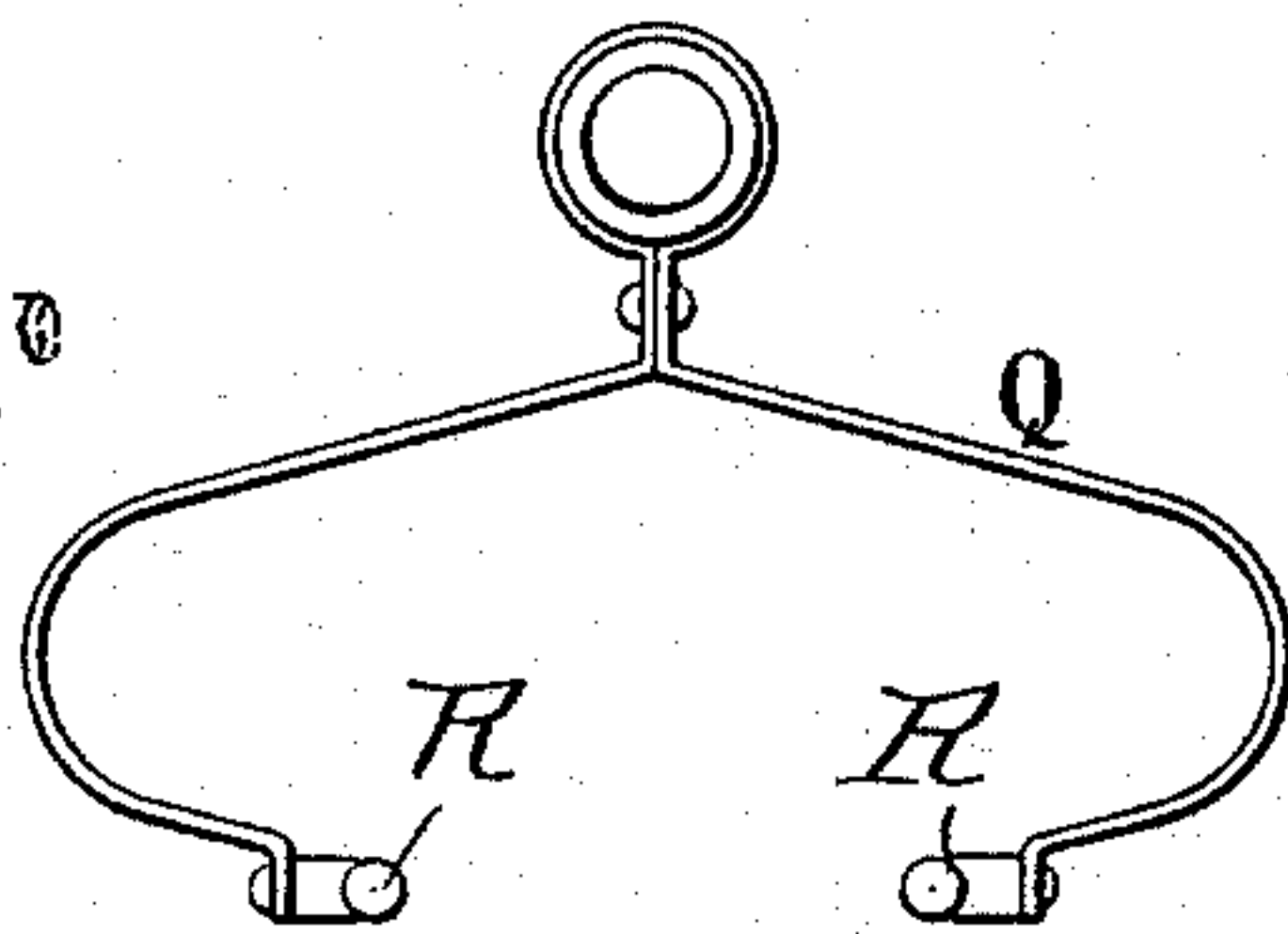
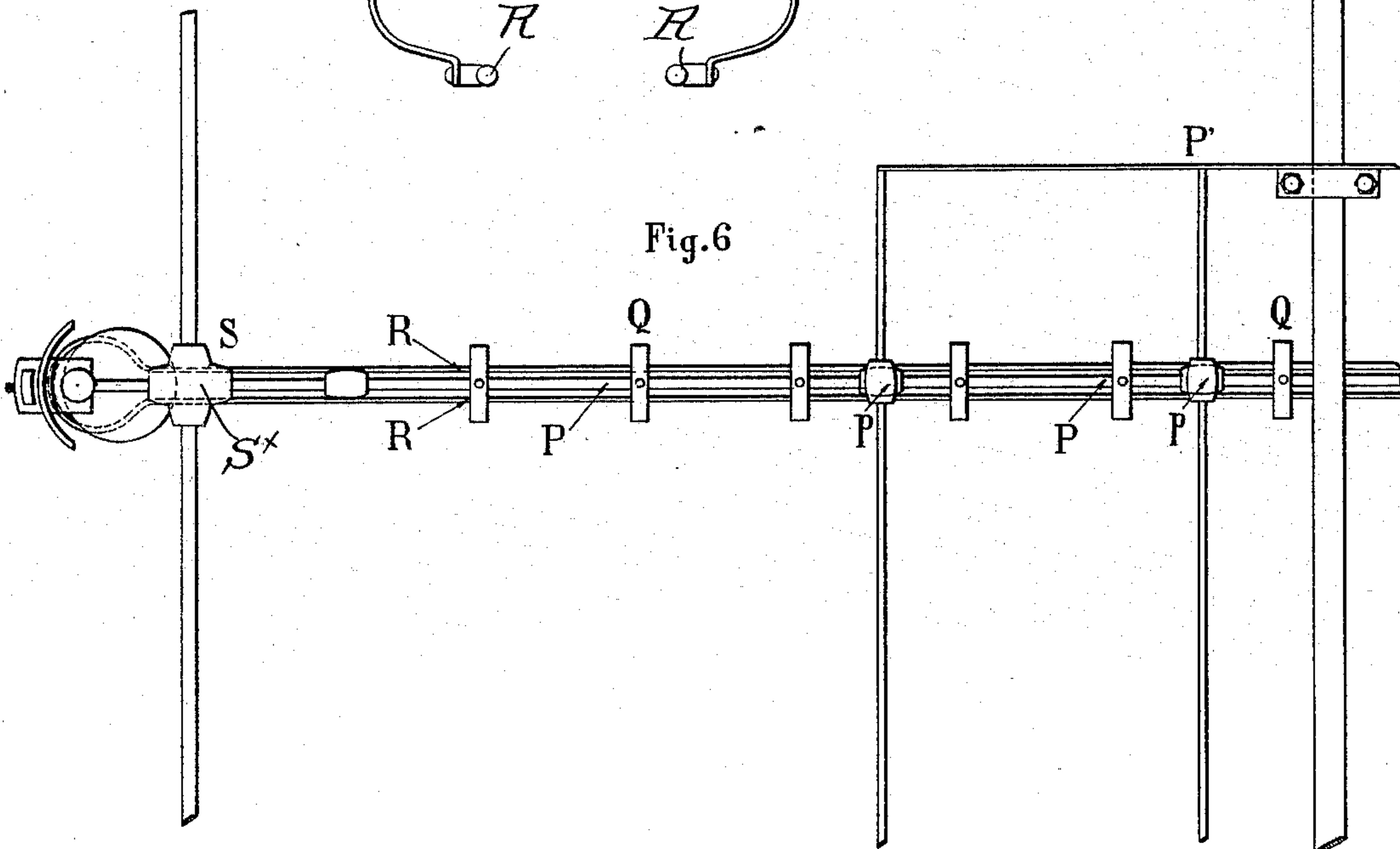


