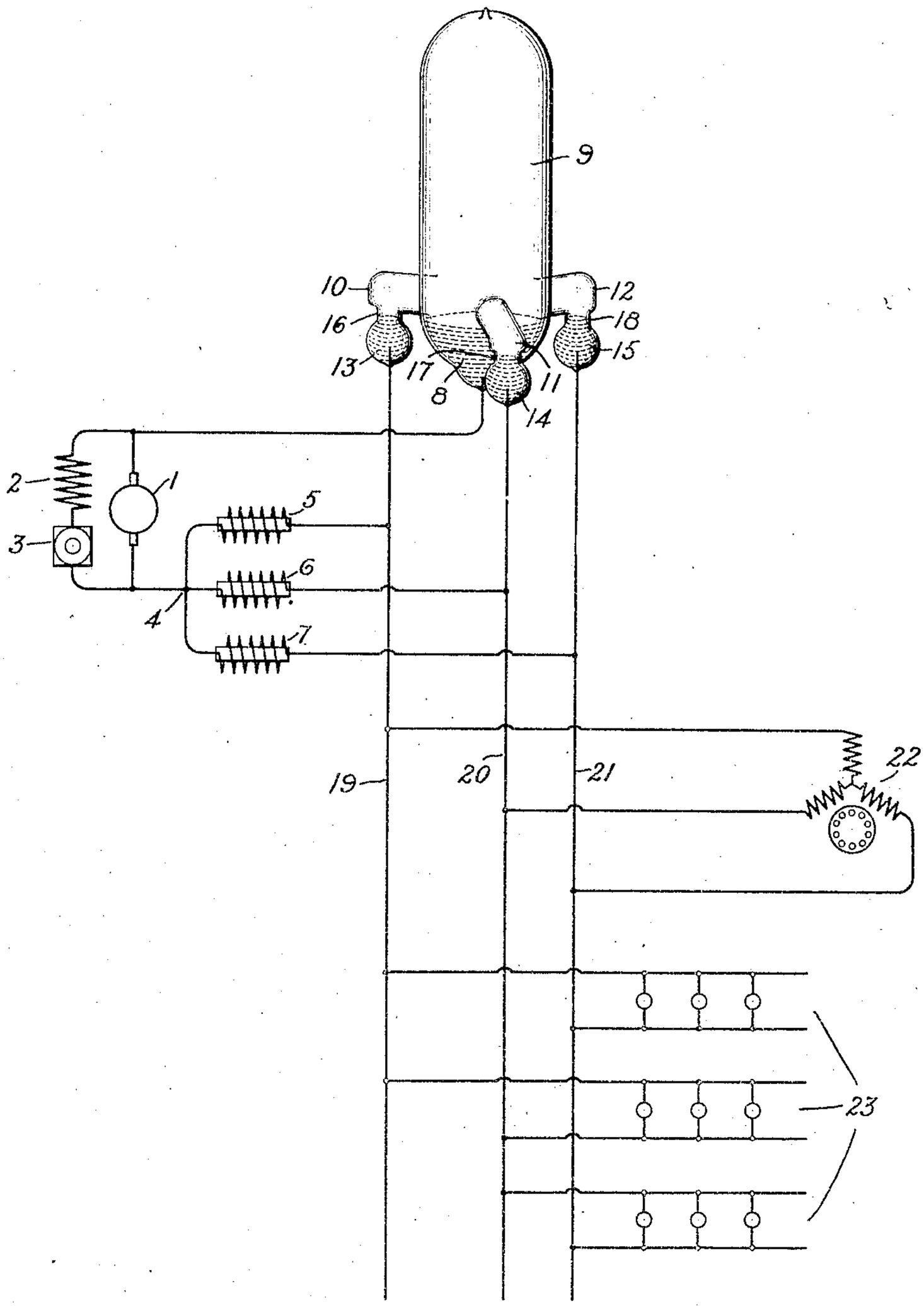
No. 787,192. PATENTED APR. 11, 1905.

O. O. KRUH.

MEANS FOR TRANSFORMING DIRECT CURRENT.

APPLICATION FILED DEC. 9, 1903. RENEWED SEPT. 1, 1904.



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No. 787,192. Patented April 11, 1905.

UNITED STATES PATENT OFFICE.

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MEANS FOR TRANSFORMING DIRECT CURRENT.

