

No. 887,660.

PATENTED MAY 12, 1908.

O. O. KRUH.

STARTING DEVICE FOR MERCURY VAPOR APPARATUS.

APPLICATION FILED OCT. 14, 1907.

Fig. 2.

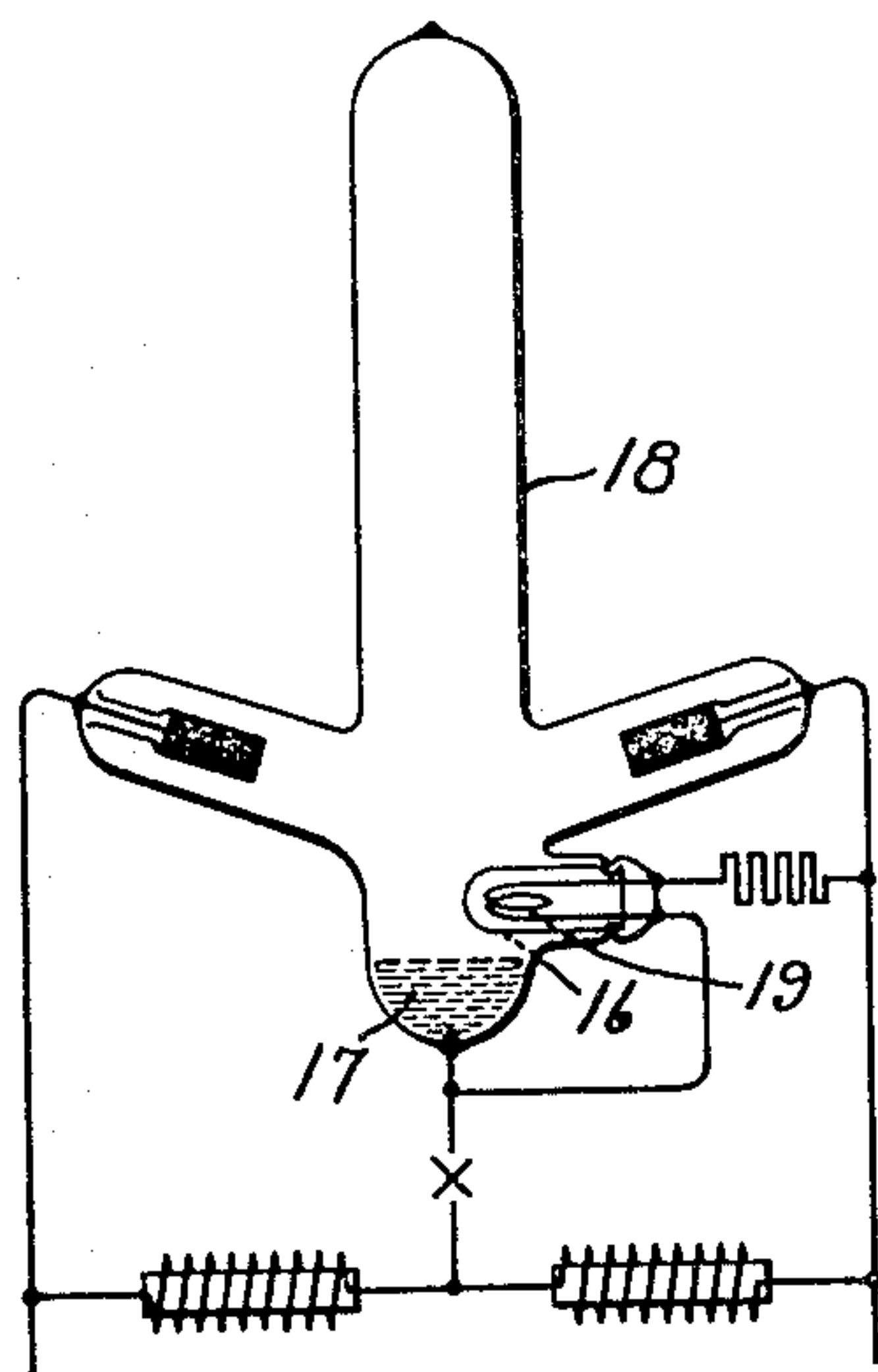


Fig. 3.

