

(No Model.)

H. LEMP.

ELECTRIC MERCURIAL SWITCH OR CONTACT MAKER.

No. 536,811.

Patented Apr. 2, 1895.

Fig. 1.

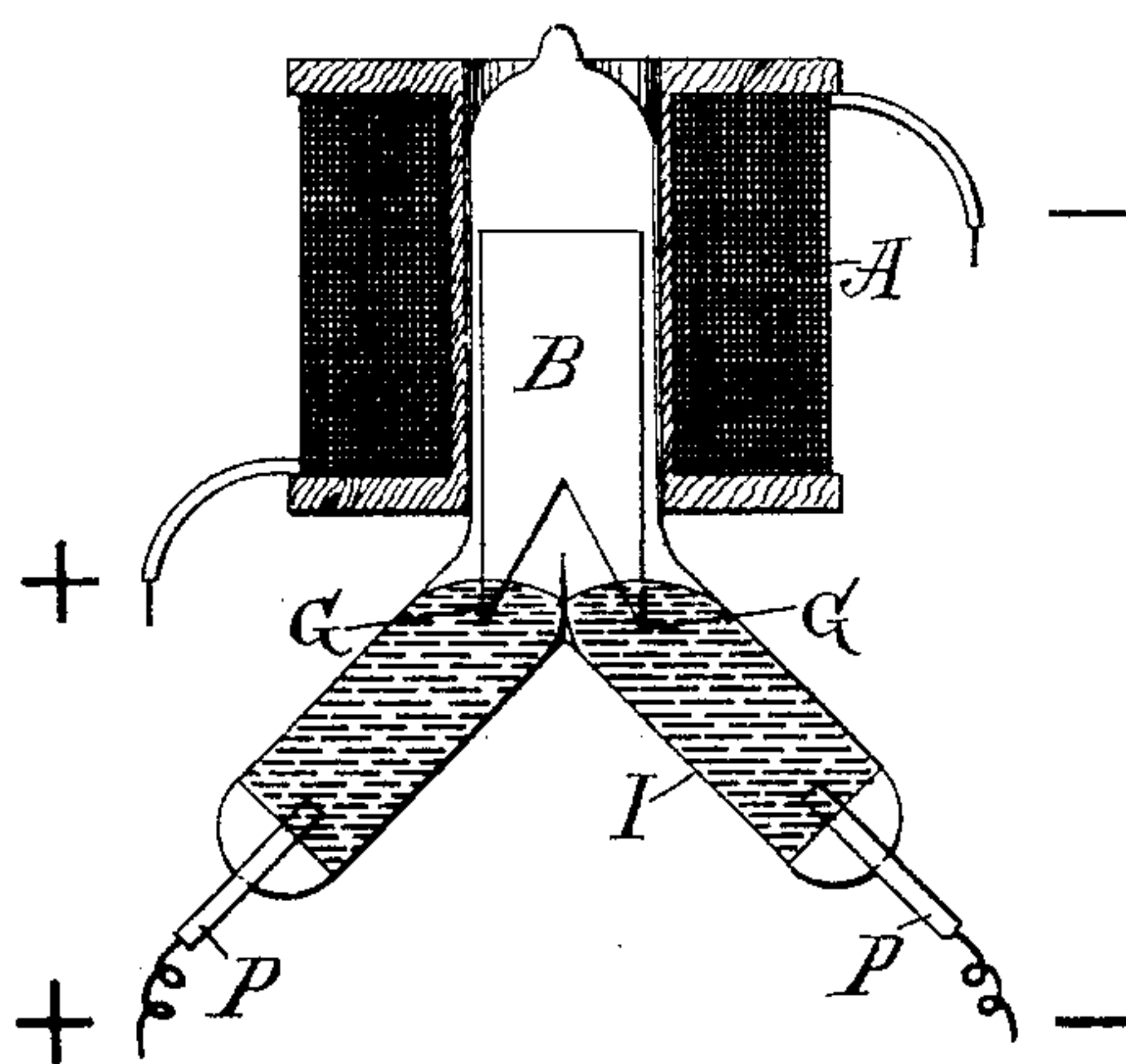
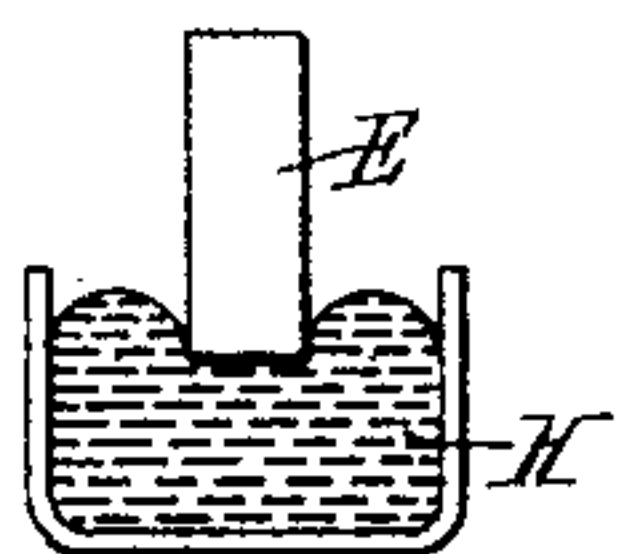


