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PATENTED AUG. 7, 1906.

H. BESSER.  
ELECTRICAL INTERRUPTER.  
APPLICATION FILED NOV. 22, 1905.

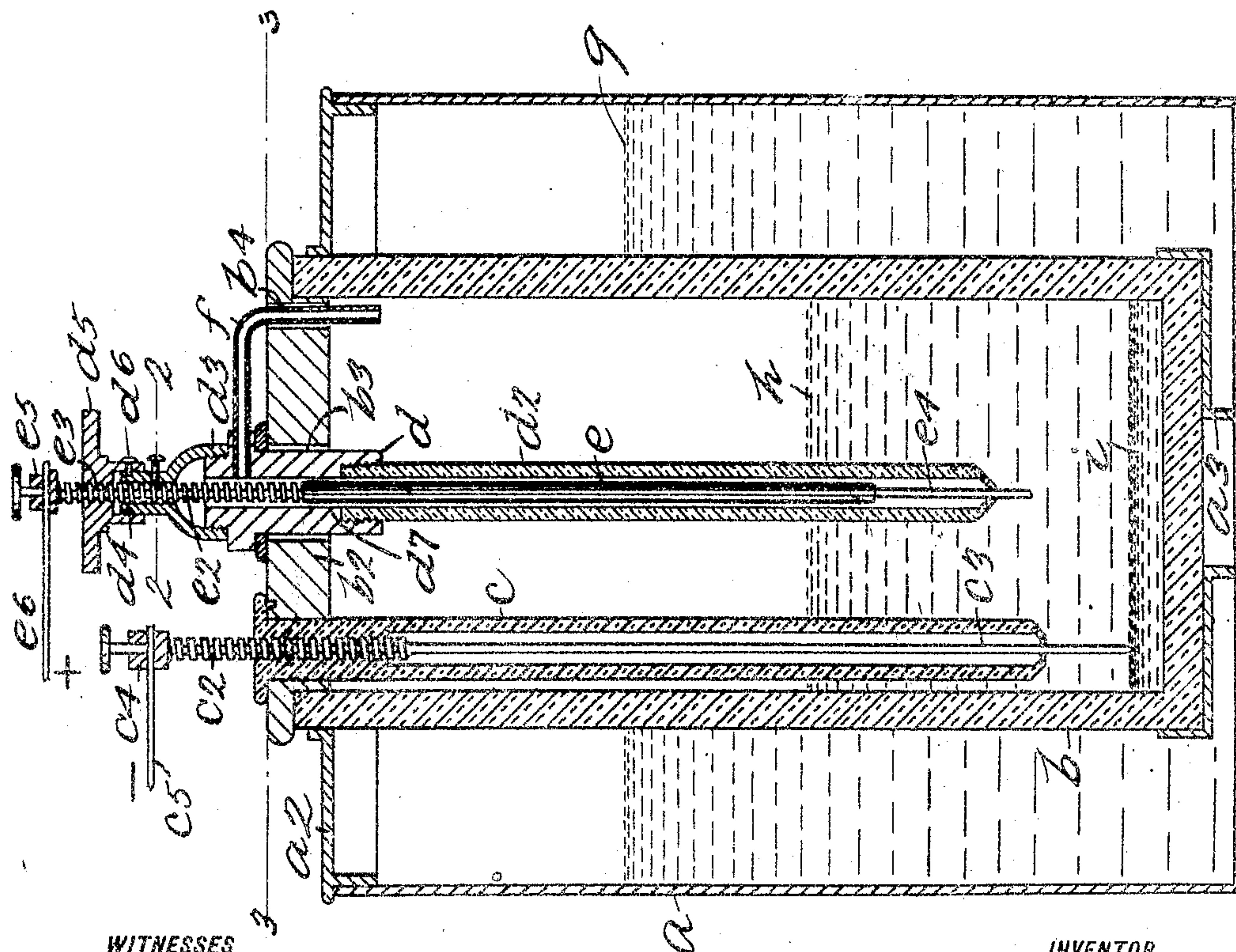
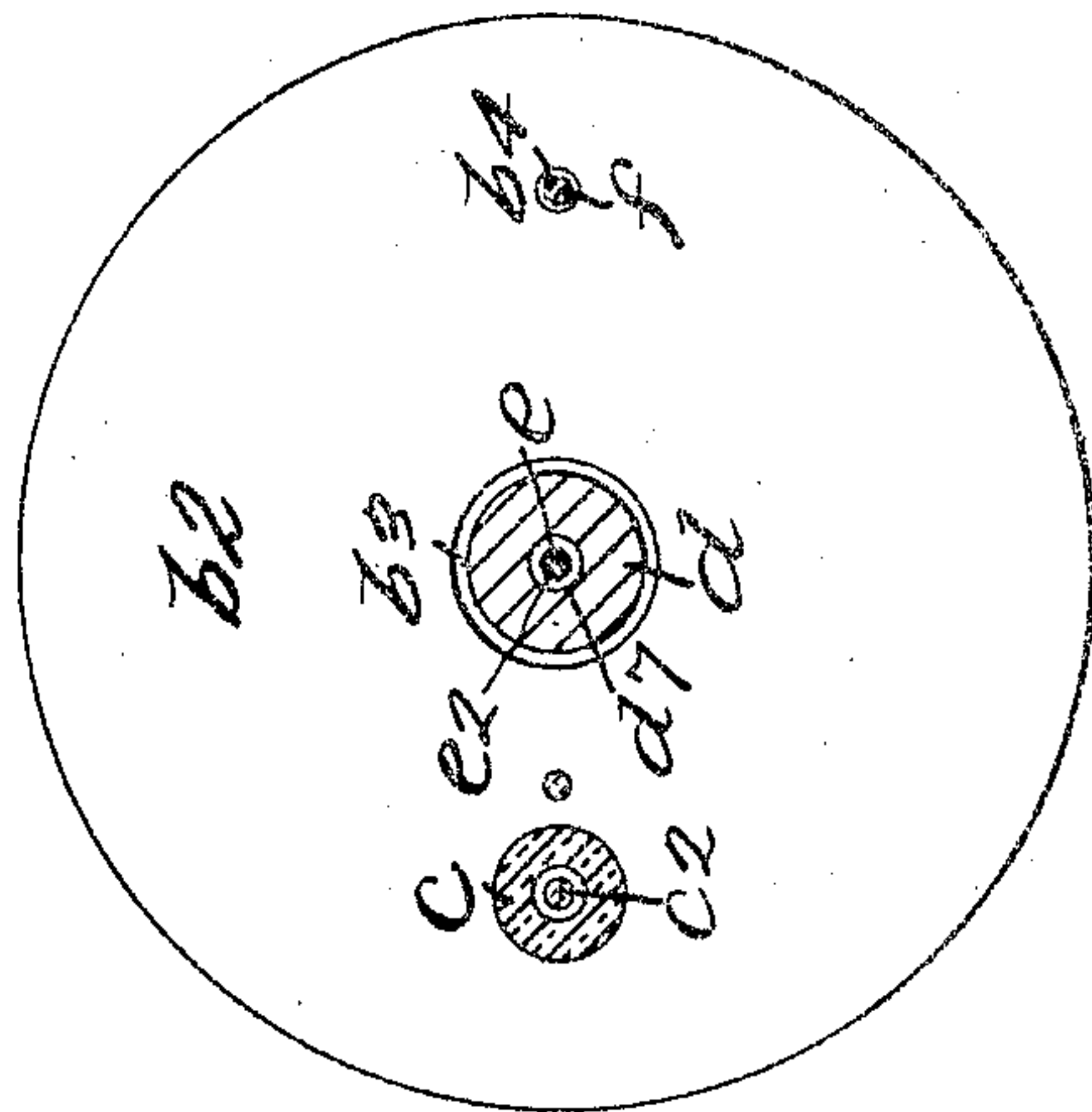


Fig. 2.



