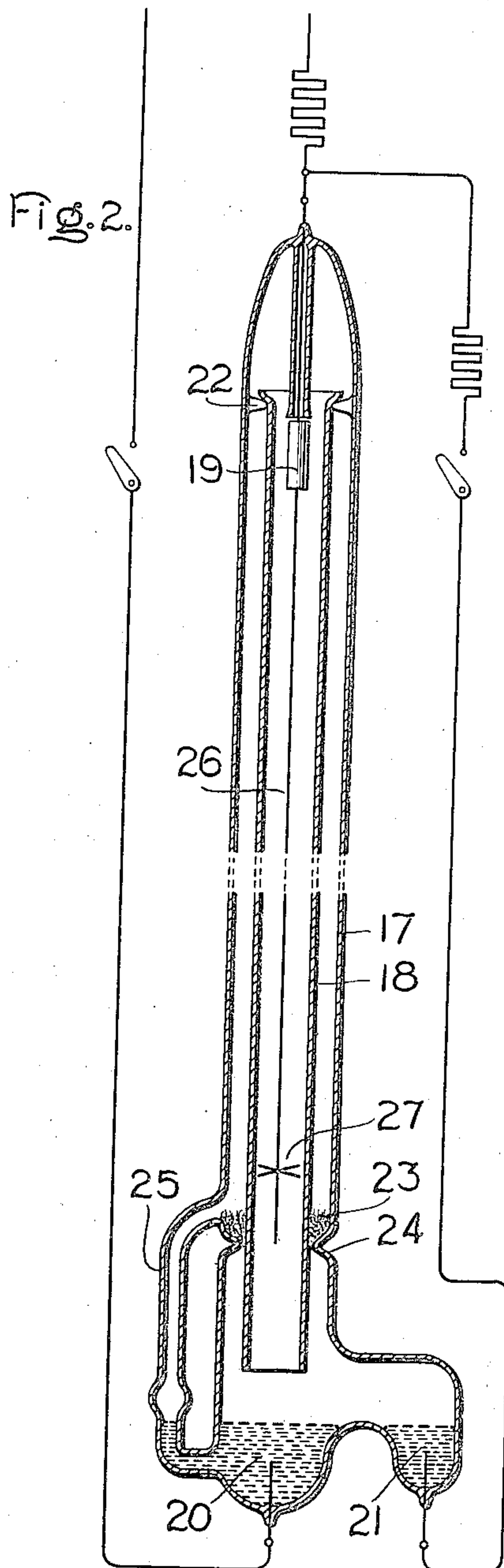
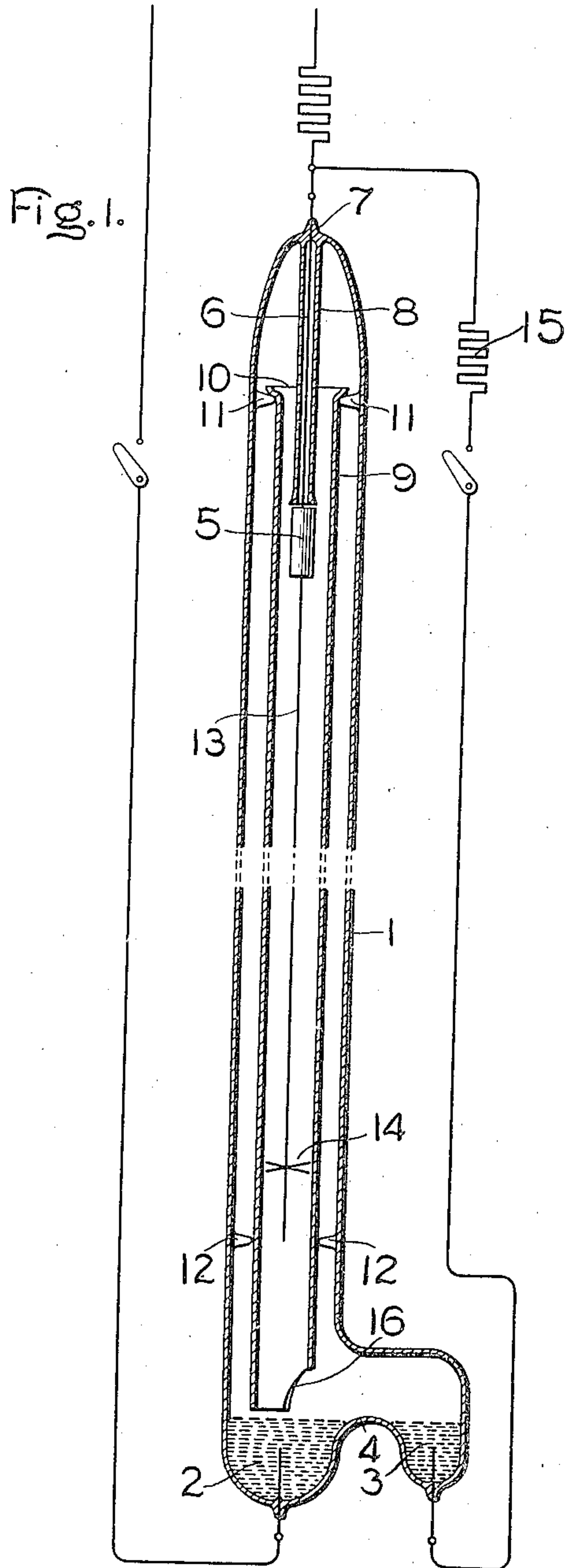


