

(No Model.)

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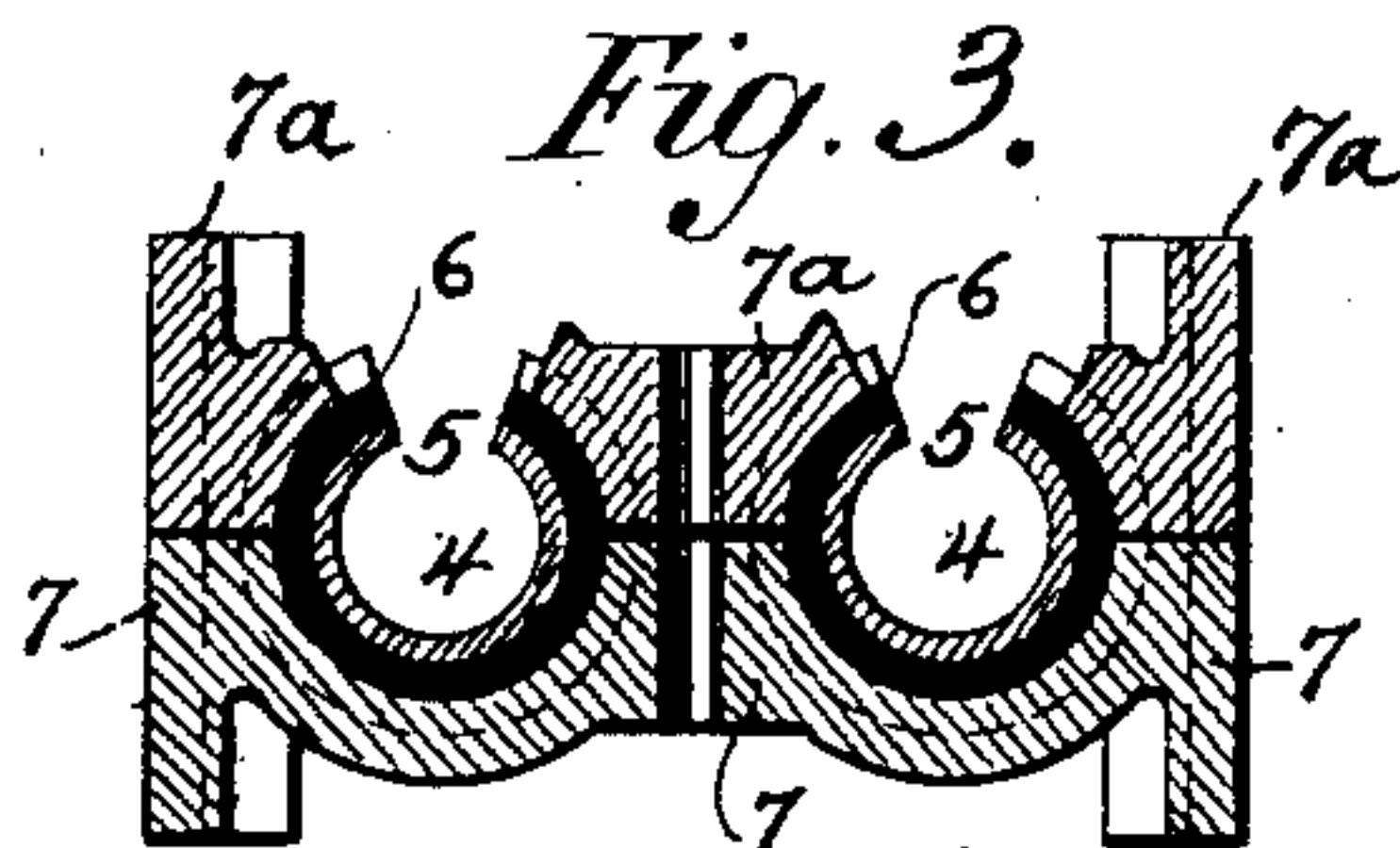