WITNESSES  
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Fig. 1.

BY

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# UNITED STATES PATENT OFFICE.

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## ELECTRICAL INTERRUPTER.

No. 837,732.

Specification of Letters Patent.

Patented Aug. 7, 1906.

Application filed November 22, 1905. Serial No. 288,533.

*To all whom it may concern:*

Be it known that I, HERMAN BESSER, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Electrical Interrupters, of which the following is a specification, such as will enable those skilled in the art to which it appertains to make and use the same.

This invention relates to electrolytic interrupters for electrical currents and the method of operating the same; and the invention comprises an improved interrupter for electrical circuits which includes one or more induction-coils in said circuits for the purpose of inducing oscillating currents in secondary circuits and an improved method of operating such interrupter whereby the potential and frequency of secondary currents are augmented and rendered constant for long periods of time, a further object being to provide an interrupter which will operate with a higher degree of efficiency and which is alike applicable for the use of constant and alternating currents, a further object being to provide an interrupter of the class specified in which the electrodes are of the same diametrical dimensions and interchangeable one with the other; and with these and other objects in view this invention consists of an interrupter constructed and operated as hereinafter described and claimed.

The interrupter herein described and claimed is an improvement on that described and claimed in United States application for Letters Patent, Serial No. 279,920, filed by me September 25, 1905, and the invention is fully disclosed in the following specification, of which the accompanying drawings form a part, in which the separate parts of my improvement are designated by suitable reference characters in each of the views, and in which—

Figure 1 is a central vertical section of an interrupter constructed according to my invention; Fig. 2, a transverse section on the line 3 3 of Fig. 1.

In the drawings forming part of this specification I have shown an outer casing *a*, provided with a detachable cover *a*<sup>2</sup>, and in the bottom of this casing is placed a support *a*<sup>3</sup> for a jar *b*, placed centrally in the casing *a*, said jar *b* being composed of porcelain, glass, or other suitable non-conducting material.

The annular space between the outer casing

*a* and the inner jar *b* is to be filled with water *g* for the purpose of acting as a sound-muffler against the high-pitched tones which emanate from the jar *b* when the interrupter is in operation.

The jar *b* extends upwardly above the cover *a*<sup>2</sup> of the outer jar *a* and is also provided with a detachable cover *b*<sup>2</sup>, having a central opening *b*<sup>3</sup>, which serves the purpose of admitting one of the electrodes. A supplemental opening adjacent to one edge of the cover *b*<sup>2</sup> serves for the admission of a tubular casing *c*, composed of porcelain or other suitable non-conducting material and which extends downwardly into the jar *b*. The top portion of this tube *c* is internally provided with a screw-thread, into which engages the screw-threaded vertical rod *c*<sup>2</sup>, which latter is provided at its upper end with the binding-post *c*<sup>4</sup> for the terminal *c*<sup>5</sup> of the main circuit. The lower end of the adjustable vertical rod *c*<sup>2</sup> is provided with the negative electrode *c*<sup>3</sup>, composed of copper or other suitable material. This electrode *c*<sup>3</sup> projects a short distance below the insulating-casing *c*, leaving thereby only a certain predetermined length of the electrode exposed to the action of the surrounding electrolyte *h* and is brought into physical contact with metallic mercury *i*, placed within the jar *b*.

The tip or lower end of the electrode *c*<sup>3</sup> can be of more or less pointed form, of a flat or conical, concave, or convex shape for reasons hereinafter more fully described.