Fig 4.

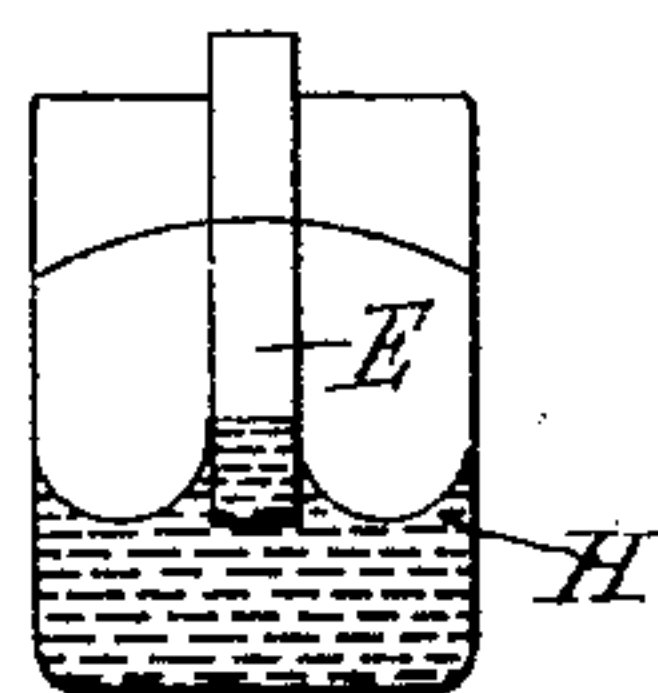


Fig. 2.

Fig. 5.