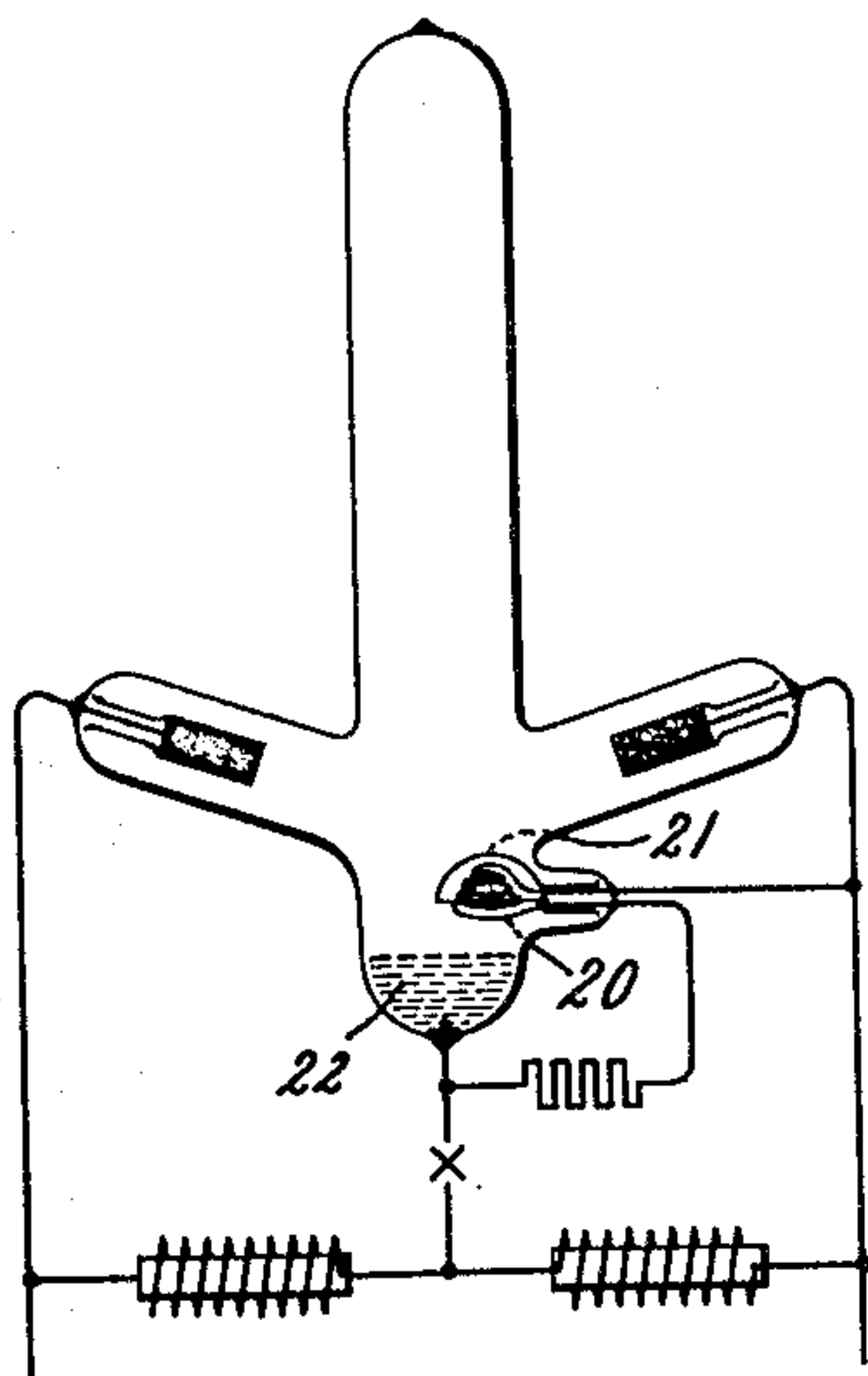
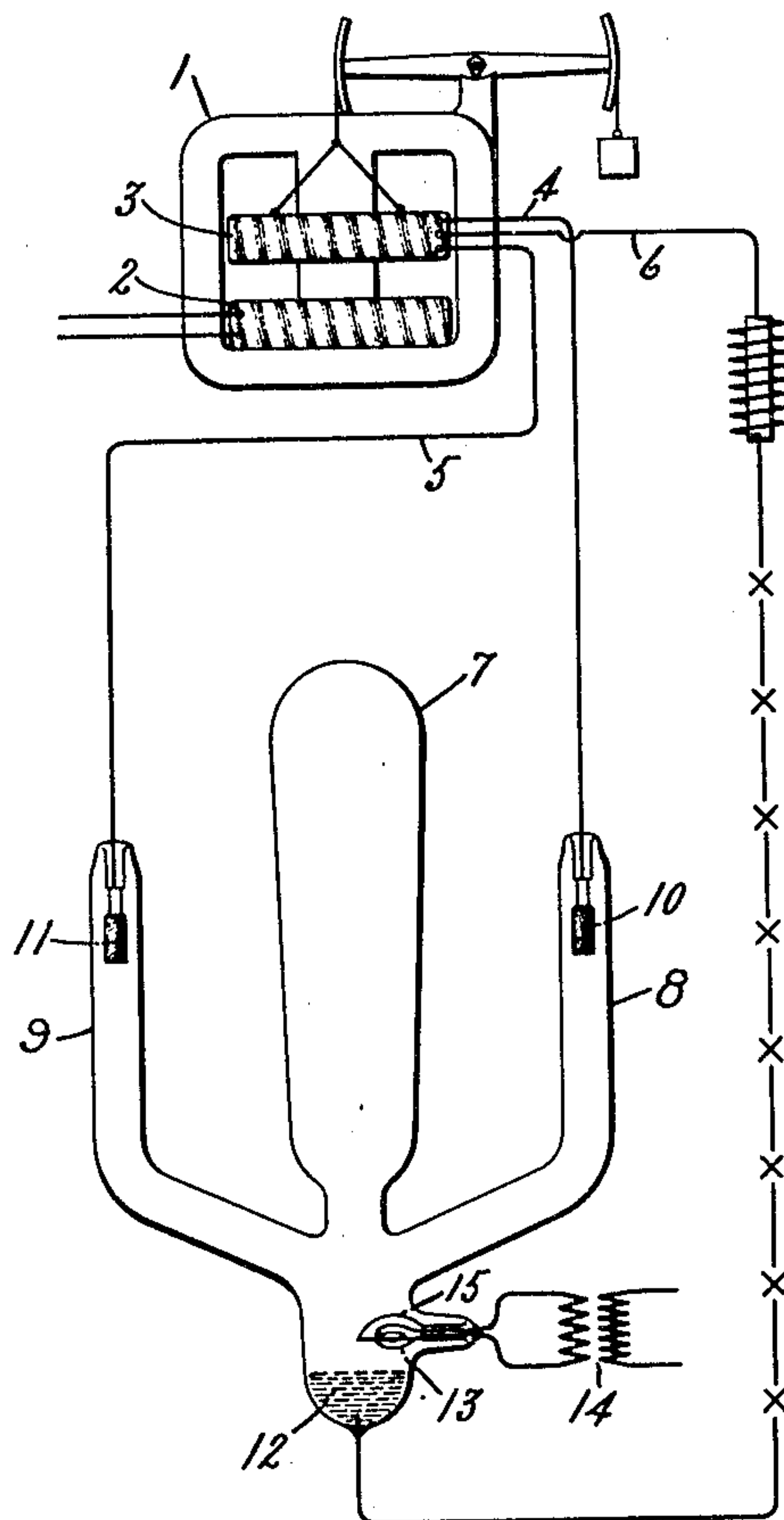