SPECIFICATION forming part of Letters Patent No. 787,192, dated April 11, 1905.

Application filed December 9, 1903. Renewed September 1, 1904. Serial No. 223,002.

To all whom it may concern:

Be it known that I, OSIAS OTTO 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 Means for Transforming Direct Current, of which the following is a specification.

My invention relates to means for transforming direct current into multiphase alternating current, and is embodied in an organization in which this result is accomplished through the instrumentality of vapor electric apparatus.

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

For an explanation of the invention both as to its construction and mode of operation reference is to be had to the following description, taken in connection with the accompanying drawing, which represents diagrammatically one embodiment of my invention.

In the drawing the direct current which is to be transformed into alternating current is derived from a suitable source—such, for example, as a direct-current generator, the armature of which is indicated at 1 and the field-winding at 2. A rheostat for regulating the current in the field-winding is indicated at 3. One lead from the generator is connected to the junction 4 between three reactance-coils 5, 6, and 7, while the other lead is connected to the central mercury electrode 8, constituting the cathode or negative electrode of a mercury-vapor apparatus. This apparatus consists of an envelop 9, of glass or other suitable material, provided with a number of pockets for containing bodies of mercury constituting electrodes. One of these pockets, which is located centrally with respect to the others, contains the body of mercury 8, before mentioned. The other pockets constitute enlargements of depending portions of equally-spaced downwardly-bent tubes 10, 11, and 12, communicating with the main envelop 9, as shown. These enlargements contain bodies of mercury 13, 14, and 15, constituting electrodes cooperating with the cathode 8, and are connected with the main tubes 10, 11, and 12 through necks or constricted portions, as at 16, 17, and 18. The circuits of the inductance-coils 5, 6, and 7 extend, respectively, to the electrodes 13, 14, and 15. As shown in the drawings, a translating device or devices may be connected in circuit with leads 19, 20, and 21, extending from the inductance-coils and their coöperating electrodes. These translating devices may be of any character desired—such, for example, as an induction-motor 22, banks of lamps 23, &c.—and are supplied by multiphase current fed to the mains 19, 20, and 21.

In starting up the apparatus the receptacle 9 is tipped so as to cause mercury to flow between the central electrode 8 and some one of the surrounding electrodes 13, 14, and 15. As the receptacle is moved back to its upright position the bridge of mercury between the two electrodes thus brought into contact is broken and an electric arc formed. This arc as soon as formed generates mercury-vapor, the effect of which is to increase the resistance to the flow of current between the electrodes to a point higher than the resistance offered to the passage of an arc between one of the adjacent outside electrodes and the central electrode. The arc then jumps to one of these adjacent electrodes and repeating the operation continues to jump from electrode to electrode progressively around the central electrode 8. The rapidity of progression is rendered high by reason of the reduced exposed area of the electrodes 13 14 15. The arcs receive current from the source 1 through the medium of the inductance-coils 5, 6, and 7 and are so connected to the source as to cause the direction of flow of current to be from the source through the inductance-coils to the electrodes 13, 14, and 15. These electrodes are thus positive and the central electrode 8 negative. It will be observed that when current flows to one of the electrodes—as, for example, electrode 14—several paths therefor are open—one through inductance-coil 6 directly to the electrode and the others through the inductance-coils 5 and 7 to the translating devices, through which the current passes and

returns along the main 20 to the electrode 14. As the arc shifts to the next electrode, as 15, a similar flow of current takes place. It will thus be seen that alternating impulses of current flow in the mains 19, 20, and 21. Each current impulse traverses one of the inductance-coils and stores a portion of its energy therein. In restoring the energy the inductance-coils have the effect of securing a symmetrical multiphase-current flow in the mains 19, 20, and 21.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. The combination of a source of direct current, a vapor electric device, and means cooperating with said source and said device for transforming direct current from said source into multiphase alternating current.

2. The combination of a vapor electric device having a cathode and a plurality of anodes, multiphase mains extending from the anodes, a source of direct current, connections between said source and said cathode, energy-storing devices connected respectively between said mains and the other terminal of said source, and current-consuming means connected between said mains.

3. The combination of a source of direct current, and a vapor electric apparatus associated therewith having a cathode and a plurality of anodes, the working surface of the anodes being of restricted cross-section.

In witness whereof I have hereunto set my hand this 4th day of December, 1903.

OSIAS O. KRUH.

Witnesses:

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