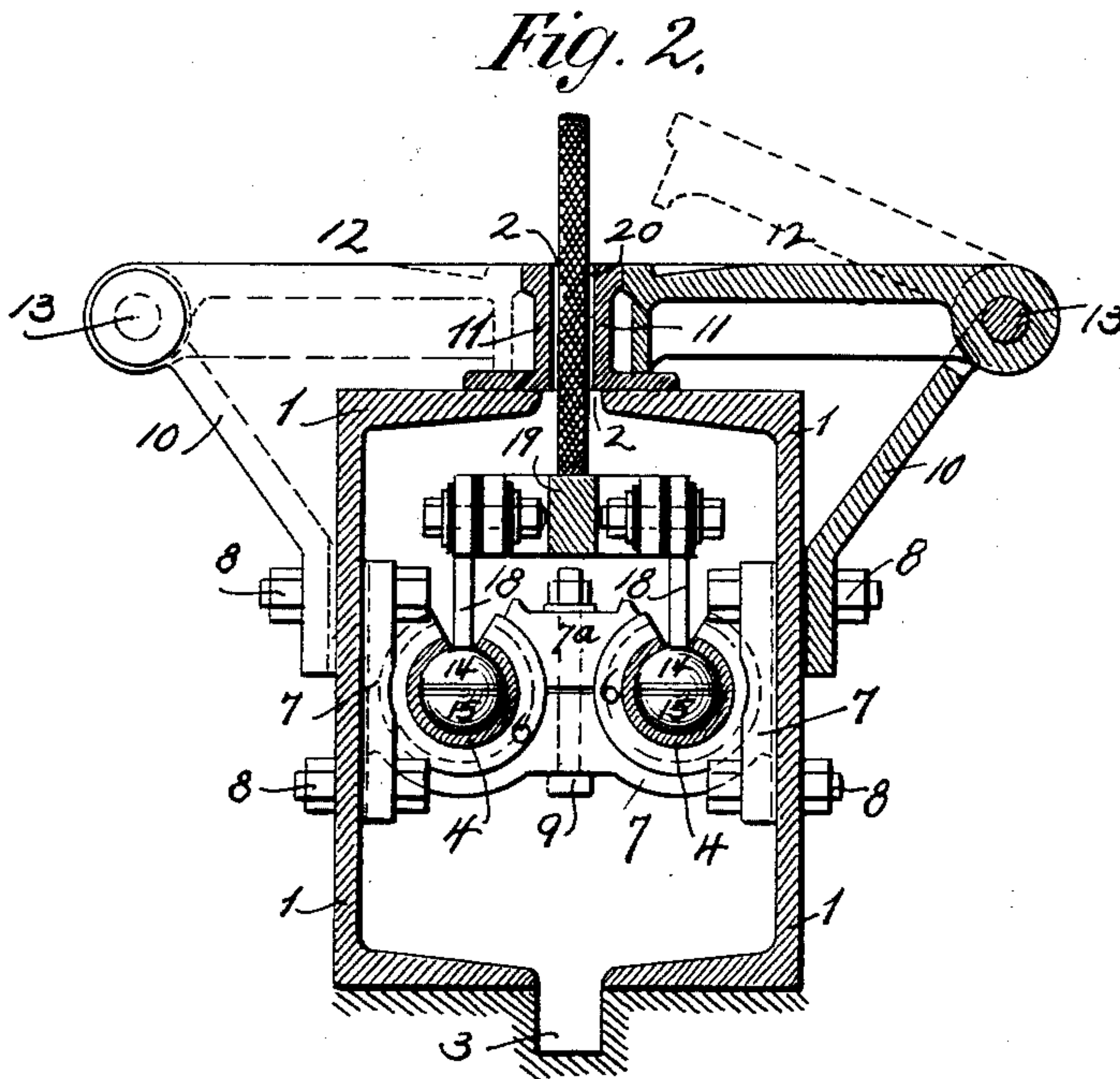
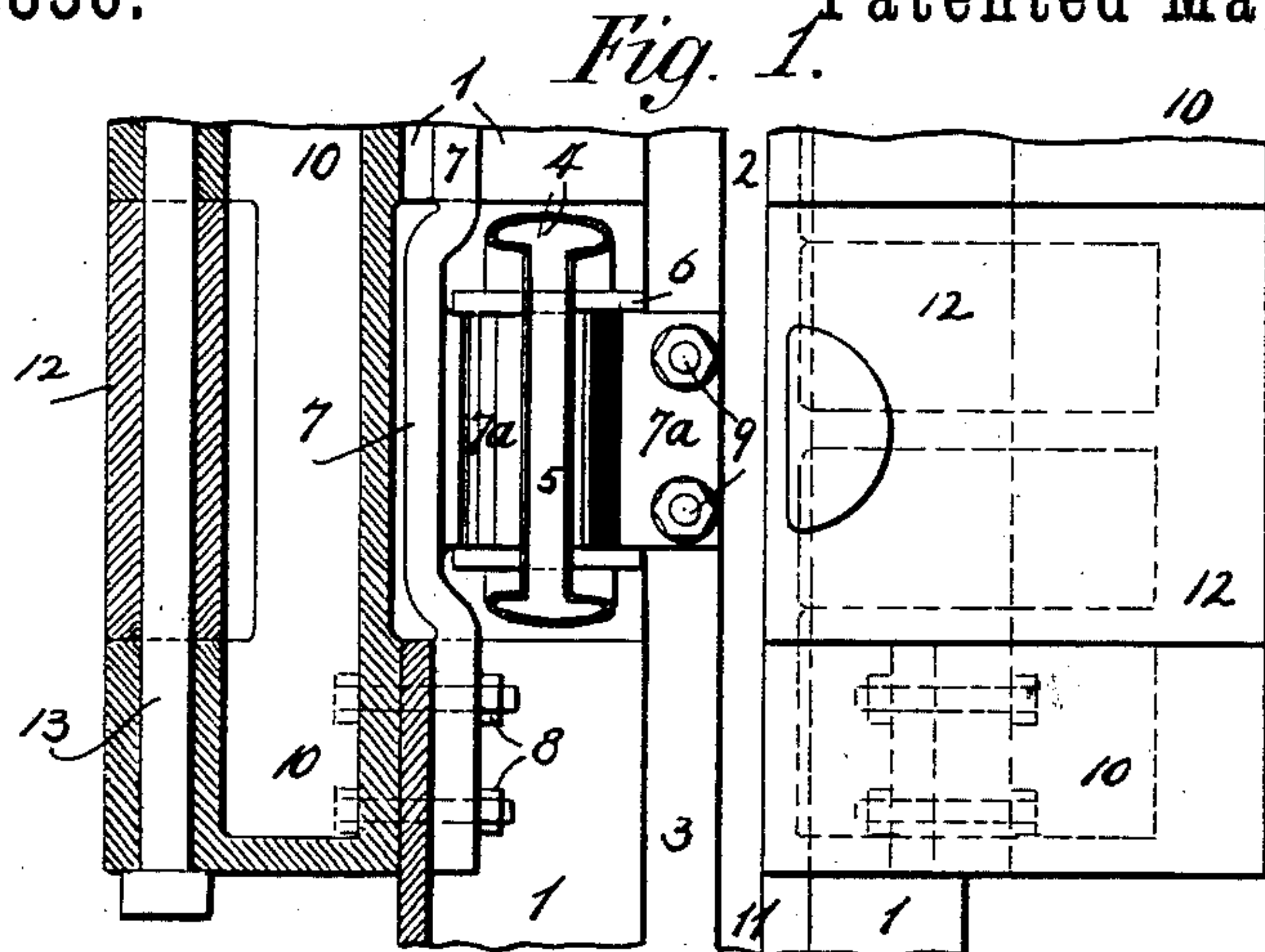
C. W. SIEMENS, Dec'd.

