

L. W. PULLEN.

CURRENT COLLECTING DEVICE FOR ELECTRIC CARS.

APPLICATION FILED JULY 18, 1904.

3 SHEETS-SHEET 1.

FIG. 1

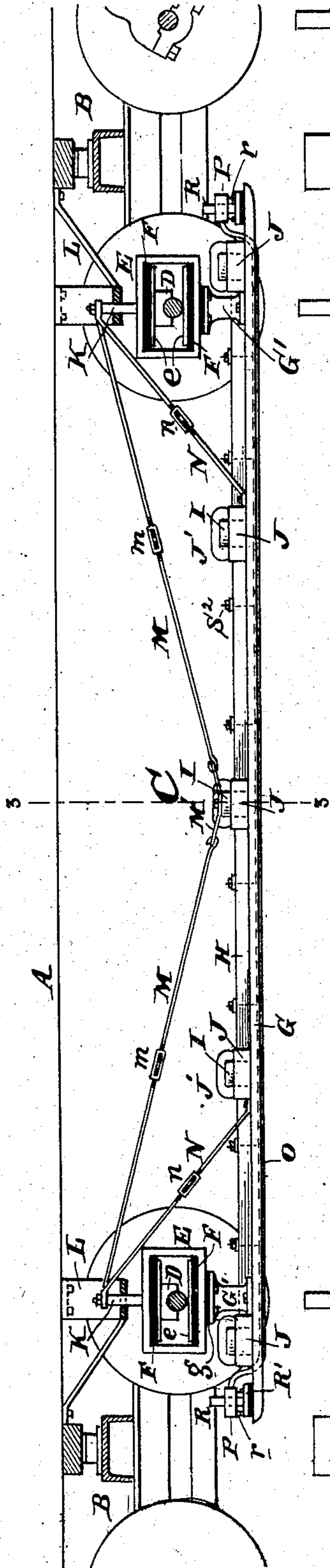
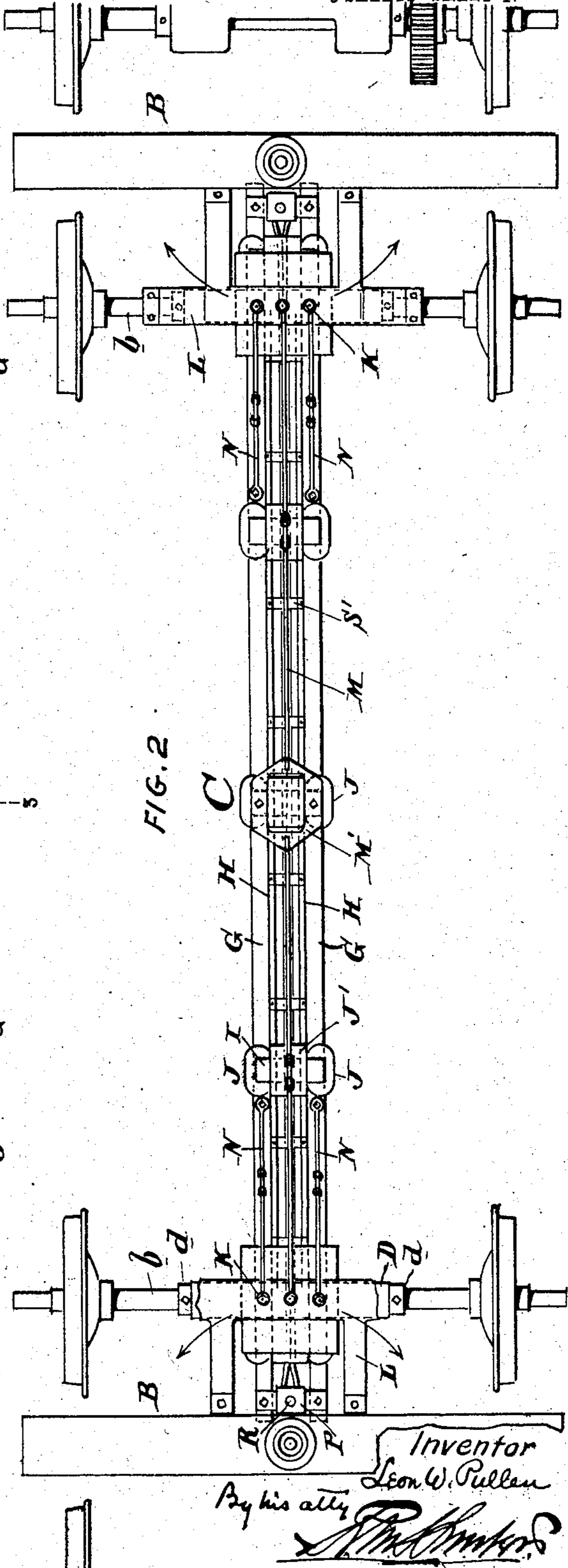


FIG. 2



Attest
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No. 791,816.