Passing through the opening *b*<sup>3</sup> and extending into the jar *b* is a metal plug *d*, to which is secured a porcelain tube *d*<sup>2</sup>, which extends downwardly to a position adjacent to but above the mercury *i*, and the plug *d* is provided at the top thereof with a cap *d*<sup>3</sup>, which in turn is provided with an outer angular groove *d*<sup>4</sup> at the top thereof, and rotatably mounted on the cap *d*<sup>3</sup> is a disk *d*<sup>5</sup>, through which passes a screw *d*<sup>6</sup>, which operates in the groove *d*<sup>4</sup>, and by means of this construction it will be seen that the disk *d*<sup>5</sup> may be rotated upon the cap *d*<sup>3</sup> without changing the relative positions thereof. The plug *d* is provided with a central bore *d*<sup>7</sup>, in which is mounted a vertically-movable rod *e*, preferably composed of copper and the top of which is preferably composed of iron or steel and provided with a screw-thread, as shown at *e*<sup>2</sup>, and the screw-thread *e*<sup>2</sup> engages a similar screw-thread *e*<sup>3</sup> in the rotatable disk *d*<sup>5</sup>,



and secured to the bottom of the rod  $e$  is a platinum tip  $e^4$ , either by screwing said tip into the rod  $e$ , by soldering thereto, or in any other suitable manner. This tip  $e^4$  projects  
 5 a predetermined distance below the porcelain tube  $d^2$ , and this distance is capable of being varied by the rotation of the disk  $d^5$ , as will be readily seen. Mounted on the top of the rod  $e$  is a binding-post  $e^6$  for the terminal  
 10  $e^6$  of the main circuit.

The above-described insulating-tubes  $c$  and  $e$  with their attached electrodes  $c^3$  and  $e^4$ , their respective regulating mechanism, vertical adjustment, and their binding-posts  $c^4$   
 15 and  $e^5$ , are made of like diametrical dimensions, so as to permit them to be interchangeable by placing the positive electrode in the position of the negative electrode, and vice versa, and it is obvious that the receiving-  
 20 opening in the cover  $b^2$  of the jar  $b$  must correspond in dimension therewith. Secured to the plug  $d$  above the cover  $b^2$  is a metal tube  $f$ , which is bent downwardly and passes through the supplemental opening  $b^4$  in the  
 25 cover  $b^2$ , the object of the vent-tube  $f$  being to provide a by-pass for such portion of the electrolyte as has a tendency to creep upwardly within the porcelain tube  $d^2$  whenever the electrolyte becomes strongly agi-  
 30 tated and heated from the action of the interrupter. The opening  $b^4$  is made of slightly larger diameter than the diameter of the vent-tube  $f$ , which enters the same and acts in this capacity as a vent-opening to facilitate the  
 35 escape of hydrogen, oxygen, and other gases which are collecting within the jar  $b$  during the operation of my interrupter, and which being of a higher inflammable and explosive nature might under certain circumstances  
 40 tend to destroy the apparatus in case such gases are kept retained within the jar.

The electrolyte  $h$  in the jar  $b$  is composed of an approximately one-to-eight proportioned solution of sulfuric acid and water, and placed  
 45 in the bottom of the jar  $b$ , as heretofore described, is a quantity of metallic mercury  $i$ , which latter is in constant physical contact with the copper electrode, as hereinbefore described.

50 It will be understood also that the conductors  $c^3$  and  $e^6$  form part of a circuit in which is included any source of electrical supply, rheostats, switches, and induction-coils in the usual manner, such features not being shown  
 55 in the drawings as they form no part of my invention.

The operation of this apparatus is identical to that of the apparatus described and claimed in United States application for Letters Patent Serial No. 279,920, filed by me  
 60 September 25, 1905.

In the production of oscillating constant currents as well as oscillating alternating currents of high frequency and great tension it  
 65 becomes at times imperative to regulate the

pitch of the tones or sound-waves, Hertzian and other waves produced by the interrupter in order to adapt the same to the different requirements of the work to which the interrupters are applied. Such minute regula-  
 70 tions cannot be effected by other interrupters as accurately nor over such a large range of tone-scales as my improved interrupter in its application to all classes of work is designed for. I accomplish this by the appli-  
 75 cation and use of finely-formed gradually increasing or decreasing pointed negative electrodes which are of similar cross-sectional measurement as the positive electrodes.