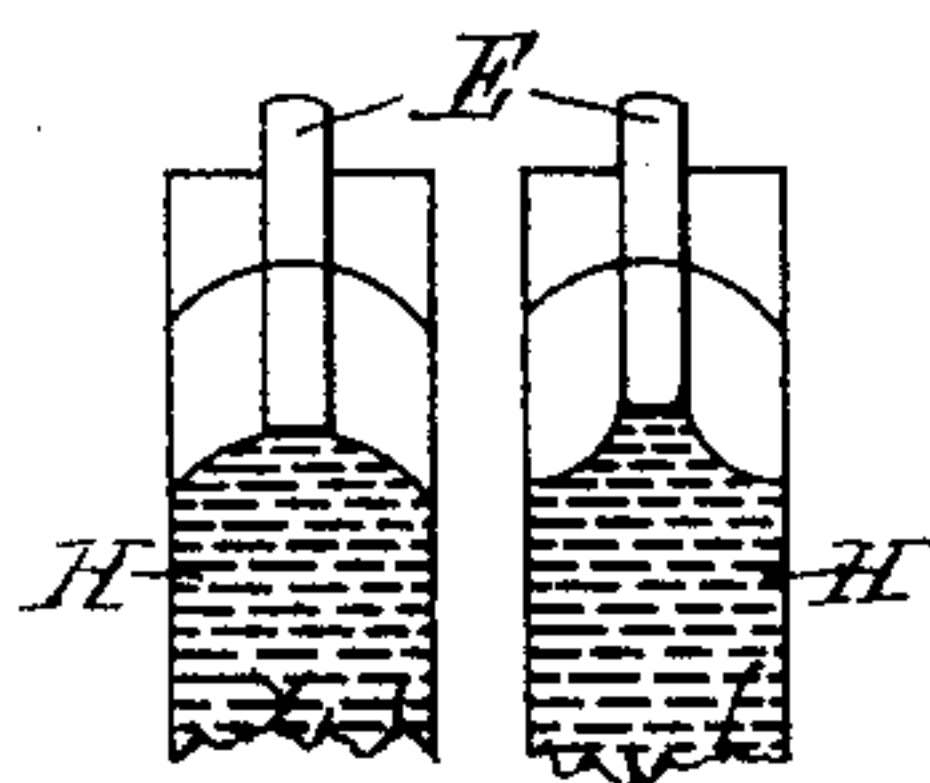
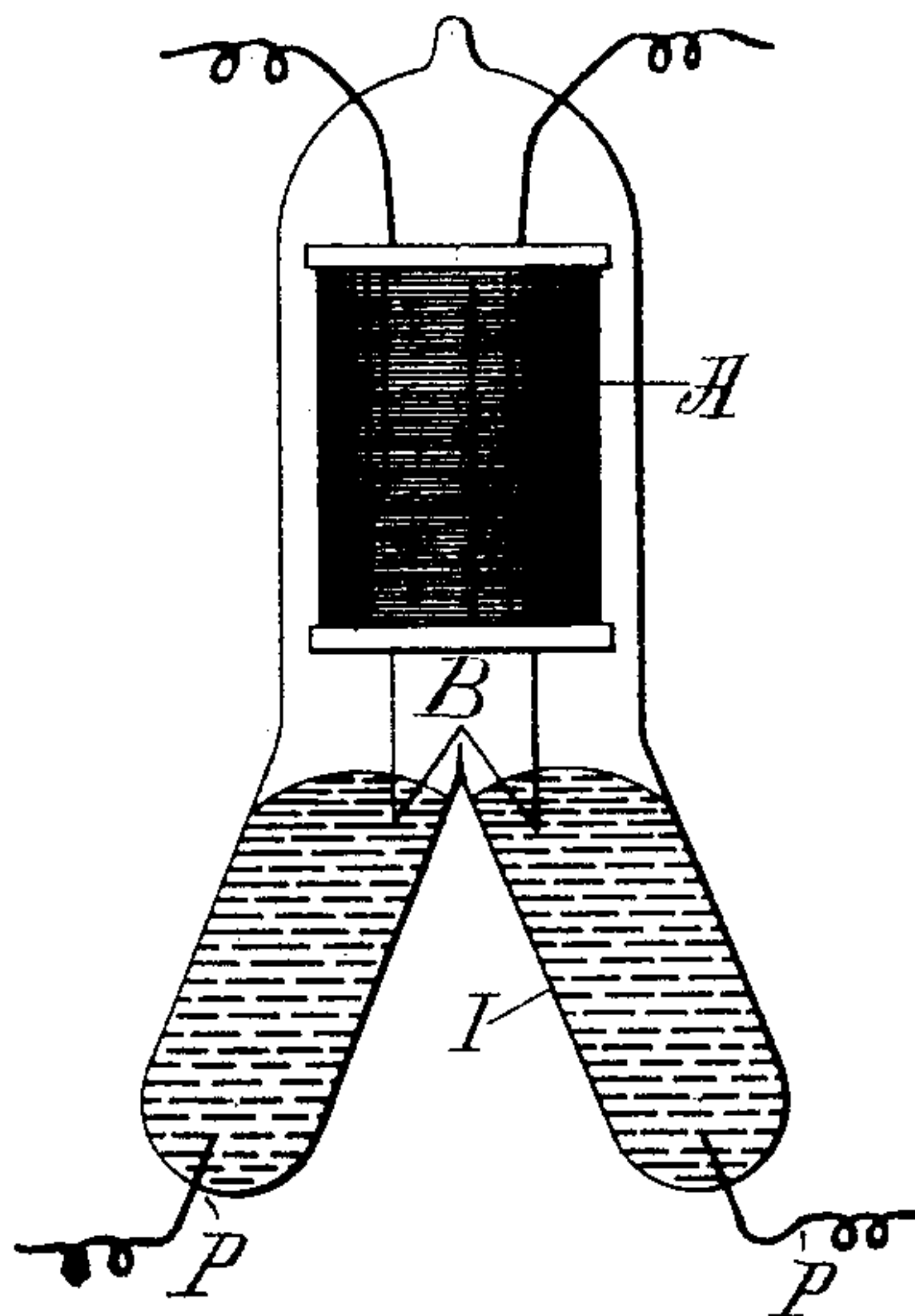