Fig. 6



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UNITED STATES PATENT OFFICE.

EMILE CHABEAULT, OF MARSEILLES, FRANCE.

CLOSED-CONDUIT SYSTEM FOR ELECTRIC RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 509,651, dated November 28, 1893.

Application filed October 13, 1892. Serial No. 448,722. (No model.) Patented in France March 29, 1892, No. 220,419.

To all whom it may concern:

Be it known that I, EMILE CHABEAULT, a citizen of the Republic of France, residing at Marseilles, in the Republic of France, have
5 invented certain new and useful Improvements in Electric Traction on Railroads, (for which I have obtained Letters Patent in France, No. 220,419, dated March 29, 1892,) of which the following is a specification.

10 My invention relates to an electric railway system and particularly to the means for furnishing the motor of the car with electricity, from an under-ground conductor.

In the drawings:—Figure 1 is a diagrammatic side elevation of the system. Fig. 2 is a plan view of the same. Fig. 3 is a sectional view of a current furnisher partly in side elevation. Fig. 4 is a transverse section of the same. Fig. 5 is a side view of one end of the
20 current gatherer on the car. Fig. 6 is a plan view of the same. Figs. 7, 8 and 9 are views of details.

In the drawings, A, A' represent the car rails; D, the conduit; B, the current furnisher and E, the current gatherer on the car.

25 In Fig. 2, B, B' show the current furnisher as arranged separately or singly to supply current to an ordinary motor on the car while C, C, C, represent current furnishers arranged
30 in a series or group and constituting a charging station which may be used to charge a storage battery on the car.

The dotted line represents the central line of the roadway.