PATENTED JUNE 6, 1905.

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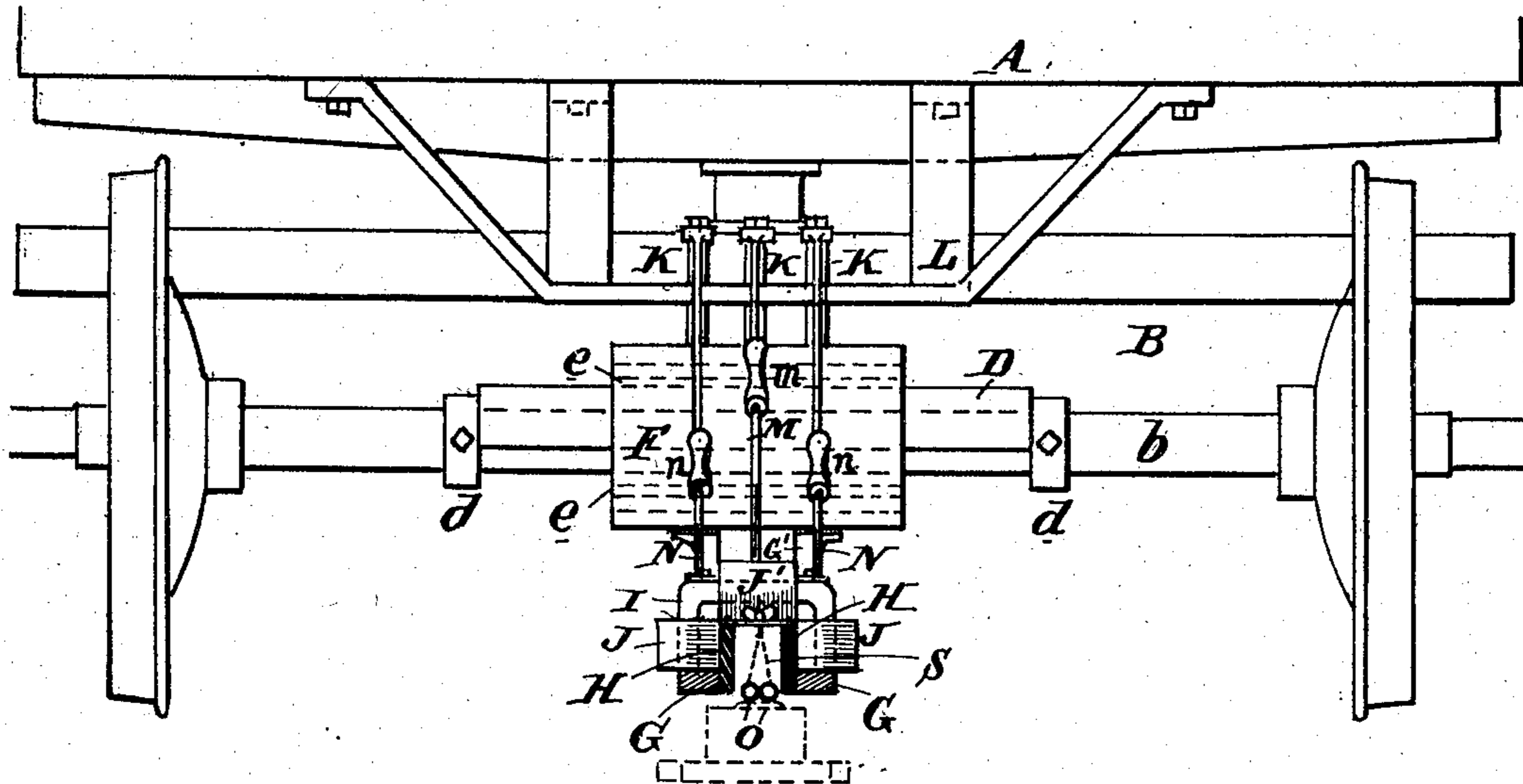