GUARANTEE TRUST AND SAFE DEPOSIT COMPANY, Administrator.

CONDUIT ELECTRIC RAILWAY.

No. 520,356.

Patented May 22, 1894.



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Administrator  
of  
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Inventor:  
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*Timothy F. O'Connell*

(No Model.)

2 Sheets—Sheet 2.

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Fig. 4.

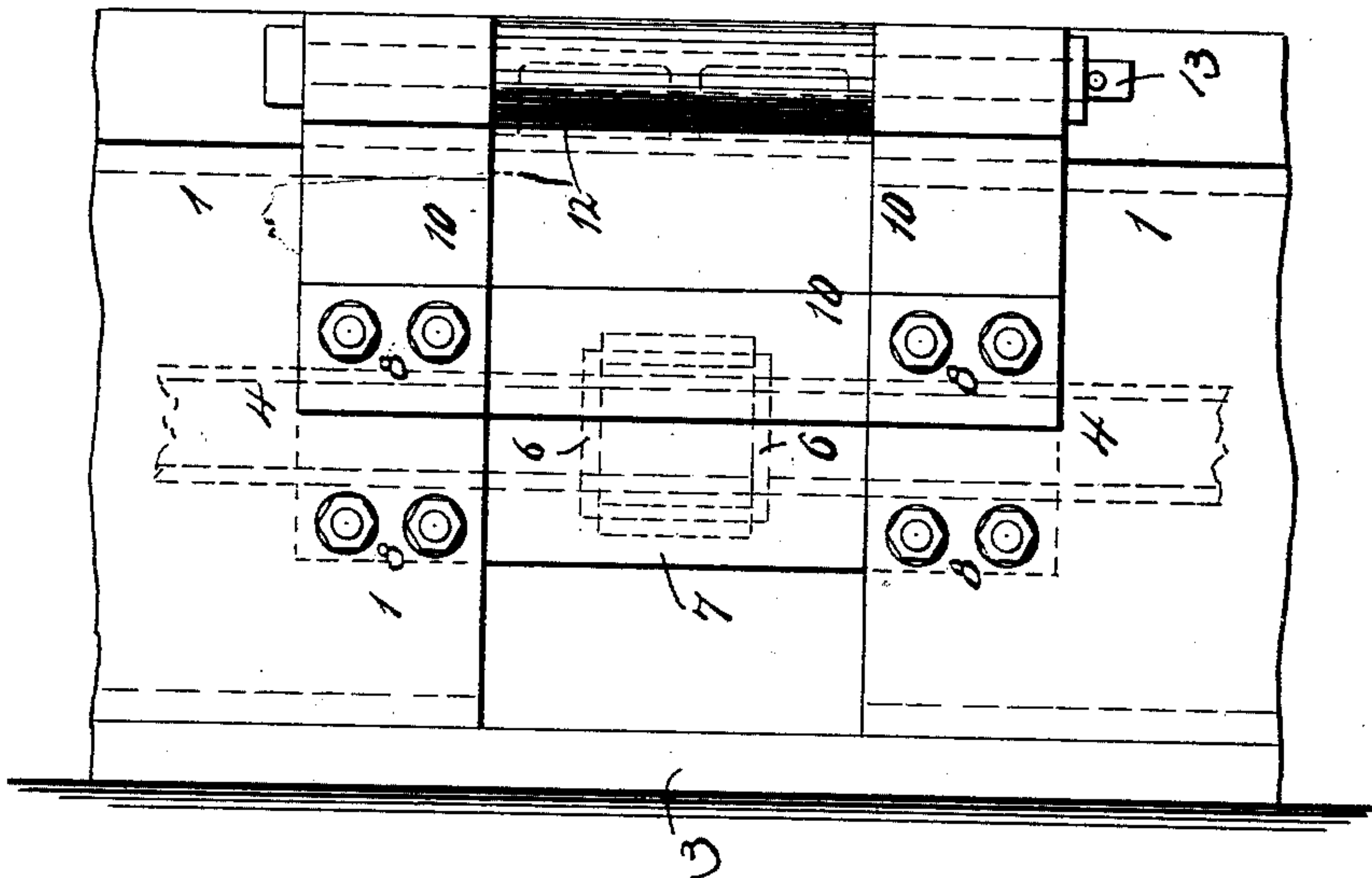


Fig. 5.