35 The current furnishers Fig. 3 comprise a box made of two sections F, G, secured together and provided with strengthening ribs *a*. The section F, has an upwardly extending tubular part H centrally of it and within
40 this is arranged to slide a rod *d* of conducting material surrounded by an insulating tube *g*, about which is a protecting steel tube *h*, which in turn bears or slides within the tubular part H.

45 At the upper part of the conducting bar *d* above the tube H, is an inverted cup shaped insulating disk *i*, and depending from this disk is a shield J which when the conducting bar is raised as hereinafter described, the
50 parts will be shielded and protected. The upper end of the bar *d*, carries a contact piece

or knob J' of soft steel secured to the rod by a ring *b*, and a spherical head C screw threaded on the end of the rod. A conical contact piece *e* is secured to the lower end of the rod 55 and the whole rod with its contact is capable of having vertical movement relative to the casing, in which movement the upper part of the rod carrying the knob J' projects through and above the upper opening in the casing 60 or box. When in normal position the lower contact *e*, rests on the spring *z* which acts as a spring cushion to take up the shock when the bar *d*, falls down after the passage of the car. The knob J' with its ring is permitted 65 rotary movement about the axis of the bar *d*, by reason of the spherical form of the head *c*, this movement taking place through frictional contact with the current collector or gatherer on the car, thus distributing the wear 70 more evenly. The ring *b* rests upon a rubber ring or cushion *k*, said ring serving to cushion the fall of the head and ring. The fixed contact within the casing comprises a truncated hollow conical part *l*, adapted to receive 75 the conical contact *e*, when the bar *d*, is raised which part *l* is of spring metal pressed or clamped about an insulating ring M, by a split collar N of conducting material between the ends of which as in Fig. 4 and also in Fig. 3 80 the end of the conducting wire L is clamped thus establishing electric connection with the hollow conical contact *l* through the ring N, the part M, as before stated forming an insulation and being carried by the part F, of 85 the casing which has a screw threaded depending boss F' Fig. 3, to which the part M is fitted. As the car comes above the current furnisher, the head J', is lifted to engage the current collector E, on the car which is formed 90 to elevate the head J' with the rod *d*, to its highest point thus making the contact *e*, engage the contact *l*, and establishing electric connection from the conductor L, through the contacts, *l*, *e*, conducting rod *d*, contact knob 95 J', the parts of the current gatherer and the connections to the motor. When the car has passed the current gatherer drops the knob J' which allows the rod *d* to fall and break the circuit.

When the current furnishers are disposed in a series as represented in Fig. 2, they are

connected with each other by iron bars *m*, forming a central guiding rail between them, to direct the current gatherers hereinafter described into contact with the knobs *J'* of the current furnishers, and this bar is prolonged before and after the charging storage station, said prolongations ending in blocks *o*, the object of which is to insure the proper contact of the parts and working of the system. These blocks are intended to act as armature pieces in connection with magnets which are carried by the current gatherers, as will be hereinafter described. When the cars run both ways, over the same tracks there is a block or prolongation at each end of the charging station or current furnisher, but when the cars run only one way then the blocks in rear of the current supplying devices are omitted. The distance between the charging stations is regulated so that the same amount of electricity will be supplied at any station as has been expended in the transit of the car from the preceding station.

Any ordinary form of storage battery may be used on the car to receive the electricity from the furnishers, but as this battery forms no part of my invention I have not shown it herein.

The current gatherer comprises the frame *P'* Figs. 5 and 6 secured to the car. To this frame is connected by the swiveled joints *p*, *p*, Figs. 5, 6, 8 and 9 the bar *P* extending lengthwise below the car. Figs. 8 and 9 illustrate this swivel from which it will be seen that the lower member receives the bar *P* and is swiveled to the upper member by the screw shank *p*^x. This upper member receives the cross bar *p*² Fig. 5 of the frame *P'*. From this bar *P* insulating hangers *Q* depend on each side to the ends of which are secured the parallel spring conducting rods *R* arranged with a space between them which space is centrally of the conduit and over the contact knobs *J'*. At their ends the rods are bent downwardly as shown at *R'* Fig. 5 and they end in a loop portion *T*, Figs. 5 and 6 of enlarged diameter adapted to receive the knobs *J'* freely when they are raised as hereinafter described, it being understood however that the distance between the straight portions of the conducting rods *R* is less than the width of the head or knob *J'* in order to support the same and serve as a track therefor. The main supporting bar *P* is supported at its front and rear ends by the box *S*^x the cross bar *S* connected with the car frame by any suitable hangers as *S'* dotted lines Fig. 5. An electro-magnet *U* is supported above the loop *T* upon an adjustable supplemental frame *u*, which magnet is energized through electrical connections with the motor or storage battery on the car. The magnet is combined with a polar extension *q*, adapted to serve as a guide for the head *J'* of the current furnisher. The supplemental frame is maintained normally in elevated position by a spring *r*, the front end of which is held by