FIG. 3

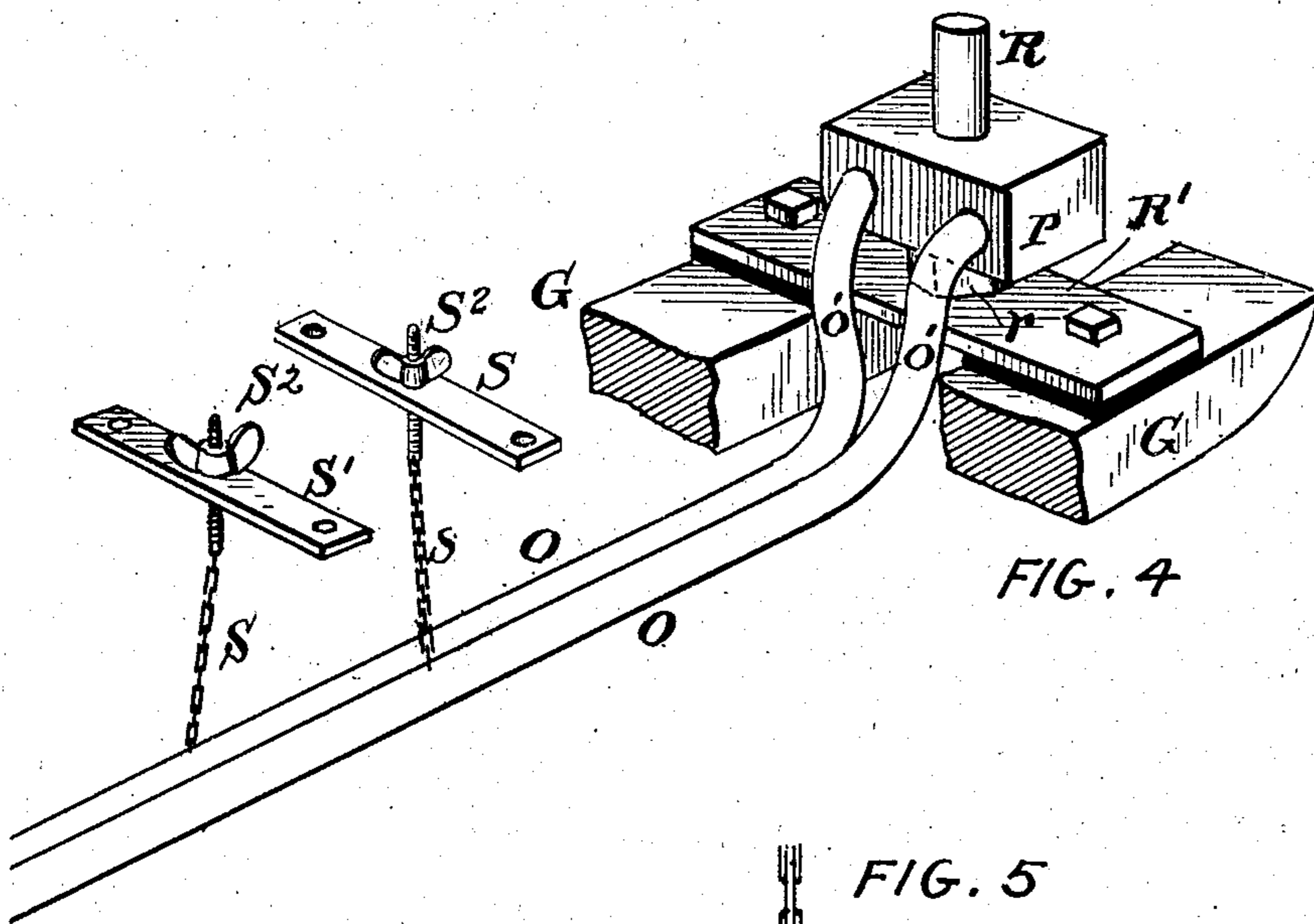


FIG. 4

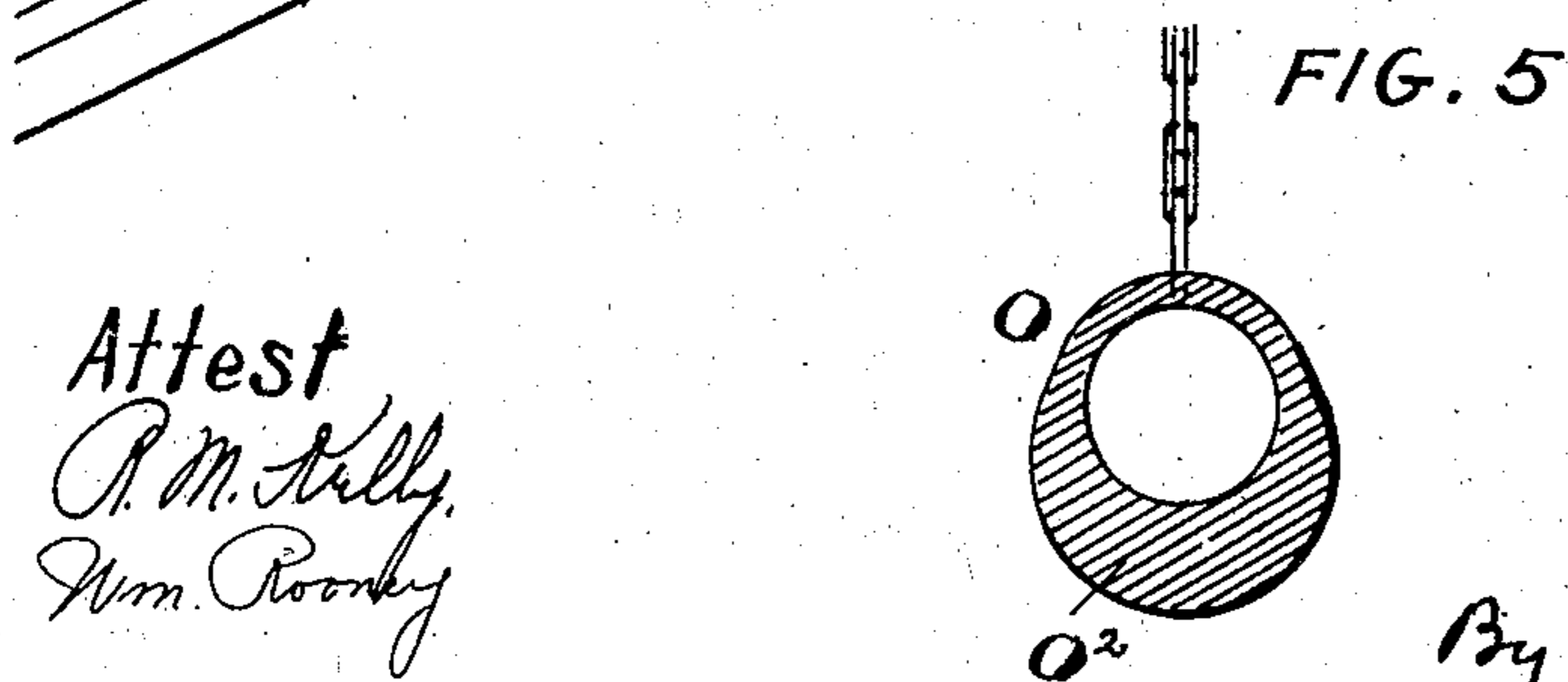


FIG. 5

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