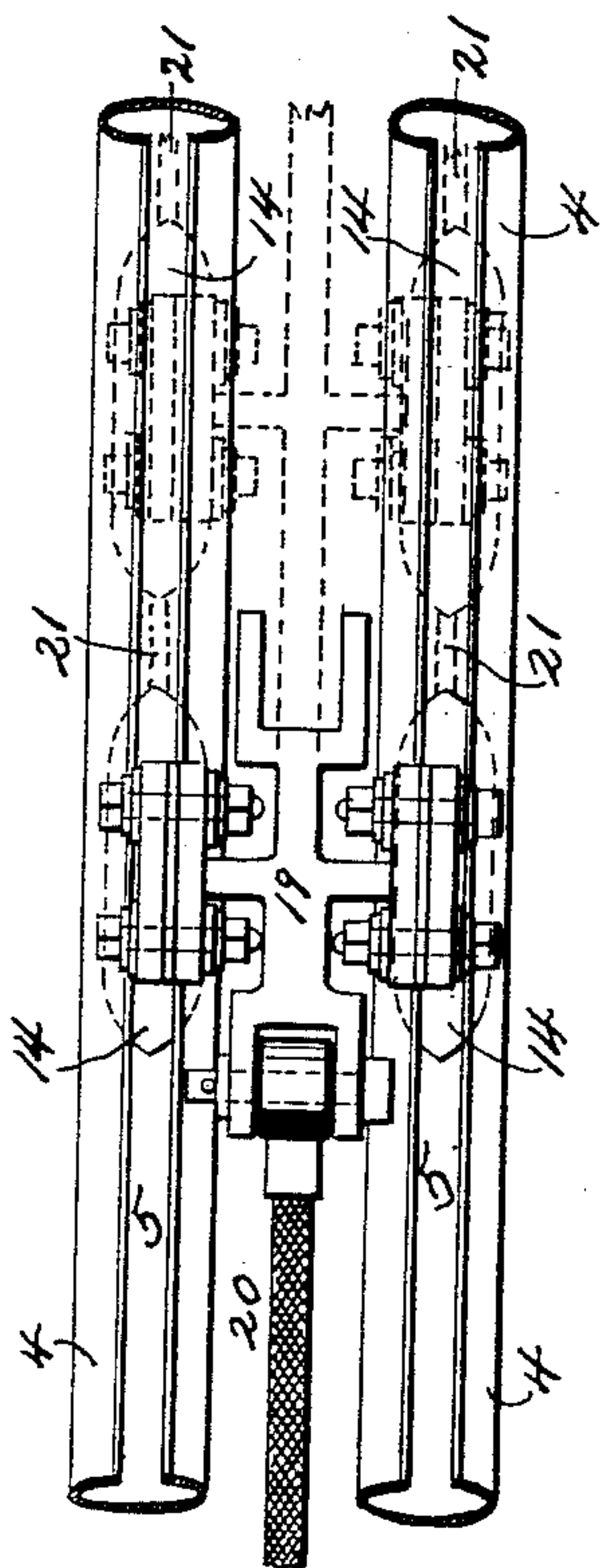


Fig. 6.