Fig. 1.



Witnesses:

George W. Tilden
J. Ellis Allen

Inventor:

Osias O. Kruh,

by *Alfred H. Davis*
Att'y.

UNITED STATES PATENT OFFICE.

OSIAS O. KRUH, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY,
A CORPORATION OF NEW YORK.

STARTING DEVICE FOR MERCURY VAPOR APPARATUS.

No. 887,660.

Specification of Letters Patent.

Patented May 12, 1908.

Application filed October 14, 1907. Serial No. 397,270.

To all whom it may concern:

Be it known that I, OSIAS O. KRUH, a subject of the Emperor of Austria-Hungary, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Starting Devices for Mercury Vapor Apparatus, of which the following is a specification.

My present invention relates to means for starting in or maintaining in operation a device of the general class including mercury arc rectifiers, mercury arc lamps, whether alternating or direct, and the like, and comprises certain improvements in that type of starting device wherein a heating conductor is arranged in proximity to one of the electrodes and acts by reason of certain rays or emanations from the conductor to initiate the main arcs.

The features of novelty which characterize my invention are pointed out in the appended claims.

The invention itself, as embodied in practice, will be better understood by reference to the following description taken in connection with the accompanying drawing, which shows, by way of illustration, certain applications of my invention.

In the drawings Figure 1 shows a mercury arc rectifier system embodying my invention, while Figs. 2 and 3 represent modifications.

In the particular arrangement shown in Fig. 1, the rectifier which I have chosen to illustrate my invention is of the high potential constant current type. The source of current for this rectifier may be the usual constant current transformer, such as I have indicated diagrammatically at 1. This transformer has relatively movable coils in order to secure the desired constant current regulation in the secondary circuit. The primary is indicated at 2 and the secondary at 3. From this secondary extend three conductors of which those numbered 4 and 5 are connected to the outside terminals of the coil, while the third conductor 6 is connected at or near the middle or electrical center of the coil. The rectifier tube with which these conductors are associated is indicated at 7, and is of a general form similar to those now in common use. It is provided with outwardly and upwardly extending arms 8 and 9 containing at their upper ends the usual anodes 10 and 11. In the bottom portion of the tube is a body of mercury 12

constituting the cathode. For all of these electrodes suitable leading-in wires or conductors are provided.