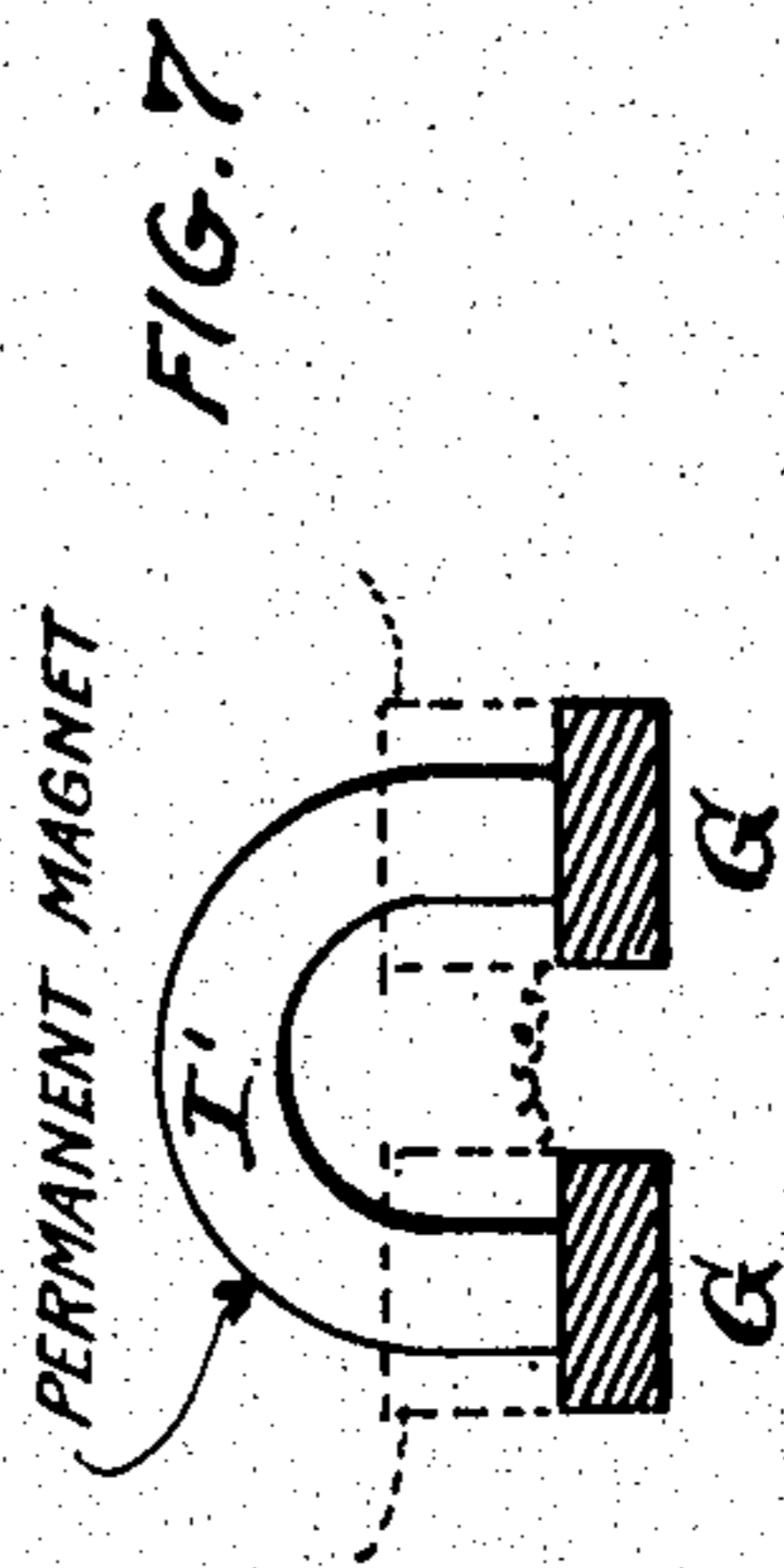
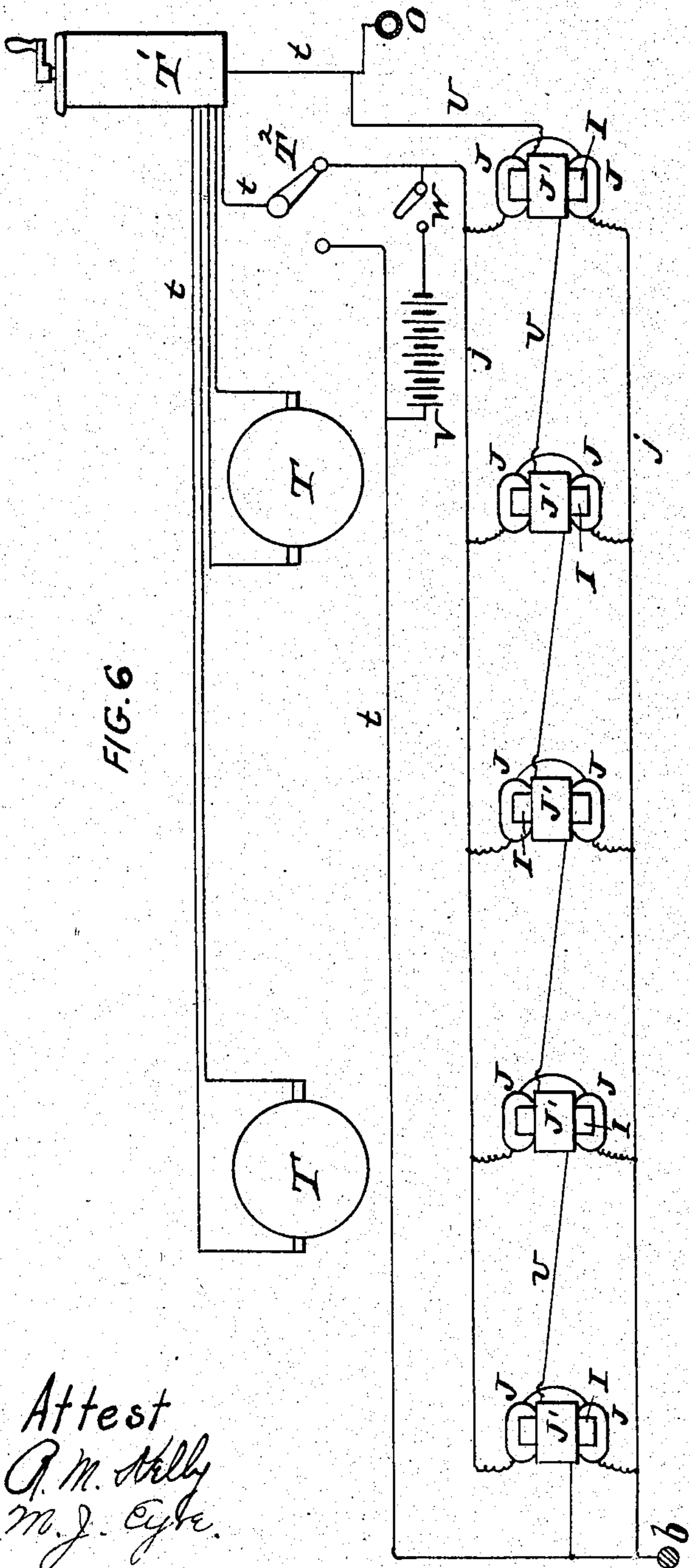
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

LEON W. PULLEN, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO
WIRELESS RAILWAY COMPANY, A CORPORATION OF THE DIS-
TRICT OF COLUMBIA.

CURRENT-COLLECTING DEVICE FOR ELECTRIC CARS.