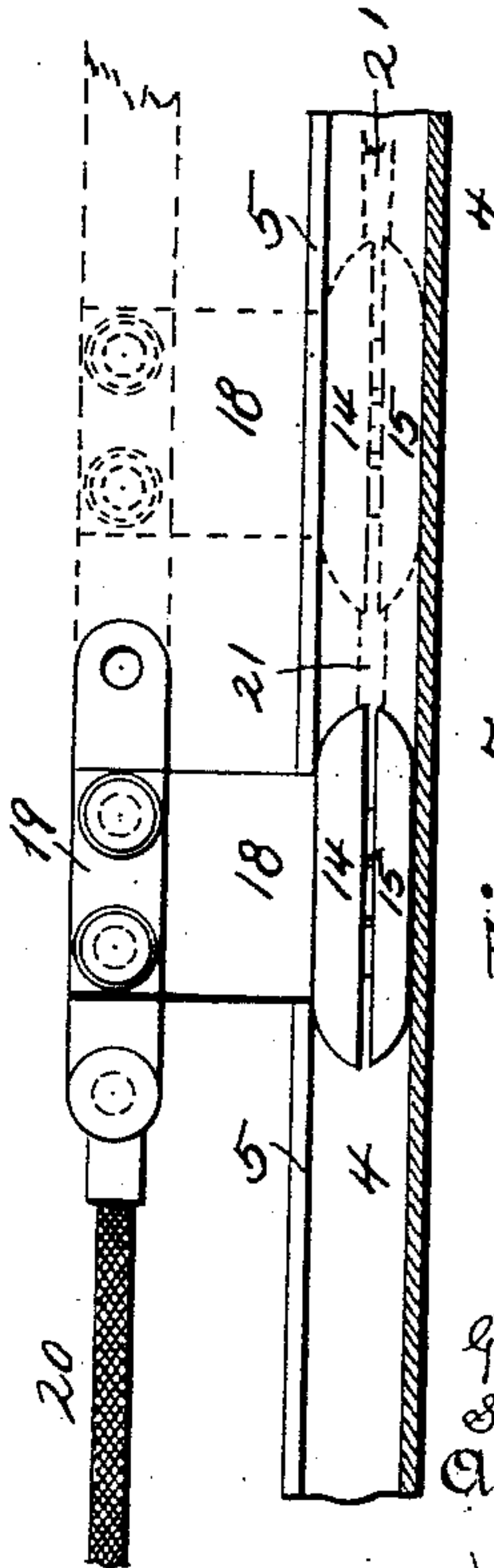
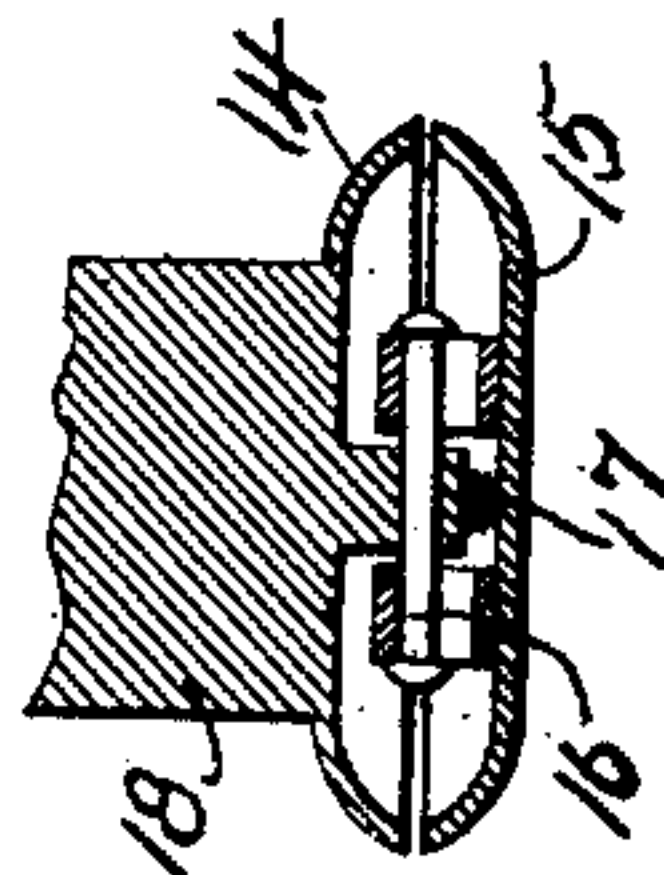