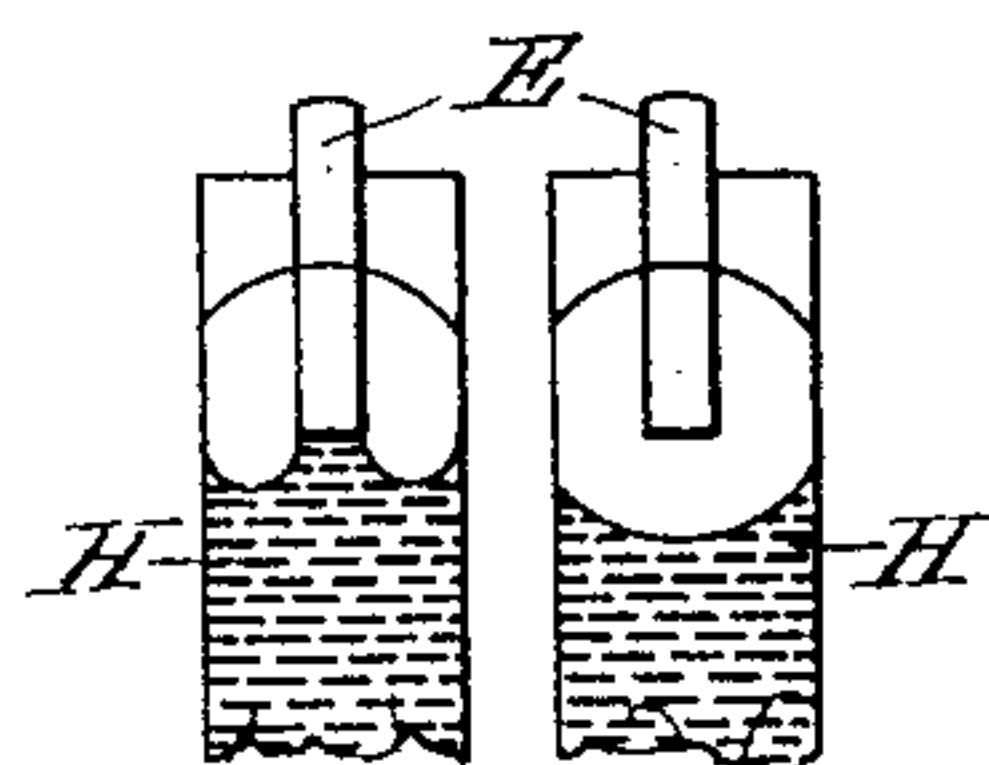