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 ENVELOP FOR VAPOR ELECTRIC CONDUCTORS.
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917,212.

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UNITED STATES PATENT OFFICE.

EZECHIEL WEINTRAUB, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

ENVELOP FOR VAPOR ELECTRIC CONDUCTORS.

No. 917,212.

Specification of Letters Patent.

Patented April 6, 1909.

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To all whom it may concern:

Be it known that I, EZECHIEL WEINTRAUB, a subject of the Czar of Russia, residing at Schenectady, in the county of Schenectady and State of New York, have invented certain new and useful Improvements in Envelops for Vapor Electric Conductors, of which the following is a specification.

My present invention relates to the construction of the envelops or receptacles of devices such as vapor electric lamps, rectifiers, or the like, in which a vapor, such as the vapor of mercury, serves as the conducting medium.

In carrying my invention into practice I make use of an outer envelop in which I locate an open tube, or similar shaped confining vessel, through which the arc or current flow in the vapor medium is caused to pass. This construction possesses various important advantages which I will explain in connection with the accompanying drawings and embodies, moreover, certain features of novelty which I have pointed out with particularity in the appended claims.

In the drawings, Figure 1 represents one embodiment of my invention; and Fig. 2 another embodiment of my invention.

In both of the figures of the drawings I have represented my invention as applied to a mercury vapor lamp, but it will readily be understood by one skilled in the art that the various features of novelty of my invention are applicable, without the exercise of invention, to vapor rectifiers as well as to other devices in which current is caused to pass through the medium of a conducting vapor or gas.

In Fig. 1 the outer envelop of a lamp, which may be of indefinite length, is indicated at 1. This envelop is in the form of a long tube provided at its lower extremity with two receptacles or pockets for containing bodies of mercury 2 and 3 which constitute electrodes of the lamp.

The electrode 3 is contained as indicated, in a pocket projecting laterally from the main tube 1, while the body of mercury 2 is contained in the closed end of the main tube 1. The two bodies of mercury or electrodes are normally separated from each other by an intervening wall or portion of the tube or receptacle as indicated at 4.

At the top of the lamp is an electrode 5, of

artificial graphite or other suitable material. This electrode is supported in place by a downwardly projecting conductor 6, sealed through the top of the tube 1 as indicated at 7, and covered throughout its length by insulating material 8 such as a tube of glass or quartz the lower end of which flares over the electrode 5 as indicated.