Fig. 7.



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# UNITED STATES PATENT OFFICE.

GUARANTEE TRUST AND SAFE DEPOSIT COMPANY, ADMINISTRATOR OF  
CHARLES WM. SIEMENS, DECEASED, OF PHILADELPHIA, PENNSYLVANIA.

## CONDUIT ELECTRIC RAILWAY.

SPECIFICATION forming part of Letters Patent No. 520,356, dated May 22, 1894.

Application filed October 19, 1893. Serial No. 488,655. (No model.) Patented in England October 17, 1883, No. 4,945.

*To all whom it may concern:*

Be it known that the GUARANTEE TRUST AND SAFE DEPOSIT COMPANY, of the city of Philadelphia, in the State of Pennsylvania and United States of America, administrator of the estate of CHARLES WILLIAM SIEMENS, deceased, late a resident of Westminster, London, England, does declare the said CHARLES WILLIAM SIEMENS to have invented new and  
10 useful Improvements in Electric Railways, (for which Letters Patent of Great Britain, No. 4,945, were granted to him on the 17th day of October, 1883,) of which the following is a specification.

15 The invention for which it is desired to secure Letters Patent, relates to electric railway systems and more particularly to the novel underground conductors insulated from the earth, and by or from which electric current  
20 is transmitted to the motor or motors of a vehicle or vehicles traveling on a track ranging parallel with the subway conductors. These conductors may have any desired form but in the present case they are shown as tubes having a longitudinal slot at the upper side or  
25 part. The underground conductors are placed within a chamber along which a box-like conduit is formed, preferably by opposing channel irons separated to provide between their  
30 upper edges or parts a longitudinal slot. In the preferred construction, opposing angle irons which rise to the roadway level are fixed to adjacent upper parts of the channel irons. A drainage trough or channel also is provided in the chamber or conduit. A preferably flexible conductor passes downward from  
35 the vehicle through the slot formed between the opposing angle and channel irons to the contacts which travel in the tubular conductors as they are drawn along by the moving  
40 vehicle. The slotted conductors are sustained within seatings of insulating material which are supported by chairs bolted to adjacent ends of the channel irons which are  
45 longitudinally separated expressly to provide recesses or pockets to accommodate the chair and insulation supports of the tubular conductors. Hinged or removable covers or lids at the roadway level provide for free access  
50 to the tubular conductors and their supports to facilitate inspection, cleaning or repairs.