a screw *s* which passes through a block 20 on the front end of the bar *P*. The frame *u* is hinged to the block 21 on the bar *P* and it will be seen from this that the frame with its magnet may be adjusted up or down by adjusting the supporting screw *s* at the front and in all positions the frame and magnet being supported by the spring *r* may have a certain amount of yielding action vertically. While the car is running between the charging stations or between the single current furnishers the spring holds the supplemental frame with the electro magnet up, or when the car is running down grade at which place it will be understood that the car does not need charging and consequently there I prefer to have no current furnishers on said down grades. When the car comes to a current furnisher however the magnet will move toward the block *o* by reason of the attraction of the magnet and depress the supplemental frame so that the guiding pole *q*, will contact with the upper end of the current furnisher and being magnetized by the electro-magnet it will attract the head or knob *J'* and the said head being free to move upward it will rise, and thus pass through the loop *T* and as the car moves on, the parallel parts of the rods *R* engage the under sides of the knob and hold the same up so that the circuit will be completed to the motor or storage battery as the case may be by reason of the contact of the conical contact *e*, with the contact *l*, the course of the current then being through the bar *d*, the head *J'*, the rods *R* and the wire *t*, Fig. 5. The return of the current is through the car wheels and track. The rods *R* are of spring material in order to prevent rupture or straining the joints in rounding curves. When the movement of the car brings the rear of the current gatherer over the point of location of the current furnisher the conducting rod with its head or knob will be depressed by the reverse inclined part at the rear end and finally released from the pole piece *q*, after which the rod falls cushioning on the spring *z*.

The extensions *p'* are provided Fig. 5, to assist in guiding the knobs *J'* to the rear when they are elevated through the attraction of the magnet. These extensions are parallel with the inclined rods *R'*.

As before intimated the current may be supplied either directly to the motor as in going up grade or to the storage battery for future use when passing over level points in the road.

I claim—

1. In combination, in an electric railway, the main conductor, the car, the current gatherer thereon, the movable contacts arranged at intervals along the road and normally out of electrical connection with the main conductor, the said current gatherer having an electro magnet at its end for raising the movable contact and having also inclined ends for engaging and moving the contacts into electrical connection with the main conductor,

after being raised by the magnet substantially as described.

2. In combination, the main conductor, the current furnisher comprising a casing a rod 5 arranged to slide therein, said rod having an upper contact to move through the upper open end of the casing and a lower conical contact *e*, the stationary contact *l* within the casing electrically connected to the main conductor and arranged above the lower movable 10 contact on the sliding rod to engage therewith when the rod is raised and the current gatherer on the car arranged to engage the upper contact and raise the rod, the said contact *l* consisting of a hollow conical piece surrounding the sliding rod substantially as described. 15

3. In combination the main conductor, the car, the current gatherer thereon, the movable contacts arranged at different points 20 along the road and normally out of electrical connection with the main conductor said contacts comprising a sliding rod, an upper head or knob swiveled thereon and adapted 25 to engage the current gatherer and the lower contact on the rod arranged to make electrical connection with the main conductor when the rod is raised, substantially as described.

4. In combination, the main conductor, the 30 car, the current gatherer thereon, the current furnisher comprising a casing with a central tubular part *H* and an upper open end. A sliding rod arranged in said tubular part, and having an upper and a lower contact, the stationary contact within the case and above 35 the lower movable contact on the rod, and the shield connected with the upper part of the

rod and extending downwardly therefrom, substantially as described.

5. In combination, in an electric railway the 40 main conductor the car with its current gatherer, the casing, the sliding rod therein having an upper contact and a lower conical contact, the stationary contact encircling the sliding rod, normally insulated therefrom and supported from the casing above the lower movable 45 contact and the electrical connection from the stationary contact to the main conductor, substantially as described.

6. In combination, the main conductor, the 50 movable contacts arranged at different points along the same and normally out of electrical connection with the main conductor, the car and the current gatherer comprising the rods 55 *R. R.* the insulating supports *Q*, said rods having inclined ends, the supplemental hinged frames at the ends of the rods *R*, the electro-magnets carried by said frames and the polar extensions *q*, of the said magnets, substantially as described. 60

7. In combination, the main conductor, the current furnishers comprising the movable contacts and the supports therefor, the blocks 65 *o* arranged adjacent to the said current furnishers, the car the current gatherer and the electro-magnet movably supported thereon at its end and having a polar extension, substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

EMILE CHABEAULT.

Witnesses:

TH. PLUMAL,
J. GAUNE.