SPECIFICATION forming part of Letters Patent No. 791,816, dated June 6, 1905.

Application filed July 18, 1904. Serial No. 216,983.

To all whom it may concern:

Be it known that I, LEON W. PULLEN, of the city and county of Philadelphia and State of Pennsylvania, have invented an Improve-
ment in Current-Collecting Devices for Elec-
tric Cars, of which the following is a speci-
fication.

My invention has reference to current-col-
lecting devices for electric cars; and it con-
sists of certain improvements, which are fully
set forth in the following specification and
shown in the accompanying drawings, which
form a part thereof.

The object of my invention is to provide a
current-collecting device for electrically-pro-
pelled cars which shall be adapted to receive
current from contacts arranged along the rail-
way at intervals and supplied with current
from a supply-conductor through magnetic
switches—such, for example, as set out in Let-
ters Patent No. 749,401, granted to me on Jan-
uary 12, 1904.

In carrying out my invention I employ two
longitudinal pole-pieces extending almost the
length of the car and separated a short dis-
tance and magnetized by electro or other mag-
nets; preferably of the horseshoe type, con-
necting them at intervals, whereby one pole-
piece is of north polarity and the other of south
polarity, and combine therewith one or more
flexibly-supported collector-bars suspended
between the pole-pieces and insulated there-
from, and suspension means for said devices,
whereby they move as a unit with the car-
body in a horizontal direction, but are sus-
tained vertically upon the axles independently
of the vertical movements of the car-body, so
that the collector-bars are supported at a fixed
distance from the ground.

My invention also comprehends many de-
tails of construction, which, together with the
above features, will be better understood by
reference to the drawings, in which—

Figure 1 is a side elevation of my improved
current-collecting device with the car-track
axles indicated in section. Fig. 2 is a plan
view of the collecting device. Fig. 3 is a
cross-section of Fig. 1 on line 3 3. Fig. 4 is

a perspective view of the suspension construc-
tion for the ends of the current-collector bars.
Fig. 5 is a cross-section of my preferred shape
of collector-bar. Fig. 6 is a diagram illus-
trating the motor-circuits in their relation to
the collector-magnets, and Fig. 7 is a cross-
section showing the use of permanent mag-
netic cores for the collector-magnets.

A is the outline of the bottom of the car-
body. B B are the car-trucks and may be of
any suitable construction, and C is my im-
proved current-collector device. The rear-
most axle *b* of the forward truck and the for-
ward axle of the rear truck are each provided
with a box D between the wheels and held
against lateral movement by collars *d* on the
axles.

E represents box-frames surrounding the
axles and boxes and are provided with inter-
nal upper and lower steel plates *e e*, insulated
from the box-frames by insulation F and form-
ing elongated spaces between them. The up-
per of these plates *e* rests upon the boxes D
with freedom of movement thereon, whereas
the lower plates *e* are below the axles and act
to take any upward thrust of the collector
should such occur from any cause. To these
box-frames E are secured insulated depending
brackets G', to which are attached the two
longitudinal pole-pieces G G, which are par-
allel to each other and separated a few inches.
In addition to being secured together by the
brackets these pole-pieces are further attached
together by the U-shaped cores I of electro-
magnets, which are arranged at intervals to
produce in the pole-pieces strong magnetic
fields of north and south polarity. These
cores are provided with coils J', designed to
be energized in series in a shunt-circuit U
around the motors T when the car is in opera-
tion or temporarily at rest. In addition to
these coils there are coils J on the cores,
which may be coupled in multiple or multi-
ple by circuit *j* and energized by a current
from a battery U, controlled by a switch W,
and also by the current in the motor-circuit *t*
during the normal operation of the car under
the regulation of the controller T'. The bat-

tery is employed for producing a magnetic field in the pole-pieces for the initial closing of the switch in the railway-circuit of the road-bed after the current has been put into the line from the power-station or after it has been momentarily interrupted from any cause. In this manner the magnetic strength of the pole-pieces increases with the load on the motor, so that when the motor requires the greatest current the field of force of the pole-pieces is strongest to insure the required contact in the switch-boxes to insure the flow of current without heating. As this application does not claim these circuits, no illustration of the particular circuits and switches is shown.