The contact which is drawn along the tubular conductors may have any suitable form, a preferred construction being a pair of spring-separated cheek pieces or plates which press  
55 against opposing sides or faces of the conductor from which the current actuating the vehicle motor is taken.

The invention will first be described and then will be particularly defined in claims  
60 hereinafter set forth.

Reference is to be had to the accompanying drawings, forming part of this specification and in which similar reference numerals indicate corresponding parts in the several views. 55

Figure 1 is a detail plan view, partly in horizontal section, of a portion of the underground conduit next the adjacent ends of the channel irons forming the same, and a portion of one tubular conductor and its chair  
70 and insulation supports, the hinged cover at one side of the conduit being removed. Fig. 2 is a transverse vertical sectional elevation of the parts shown in Fig. 1, together with the contacts. Fig. 3 is a central vertical  
75 transverse section of the tubular conductors, their insulation, and the supporting chairs. Fig. 4 is a detail side view of parts shown in Figs. 1 and 2. Fig. 5 is a plan view of a pair of tubular slotted conductors, traveling con-  
80 tacts therein, and a portion of the flexible conductor conveying current to the vehicle motor. Dotted lines in this view indicate how a number of connected contacts may be employed. Fig. 6 is a vertical sectional view  
85 of the parts shown in Fig. 5, and Fig. 7 is a detail horizontal sectional view of one of the traveling contacts.

In a continuous chamber formed in the earth or underground and about parallel  
90 with a surface railway track on which electric cars or vehicles are to travel, is formed a conduit which preferably comprises opposing pairs of channel irons 1, 1, set edgewise on any suitable foundation and with their hollow  
95 sides or flanges facing each other. These channel irons are separated sufficiently to provide between their upper opposing flanges a slot 2, in which runs the electrical conductor which conveys current from the main conductors  
100 held within the conduit, and at the lower separated flanges of the channel is formed in the



concrete bed, or it may be by separate tiles or pipes, a trough or channel 3, which gives drainage from the conduit of water entering it from the ground surface through the slot 2, or otherwise. The channel irons 1, 1, are separated longitudinally or at the ends, as shown in Figs. 1 and 4 of the drawings, in order to form spaces or pockets to receive and give access to the chair and insulation supports of the main electrical conductors. There are preferably two of these main conductors 4, 4, which range along within the conduit or between the channel irons forming the same, and in the drawings these conductors are shown as having a tubular cylindrical general form and provided along their upper parts, each with a slot 5, through which travels the arm of the contact device presently described. The conductors 4, are supported directly by or within beds of any suitable insulating material 6, which in turn are secured in or upon chairs 7, preferably made of metal and with flanges which bear on and are secured by bolts 8, to the inner faces of the channel irons, see Fig. 2, of the drawings. The chairs have three detachable jaw-like portions 7<sup>a</sup>, shown in Figs. 2 and 3, and which permit proper adjustment of the conductors 4, and their insulation supports 6, upon their lower main portions and afterward lock 4 and 6 securely in place while sustaining them from the channel irons. Bolts 9, hold the central jaw 7<sup>a</sup> in position.

In order to fully protect the chair and insulation supports 7, 6, of the main conductors at the spaces or pockets between the separated ends of the channel irons, and also to give free access to 7, 6, at or through said spaces, the latter are covered by a metal box-like casing 10, secured to the channel irons preferably by the upper bolts 8, which fasten the conductor chairs 7. The outer side wall of the casing 10, slants at an angle of forty-five degrees or sufficiently to give ample room between it and the base flange of an adjacent continuous angle iron 11, for reaching the conductor supports. A portion of the top of the box or casing 10, which is made removable and preferably as a door or cover 12, hinged by a bolt 13, to lugs on the casing and closing upon or against the angle iron 11, allows convenient access to the conductor and its supports by swinging the door open, as indicated by dotted lines in Fig. 2, of the drawings. There is a casing 10, with a hinged cover 12; and also an angle iron 11, secured to each of the main conduit channel irons 1, 1, at all spaces between the ends of said channel irons, and the upper faces of the parts 10, 12, 11, are about level with the surface of the roadway on which the vehicle tracks are laid. It will be noticed that the continuous angle irons 11, 11, which bridge the spaces between the ends of the channel irons and which are bolted to the top flanges of the latter, form most effective ties or stays for the channel irons, and the space between the two angle