Located concentrically within the main tube 1 is a second tube 9 open at both ends and suitably supported in position. The arrangement is such that the lower end of the tube 9 projects down into close proximity to, or it may be into actual contact with, the mercury electrode 2. The upper end of the tube 9 extends within a moderate distance of the top of the outer tube 1. The tube 9 and the electrode 5 are so related that the electrode is in a position at some distance below the upper opening of the tube.

I may provide any one of a number of devices for holding the tube 9 in position. Thus for example I may flare the upper end of the tube and, below the flared portion indicated at 10, I may locate a number of knobs or lugs 11 projecting inwardly from the outer tube 1 and engaging the flared portion 10 so as to support the tube 9.

The lower portion of the tube 9 may be held in concentric position by a number of inwardly projecting fingers 12 fused to the inside of the tube 1.

The upper electrode 5 is provided with an electrically connected depending filament 13 of carbon or other suitable material which filament extends axially downward in the inner tube 9 into proximity to the main electrode 2. The lower end of this filament may, if desired, be centralized by means of cross-arms such as 14 of the same material as the filament, or of insulating material, and secured thereto by a suitable cement.

The material of which the inner tube 9 is composed is, in the preferred form of my invention, fused quartz or silica. This substance is so highly refractory as to permit the lamp to be run, if desired, at very high current densities. In place of the quartz, however, I may use hard glass, and under certain circumstances I may use material of the same composition as that of the outer envelop or tube 1. By using fused quartz, however, I obtain all the advantages incident to the use of a quartz envelop, without involving the attendant difficulties with re-

spect to the sealing-in of the leading-in conductors, the shaping of the tube in the desired shape, and the like.

One of the features of my invention which is of marked utility, regardless of the material of which the inner tube 1 is composed, is the fact that the tube-like chamber between the inner tube 9 and the outer tube 1 serves as a condensing chamber for the mercury vapor.

In starting into operation the lamp shown in Fig. 1, I connect up the main electrodes 5 and 2 of the lamp across a suitable source of electrical energy, as indicated, while the additional or auxiliary electrode 3 is connected, through a suitable resistance such as 15, to the main leading to the upper electrode or anode 5. Upon slightly agitating the lower portion of the lamp, or in some other manner causing a momentary flow of mercury over the bridge or wall 4, current is caused to flow between the electrodes 2 and 3 and, as the mercury recedes, an arc is sprung which, by the generation of ionized mercury vapor, causes an arc to start in the main lamp tube between the electrode 2 and the upper electrode 5. This action is greatly assisted by the presence of the conducting filament 13. It may possibly happen that at starting the arc flows, not only inside of the inner tube 9 to the upper electrode 5, but also through the space between the inner and the outer tube. The arc or flow of current in this outer space is, however, only momentary.

In order that the inner tube 9 may be in easy communication with the lateral projection of the main tube 1, in which the starting arc is formed between the main electrode 2 and the supplemental electrode 3, I may cut away or chamfer the lower end of the tube 9 as indicated at 16.

In the modification of the invention shown in Fig. 2 I employ, as before, an outer envelop or receptacle 17 and an inner tube 18 supported in any suitable manner such as has been described in connection with Fig. 1. The upper electrode 19 of the lamp, instead of being dropped down a considerable distance into the tube 18, may be located near the orifice of the same as shown. The lower end of the inner tube 18 may be arranged as in Fig. 1, or, if desired, may be cut across square as indicated and arranged at a distance above the main mercury electrode 20 such as to afford free communication with the space over the auxiliary electrode 21.

The tube 18, which is supported at its top end by prongs or lugs 22 secured to the wall of the envelop 17, or by other suitable means, has its lower end held concentrically by means of a lightly packed mass of mineral wool or similar material 23, which in turn is held from slipping down by reason

of an inwardly projecting ridge 24 formed by slightly constricting the tube 17 at the points indicated.

A tube 25 communicates with the chamber between the inner and outer tubes 17 and 18, at a point above the packing 23, and extends down into communication with the pocket for the mercury electrode 20. As in the lamp shown in Fig. 1, the electrode 19 is provided with a depending conducting filament 26 which may be held centrally by cross pieces 27 or otherwise.