Fig. 6.



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ELECTRIC MERCURIAL SWITCH OR CONTACT-MAKER.

SPECIFICATION forming part of Letters Patent No. 536,811, dated April 2, 1895.

Application filed July 26, 1888. Serial No. 281,136. (No model.)

To all whom it may concern:

Be it known that I, HERMANN LEMP, a citizen of the United States, and a resident of Lynn, in the county of Essex and State of Massachusetts, have invented a certain new and useful Electric Mercurial Switch or Contact-Maker, of which the following is a specification.

My invention relates to electric mercurial switches in which circuit is made and broken by the manipulation of a conductor dipping into the mercury.

The object of my invention is to produce an electric switch of this nature in which the mercury and the conductor shall be protected from the action of the atmosphere and yet provide for ready manipulation of the conductor in making and breaking circuit.

To this end my invention consists in an electric switch formed by inclosing, in an exhausted receptacle, separate bodies of mercury or other equivalent conducting material and a core of a magnet constructed to act as a conductor between said bodies, and then so arranging a magnet in relation to said core that the latter may be lifted from or allowed to dip into the mercury.

My invention further consists in the construction, combination and arrangement of parts as hereinafter fully set forth.

In the accompanying drawings, forming a part of this specification:—Figure 1, is a partially sectionized side elevation of one form of my improved switch; and Fig. 2, is a side elevation of another form thereof; while Figs. 3, 4, 5 and 6, illustrate the principles involved in the operation of a mercurial switch inclosed in a vacuum.

In ordinary mercurial contact devices where the parts are surrounded by air there is a tendency of the mercury to recoil from intimate contact with the electrode with which it should make connection, the surface of the mercury assuming a convex form, as shown in Fig. 3, where H, indicates the mercury and E, the electrode of platinum or iridium. This action is due to the fact that platinum and metals of the same class, such as iridium, have a film of air condensed on their surfaces. Other metals such for instance as copper which can form an amalgam with the mercury do not exhibit this peculiarity. If, however,

the contact surface be in a vacuum the film of air or gas condensed on the surface of the platinum or similar electrodes, is absent and the mercury has a tendency to cling to the electrode, as indicated in Fig. 4, the wetting and clinging effect being similar to that which is observed in the case of a piece of wood dipped into water or other liquid. Further, in ordinary mercurial contacts when used for making and breaking the circuit of an electric current of some strength, there is a liability to deterioration of contact owing to the oxidation of the contact electrodes. This difficulty is avoided by the use of a vacuum.

Another effect secured by the use of a vacuum is as follows:—In breaking or closing an electric circuit it is quite important that the operation should be performed quickly and completely, by what may be termed a "snapping" action, and various mechanical devices have been proposed for producing this action by a spring. This action may also be produced by a mercury switch acting in a vacuum.

The two views in Fig. 5, illustrate, respectively, the successive steps in the action of closing contact. As the mercury surface approaches the electrode E, it assumes a convex surface as shown, but the moment the mercury and electrode touch, the adhesion of the platinum and mercury quickly draws the latter into intimate contact. The reverse of this action takes place on breaking the contact. The two views in Fig. 6, show respectively the condition at the last moment of adhesion of the electrode and the mercury and the condition of the latter when they finally separate, the separation taking place suddenly.

These principles are embodied in the particular forms of switch which I will now proceed to describe.

I, represents an exhausted, hermetically sealed receptacle or tube provided with branches at the lower end to form pockets for the separate bodies of mercury, into which pockets project the terminals P, of the circuit controlled by the switch. Within the upper part of the tube I, in Fig. 1, is placed a core B, of a magnet or solenoid A. This core is bifurcated at its lower end and each prong G, is adapted to dip into its respective body of mercury. When the core is lowered, as illus-

trated, circuit is completed through it from one prong G, to the other. When solenoid A, is energized, core B, is drawn up and the circuit controlled by the switch is broken.

5 It is obviously not necessary that the coil of the electro-magnet should be outside the receptacle. It may be suspended inside the same as shown in Fig. 2, and the conductors conveying electric current thereto hermetically sealed in the receptacle in any desired
10 manner.

I claim as my invention—

1. The combination of a branching, hermetically sealed, exhausted receptacle containing
15 separate bodies of mercury, electrodes of platinum or other non-amalgamating metal extending into said receptacle, a core of a magnet in one branch of said receptacle and having a forked end for engagement respectively
20 with said bodies of mercury, and an electric coil surrounding said core and acting there-

upon to cause making or breaking of circuit between said electrodes.

2. The combination of a branching, hermetically sealed, exhausted receptacle containing
25 separate bodies of mercury, electrodes of non-amalgamating metal inserted through the tube into the respective bodies of mercury, a core of a magnet located in the tube and having a bifurcated end with which to connect
30 said bodies of mercury, and an electric coil surrounding the tube and acting upon the core to cause it to make or break circuit between said electrodes.

Signed at Lynn, in the county of Essex and
State of Massachusetts, this 20th day of July,
A. D. 1888. 35

HERMANN LEMP.

Witnesses:

E. WILBUR RICE, Jr.,
A. H. ROHRER.