The negative electrode of the various  
 80 forms at its terminating-point as described above when inserted into and making actual contact with the mercury in the bottom of the jar will enable the operator to accurately adjust the interrupter to whatever re-  
 85 quirements present themselves.

By means of such synchronous adjustment of the positive and negative electrodes lower Hertzian waves are obtainable than by other interrupters now in use and which can be  
 90 gradually advanced to the highest oscillating waves.

In the use of this type of interrupter as especially applied for the conversion of alternating currents into direct currents it is be-  
 95 lieved that the positive electrode receives and transmits but one of the phases, while the other phase being suppressed as such is not, however, destroyed. Usually in the application of interrupters used for alternating  
 100 current the suppressed phase is destroyed by conversion into heat and is also very destructive to the platinum electrode. However, in my interrupter the heat incidental to the suppression of one of the phases of the alternating  
 105 current applies itself mechanically and electrochemically to the conversion of the metallic mercury into a subsulfate of mercury, which conversion in the manner as described in my application for Letters Patent  
 110 filed September 25, 1905, becomes an active agent in the production in the oscillation of the produced current, which is demonstrated by the fact that my interrupter will, acting  
 115 as a rectifier, prevent arcing at the electrodes, will partially absorb the heat, and will produce a very materially larger output in the direct current of the secondary circuit induced by an alternating current over that of other interrupters, nor be as destructive to the plat-  
 120 inum electrodes.

It is obvious that a direct current obtained by means of my interrupter from an alternating current can be of any potentiality, high or low, according to the number of turns or  
 125 windings in the secondary circuit and a relative number of turns in the windings of the primary circuit as well as by a choice of wires of different diameters, as is well known to the art.  
 130



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

1. In an electrolytic interrupter adapted to be placed in a circuit containing a source of electrical energy and induction coil or coils, a positive and a negative electrode of like cross-sectional area, an electrolyte and metallic mercury which latter is held in constant physical contact with one of the electrodes, substantially as shown and described.

2. In an electrolytic interrupter adapted to be placed in a circuit containing a source of electrical energy a positive and a negative electrode of like cross-sectional area, and an electrolyte and metallic mercury, said electrodes being adjustable in order to determine the extent of the immersion of the positive electrode into the electrolyte and the extent of the immersion of the negative electrode into the metallic mercury, substantially as shown and described.

3. In an electrolytic interrupter, insulated positive and negative electrodes with terminal bare points respectively immersed into an electrolyte and into metallic mercury, said electrodes being of similar cross-sectional area and corresponding to receiving-apertures in the cover of the electrolytic cell and interchangeable therewith, substantially as shown and described.

4. In an electrolytic interrupter, a cell con-

taining an electrolyte, metallic mercury and vertically-adjustable electrodes provided with terminals of a gradual increasing or decreasing contact-surface, substantially as shown and described.

5. In an electrolytic interrupter of the class described, a cell provided with a cover, tubular insulating-casings suspended therein, and electrodes suspended in said casings and depending therefrom, said electrodes being vertically adjustable in said cells, an electrolyte and metallic mercury, substantially as shown and described.

6. In an electrolytic interrupter of the class described, vertically-adjustable electrodes provided with attachable and detachable terminals of conical or other suitable shape, an electrolyte and metallic mercury whereby the oscillations to be obtained by means of such interrupter can be mechanically adjusted to any requisite pitch within the range of the apparatus, substantially as shown and described.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of the subscribing witnesses, this 20th day of November, 1905.

HERMAN BESSER.

Witnesses:

F. A. STEWART,  
C. E. MULREANY