When the lamp is started into operation, the arc which is formed between the electrodes 19 and 20 flows only in the inner tube 18, and is prevented from flowing in the space between the inner tube and the outer tube 17 by reason of the presence of the mineral wool 23. This lightly packed wool is porous, so to speak, to the passage of mercury vapor, but has the effect of introducing such a resistance to the flow of current that no arc can pass. Due to the presence therefore of this wool, there is no opportunity for the arc to take the outside path, so to speak, and flow over the top edge of the inner tube 18 and then down into the tube to the electrode 19. The electrode 19 may therefore be located as near as may be desired to the top of the tube 18. When the lamp is in operation the mercury is vaporized and, passing up through the inner tube 18, diffuses into the space between the inner and outer tubes 18 and 17 and, as it is condensed, returns through the tube 25 to the mercury receptacle in the bottom of the lamp.

The constriction 24 prevents this condensed mercury from disturbing the surface of the mercury cathode and likewise prevents the sudden rush of mercury from one end of tube 17 to the other in case the lamp is roughly handled during transportation.

When the inner tube of the lamps shown in Figs. 1 and 2 is formed of fused silica, it does not crack or break, nor does it discolor; neither does it become coated with a light-obscuring deposit in the neighborhood of the upper electrode 19. Even if the inner tube is of hard glass there is no deposit in the neighborhood of the upper electrode, which I at present explain upon the hypothesis that there is such a draft or movement of the mercury vapor as to prevent any such deposit taking place.

It will be evident that various modifications of my invention may be made without departing from the spirit thereof, for which reason I do not wish to be limited to the exact details shown and described.

What I claim as new and desire to secure by Letters Patent of the United States, is,
1. The combination of an exhausted envelop provided with two concentric chambers in communication with each other,

electrodes in communication with said chambers, and means for causing an electric arc to flow in the inner chamber.

2. The combination of an external exhausted glass envelop, an inner tube of fused quartz or silica, and electrodes for affording a path for an electric arc in the silica tube.

3. The combination of an outer envelop, an inner envelop of a more refractory material than that of which the outer envelop is composed, and electrodes for said envelops.

4. The combination of an hermetically sealed outer envelop, electrodes inclosed by said envelop between which an arc may be maintained, and means for preventing said arc from flowing throughout its length in contact with said envelop.

5. The combination of an exhausted outer envelop, an inner tube of silica, and cooperating electrodes.

6. An exhausted envelop for a vapor electric device, having walls one within another and forming between them a condensing space for vaporized material, and electrodes for said device, one at least of which is of vaporizable material.

7. In a vapor electric device, an envelop for the arc formed of inner and outer walls, one of glass and the other of fused silica or quartz.

8. In an envelop or container for a vapor electric device, inner and outer walls formed respectively of materials possessing different degrees of heat resisting power, and electrodes therefor.

9. In an envelop for a vaporous conduct-

ing medium, the combination of inner and outer members, the inner member consisting of a shell open at either end, and electrodes, one of which is located adjacent to the opening in one end of said shell and the other extending into the other opening in said shell.

10. The combination of a tube open at both ends, an inclosing envelop therefor, and electrodes in said envelop arranged so that an arc or discharge between them passes through said tube.

11. In a vapor electric apparatus, the combination of a tube pervious to ultra violet rays, a screen impervious to the ultra violet rays surrounding the tube, a conducting vapor within the tube through which the current is adapted to pass, and electrodes for the conducting vapor.

12. In a vapor electric apparatus, the combination of a quartz tube, a glass tube surrounding the quartz tube, a conducting vapor within the quartz tube, through which the current flow in the vapor medium is caused to pass, and electrodes for the conducting vapor.

13. The combination of a refractory envelop for a mercury arc, an hermetically sealed glass container about said envelop, electrodes therefor and current conducting leads passing through said container.

In witness whereof, I have hereunto set my hand this 12th day of June, 1903.

EZECHIEL WEINTRAUB.

Witnesses:

BENJAMIN B. HULL,

HELEN ORFORD.