H H are two longitudinal boards secured at their lower parts to the inner sides of the pole-pieces G, as shown in Fig. 3, said boards acting as insulators to the current-collecting bars O O, which are suspended slightly below the lower edges of said boards and pole-pieces. These current-collecting bars are suspended by chains S and a screw and nut S², passing through a cross-bar S', secured to the top of the boards S S. These chain connections extend from the center of the cross-bars S' laterally to the collector-bars, and the successive chains are respectively connected alternately with the two collector-bars O O, so that the tendency is to cause said bars to swing toward each other and take a normally central position in the space between the insulating-boards S S. The ends of the collector-bars are turned upward into goosenecks O' and are secured to heads P, which are supported upon upwardly-extending pins R from cross-bars R', insulated from and secured to the pole-pieces. Nuts r on said pins R may be employed to limit the downward movement of the collector-bars and yet offer no obstruction to the rising of the collector-bars and the heads P when said collector-bars are pushed upward in riding over the contacts in the railway. It will be observed that in this method of suspension of the collector-bars they have every freedom of adjustment, and consequently will under no conditions bind or create excessive friction in passing over and in contact with the successive contacts arranged along the roadway and from which they collect the current. In this application no claim is made to the contact-blocks nor to the electromagnetic switch devices which are designed to be operated by the pole-pieces G, as such boxes are illustrated in my patent before referred to.

The box-frames E E each have three upwardly-extended pins K immediately above the axles b, and these pins pass through holes in a brace-frame L, secured to the under side of the car-body A, so that the said brace-frame and the car-body may rise and fall vertically relatively to the pins K. The upper end of each of the middle pins is secured to a tension-rod M, the lower ends of which tension-rods being hooked into a plate M', secured to the

core of the central electromagnet, so as to support the pole-pieces and other parts of the collector device in a horizontal position. A turnbuckle m is provided in each of the tension-rods to lengthen or shorten them for proper adjustment. Each of the side pins K is connected by tension-rods N with the pole-pieces intermediate of the center and axles, so as to provide further support to sustain the said pole-pieces in a horizontal plane. Turnbuckles n may also be employed in these tension-rods N for proper adjustment.

By adjusting the pole-pieces G into a horizontal position by the tie-rods M and N, I also secure a corresponding adjustment of the insulating-boards H and the collector-bars O, which are hung from said boards.

The collector-bars O are preferably formed of tubular metal, usually of copper, so as to embody lightness and flexibility. In the preferred form of such tubular bars I make them somewhat pear-shaped, with the greatest mass of metal at the lower and large part, as indicated in Fig. 5. In this manner the bars may have great durability and longer life before requiring to be replaced. The current may be collected from the collector-bars directly or through the heads R and supplied to the motors through the usual controllers.

The tension on the upper parts of the pins K of the tension-rods is counteracted by the frame L, which sustains the said pins in a vertical position without interfering with the vertical movements of the car-body.

It will be observed that the swivel of the trucks will in no wise interfere with the suspension of the current-collecting device, as the said current-collector device is substantially connected with the car-body, while giving said car-body provision for vertical movement independent of the collector device, whose position relatively to the roadway is defined by the axles b, upon which it is sustained through the boxes D. The trucks may swivel or turn freely, as the elongated space in the box-frames E between the plates e e permits the free swinging of the box D without interference with the said box-frames.

While I have shown the current-collecting device in connection with two swivel-trucks, it is evident that it is equally applicable to a four-wheeled car structure in which only two axles are employed—such, for example, as the two axles b b. In such a case, however, there would not be the same necessity for making the box-frame E so elongated, as the box D would not have to slide against the under surface of the plate e.

As shown, the pole-pieces G are insulated from the ground, collector-bars, and the motor-circuit, so that they are not liable from any cause, such as picking up a piece of iron, to short-circuit the line or motors. They may be insulated in any other manner desired.

While I prefer the pole-pieces to be ener-

gized by electromagnets with soft-iron cores, the cores I may, if desired, be permanent magnets and used with or without the coils J J' or either of them, as shown in Fig. 7.

5 Any other method of insulating the collector from the axles of the truck may be used in lieu of that shown.

While I prefer the construction shown, I do not limit myself to the minor details, as they may be modified without departing from the spirit of the invention.

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

15 1. In an electrically-propelled vehicle the combination of the axles, with a current-collecting device extending from axle to axle close to the road-bed, insulated supports for sustaining the collecting device from the axles with freedom of lateral movement thereon, and connecting means between the collecting device and vehicle-body whereby the body is free for vertical movement but not lateral movement relatively to the collecting device.

25 2. In an electrically-propelled vehicle the combination of two pivoted trucks provided with axles, with a current-collecting device extending from axle to axle close to the road-bed provided with flexible contact-bars and rigid pole-pieces upon opposite sides of the contact-bars, insulated supports for sustaining the collecting device from the adjacent axles of the two trucks with freedom of lateral movement thereon, and connecting means between the collecting device and vehicle-body whereby the body is free for vertical movement but not lateral movement relatively to the collecting device.

3. In a current-collecting device for electric vehicles two longitudinal pole-pieces connected at intervals by electromagnets, in combination with insulating-walls between them, flexible collector-bars suspended between the insulating-walls, and insulating supporting devices for sustaining the collecting device upon the axles.