In order to start the apparatus into operation I make use of a coil or filament 13 arranged in proximity to the cathode 12 and connected by suitable leading-in wires with an appropriate source of current, such, for example, as a small step-down transformer 14. If desired, I, of course, may use a suitable source of direct current. In either event the wire or filament 13 is intended to be heated to a moderate degree of luminosity and when thus heated it gives off certain rays or emanations which so effect the surface of the cathode 12 as to initiate the mercury arcs and so set the rectifier into operation. The rays or emanations from the wire appear to be much more powerful if the wire has a surface of some suitable oxid, such as thorium oxid, barium oxid, or the like. The wire 13 may be of any suitable metal such for example as platinum, and, if the coating is to be, for example, barium oxid, this coating may be produced by dipping the wire into a solution of barium hydrate or nitrate, drying, and then decomposing the coating in a Bunsen flame or the like so as to leave a residue of barium oxid. This operation may be repeated a number of times, if desired. I may also use a wire of the metal itself, such as thorium and oxidize its surface as by heating in air. Where such an oxid coated wire is used in a mercury vapor device, it has been found that there is a tendency for the oxid to separate from the wire and this action is probably largely hastened by the scouring effect of mercury particles traversing the mercury vapor tube. To prevent this, I provide a shield such as 15 of glass or of metal located directly over the filament 13. This prevents any drops of mercury falling down the tube from coming into contact with the filament and washing off its coating, and so greatly increases the useful life of the filament.

Instead of partially protecting the arc starting filament I may, if desired, inclose the same entirely by a suitable screen, such for example, as the screen indicated at 16 in Fig. 2. In this figure I have shown my invention as applied to a different type of rectifier tube, namely, the form of tube used with constant potential rectifiers. As rectifiers of this type and their connections are

well understood in the art, no special description thereof is necessary. It should be noticed that the screen 16, which is in the form of a tube open at both ends, completely surrounds the filament 16, and protects it from any possible mechanical injury due to the vapor blast from the cathode 17 or from mercury particles otherwise moved up or down in the container or tube 18. Under these circumstances it is evident that the protecting shield or screen 16 must be of material which is pervious to the rays or emanations which exercise a starting action upon the cathode 17 and set the mercury arcs into operation. I have found that a material suitable for this purpose is fused quartz. When such a material is used for the screen 16 the filament 19 inclosed by the screen 16, is thoroughly protected from injury for an indefinite period without materially interfering with its action in starting the rectifier arcs.

In Figs. 1 and 2 I have represented the starting filament as being coiled into a small helix, but I find it desirable in many instances to coil the filament into such a form that its spires lie within an imaginary surface either spherical, parabolic, or the like, so as to concentrate the effective rays given off on the surface of the cathode. Such an arrangement of the filament I have indicated at 20 in Fig. 3, and in this case the various spires of the filament are arranged spherically and at such a distance from the cathode 22 that the rays from the filament, or a large portion of them come to a focus at or near the surface of the cathode. The starting action is thus accentuated. In connection with the filament 20 a shield, such as 21, of glass, metal or the like, may also be employed or, if desired, a closed shield such as 16 in Fig. 2, may be used.

The filaments shown in Figs. 2 and 3 may be excited from the same current source as that which supplies the rectifier, in which case each filament will be connected between

the mercury electrode or cathode and one of the anodes, as shown in the drawings. The filament may, if desired, be excited from an independent source of current, as in Fig. 1.

It will be evident from the foregoing description that various modifications of my invention may be employed 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 evacuated envelop or tube, electrodes therein one at least of which is of mercury, a starting conductor located in proximity to the mercury electrode, and means for protecting the conductor from the washing or scouring action of mercury in said tube.

2. The combination of an evacuated envelop or tube, electrodes therein one at least of which is of mercury, a conductor presenting a surface of oxid arranged in proximity to the mercury electrode for producing an arc therefrom, and a protective screen or envelop for said conductor formed of a material pervious to arc starting radiations from said conductor.

3. The combination of an hermetically sealed envelop or tube, electrodes therein, a starting conductor having a surface of oxid, and a protecting screen or shield for said starting conductor.

4. The combination of an hermetically sealed envelop or tube, electrodes therein one at least of which is of vaporizable material, a starting conductor in proximity to the vaporizable electrode and having a surface of oxid, and a protecting screen or shield for said starting conductor.

In witness whereof, I have hereunto set my hand this 10th day of October, 1907.

OSIAS O. KRUH.

Witnesses:

HELEN ORFORD,

MARGARET E. WOOLLEY.