irons is an upward continuation of the contact arm slot 2, formed between the channel iron flanges. When two underground main conductors 4, 4, are used, one positive and the other negative for the working and return currents respectively, the contact device will have two contacts, one running in each conductor. These contacts may have any approved form but are preferably made expansible and with two opposing cheek pieces or plates 14, 15, having interior lugs through which passes a bolt or pin 16. The lugs on one plate 15, are slotted and an expanding spring 17, is placed between said plate and the lug on the other plate 14, and presses the two cheek pieces apart to give them good contact with opposing faces or parts of the conductor tube. The contact arm 18, which is fastened to the plate 14, has suitable insulating connection with a frame or headpiece 19, to which is coupled the preferably flexible conductor 20, which passes upward through the subway slot 2, and is coupled by duplex wires in any approved manner not necessary to show or describe, to the vehicle motor to connect its positive terminal with one main conductor 4, and its negative terminal to the other main conductor.

Dotted lines in Figs. 5 and 6 of the drawings indicate how two or more two-part expanding contacts 14, 15, may be used in each of the main conductors and in this case the contacts in each conductor will be connected by a copper wire 21, and the two end contacts will be coupled by arms 18, with the frame 19, which will be correspondingly lengthened to accommodate the entire duplex series of contacts.

The claim is not limited to the precise construction herein described, since CHARLES WILLIAM SIEMENS is considered to be the inventor, broadly, of an underground conduit placed entirely beneath the surface of the ground, and which has within it one or more conductors insulated from the earth, and a traveling contact or contacts passing along said conductor or conductors and connected with an electrically propelled vehicle moving along the ground parallel to the conduit, and further, the late CHARLES WILLIAM SIEMENS is considered to be the inventor of the construction comprising tubular insulated conductors placed underground with sliding contacts within said conductors connected preferably by a flexible or yielding conductor with an electrically propelled vehicle running on a track parallel with the conduit.

It is desired to distinguish this invention from a system of electric railways in which electrical contact is maintained by means of a slotted tube placed above the surface of the ground, and by a traveling contact in the tube connected with a vehicle, and to which construction no claim is made.

The following is claimed as the invention of the late CHARLES WILLIAM SIEMENS:

1. In an electric railway system, a continu-



ous underground chamber having a slot at its upper side, channel irons located at intervals within said chamber, chairs carried by said channel irons, a continuous slotted tubular conductor extending through the chamber and insulated from and supported by said chairs, and an electrically propelled vehicle having traveling connection with said conductor.

2. In an electric railway system, a continuous underground chamber having a slot at its upper side, channel irons located at intervals within said chamber, chairs carried by said channel irons, a continuous slotted tubular conductor extending through the chamber and insulated from and supported by said chairs, and an electrically propelled vehicle having a yielding traveling connection with said conductor.

3. In an electric railway system, a continuous underground chamber having hinged or removable covers giving access to said chamber, channel irons located at intervals within said chamber, and a conductor supported by said channel irons.

4. In an electric railway system, a continuous underground chamber having hinged or removable covers, channel irons located at intervals within said chamber, chairs carried by said channel irons, tubular slotted insulators and slotted conducting tubes within said insulators and sustained by the chairs,

and a sliding contact within said conducting tubes, connected to an electrically propelled vehicle which runs along near to or over the continuous underground chamber.

5. In an electric railway system, a continuous underground chamber having hinged or removable covers, channel irons located at intervals within said chamber, chairs carried by said channel irons, tubular slotted insulators and slotted conducting tubes within said insulators and sustained by the chairs, a sliding contact making device having two insulated contact arms, each having a moving contact within said conducting tubes, and an electrically propelled vehicle moving along the line of the underground chamber and flexibly connected to the sliding contact making device within said tubular conductors.

In testimony whereof the aforesaid administrator of the estate of CHARLES WILLIAM SIEMENS, deceased, does hereby subscribe its name, in the presence of two witnesses, this 29th day of September, 1893.

[L. s.]

GUARANTEE TRUST AND

SAFE DEPOSIT CO.,

*Administrator,*

By RICHD. Y. COOK,

*Prest.*

Witnesses:

WM. IRWIN,

W. S. WINSHIP, Jr.