4. In a current-collecting device for electric vehicles, two longitudinal pole-pieces connected at intervals by electromagnets, in combination with insulating-walls between them, flexible collector-bars suspended between the insulating-walls, insulating supporting devices for sustaining the collecting device upon the axles, and tension-rods extending from the supporting devices to the pole-pieces intermediate of the axles.

5. In a current-collecting device for electric vehicles, two longitudinal pole-pieces connected at intervals by electromagnets, in combination with insulating-walls between them, two flexible collector-bars suspended between the insulating-walls, suspension-chains between each of the bars and the insulating-walls for causing the two bars to normally move to-

ward each other, and supporting devices for sustaining the collecting device upon the axles.

6. In an electrical vehicle, a current-collecting device consisting of longitudinal pole-pieces provided with electromagnets for energizing them, collecting-bars suspended between the pole-pieces, upright guides at each end of the pole-pieces and insulated from them, and heads guided upon said guides and carrying the ends of the collector-bars.

7. In an electrical vehicle, a current-collecting device consisting of longitudinal pole-pieces provided with electromagnets for energizing them, collecting-bars suspended between the pole-pieces, and having upwardly-directed goosenecks at their ends, upright guides at each end of the pole-pieces and insulated from them, and heads guided upon said guides and secured to the gooseneck ends of the collector-bars.

8. In an electric vehicle, a current-collecting device consisting of longitudinal pole-pieces provided with electromagnets for energizing them, a collector-bar suspended and insulated from the said pole-pieces and located between them, upwardly-extending means at each end of the pole-pieces for supporting them upon the axles, and tension-rods connecting the upwardly-extending means at each end of the pole-pieces with the said pole-pieces at intervals intermediate of the ends.

9. In an electric vehicle, a current-collecting device consisting of longitudinal pole-pieces provided with electromagnets for energizing them, a collector-bar suspended and insulated from the said pole-pieces and located between them, upwardly-extending means at each end of the pole-pieces for supporting them upon the axles, tension-rods connecting the upwardly-extending means at each end of the pole-pieces with the said pole-pieces at intervals intermediate of the ends, and means for adjusting the length of the several tension-rods.

10. In a current-collecting device for a car, the combination of two longitudinal pole-pieces connected at intervals by horseshoe-electromagnets, insulating-boards secured upon the inner faces of the pole-pieces, and collecting-bars suspended between said insulating-boards and extending slightly below the pole-pieces.

11. A vehicle having two pivoted trucks, combined with boxes supported upon the adjacent axles of the two trucks, box-frames resting upon the boxes and extending below the axles and having upright pins, a current-collecting device extending between the two trucks and supported by the two box-frames, and brace-frames secured to the under part of the vehicle-body and having apertures for the upright pins.

12. A vehicle having two pivoted trucks,

combined with boxes supported upon the adjacent axles of the two trucks, box-frames resting upon the boxes and extending below the axles and having upright pins, a current-collecting device extending between the two trucks and supported by the box-frames, brace-frames secured to the under part of the vehicle-body and having apertures for the upright pins and tie-rods extending from the tops of the pins to the collector device intermediate of the axles of the two trucks.

13. A vehicle having two pivoted trucks, and boxes supported upon the adjacent axles of the trucks, combined with two box-frames resting upon the boxes and extending below the axles and each provided with plates *ee* secured within the box-frame and insulated therefrom said plates *ee* receiving the wear, and a current-collecting device extending from truck to truck and supported by the box-frames.

14. In a current-collecting device the combination of the two pole-pieces connected at intervals by the cores *I* of inverted-**U** shape, coils *J J* upon the upright legs and coils *J'* upon the upper or cross portion of the cores, and a collector-bar suspended between the pole-pieces and extending below the bottom of the pole-pieces.

15. The collector device consisting of longitudinal pole-pieces forming a longitudinal insulated space between the pole-pieces open at the bottom, a collector-bar suspended in the insulated space, and suspension-chains sustain-

ing the collector-bar and provided with means for adjustment.

16. The collector device consisting of longitudinal pole-pieces, forming a longitudinal insulated space between them open at the bottom, two collector-bars flexibly suspended in the insulated space, and means for causing the bars to normally rest against each other and in the middle of the space.

17. The collector device consisting of longitudinal pole-pieces, forming a longitudinal insulated space between them open at the bottom, two collector-bars flexibly suspended in the insulated space, means for causing the bars to normally rest against each other and in the middle of the space, and means for adjusting the bars vertically.

18. A current-collecting bar for electric-railway cars, consisting of a tubular bar having the lower portion of greatly-increased thickness and weight.

19. A current-collecting bar for electric-railway cars, consisting of a tubular bar having the lower portion of greatly-increased thickness and weight, combined with flexible supports therefor connected with its upper or thinner portion.

In testimony of which invention I hereunto set my hand.

LEON W. PULLEN.

Witnesses:

R. M. KELLY,
WM. ROONEY.