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SHIELDING SYSTEM FOR VAPOR CONVERTERS.
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Fig. 1.

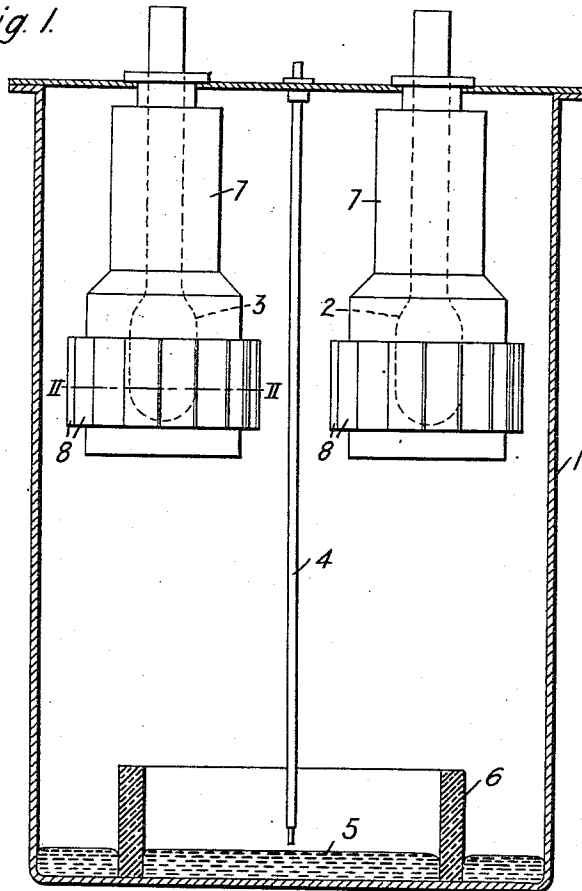
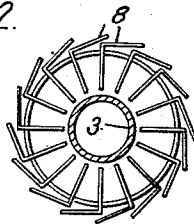


Fig. 2.



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SHIELDING SYSTEM FOR VAPOR-CONVERTERS.

1,244,555.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, EDMUND F. SIPHER, a citizen of the United States, and a resident of Wilksburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Shielding Systems for Vapor-Converters, of which the following is a specification.

My invention relates to shielding systems for vapor converters, and it has for its object to provide a system of the character described which shall effectively prevent short-circuiting and reverse arcing within apparatus of the character indicated and which shall, in other ways, promote smooth and satisfactory operation.

In the accompanying drawing, Figure 1 is a side view, partially in section and partially in elevation, of a vapor converter of the metal-case type embodying a preferred form of my invention; and Fig. 2 is a cross section of an anode and its accompanying shield taken on the plane II—II of Fig. 1.

In the operation of vapor converters, the power arc is conveyed between the electrodes principally by means of a stream of electrons emitted by the cathode and impinging upon an anode. All electrodes exhibit negative-electrode reluctance at the surface thereof and hence, in order to permit unilateral conductivity, the negative-electrode reluctance of the cathode is broken down. The subsequent action of the arc on said electrode produces a cathode spot thereupon with resultant heating and, accordingly, it is customary to form the cathode, in apparatus of the character designated, from a mass of vaporizable reconstructing material, such, for example, as mercury.

The emission of an arc from a cathode of the character described produces violent mechanical agitation therein and throws off therefrom globules which pass along the arc path and which may, by impact upon an anode, destroy the negative-electrode reluctance thereof and, hence, permit short circuiting or reverse arcing within the apparatus.

The globules are composed of a large number of both positively and negatively charged particles or ions and, hence, their resultant charge is very small in comparison

with their mass. The electrons, which perform the major portion of the current-carrying function, however, carry a very strong charge with respect to their mass and, by the joint action of momentum and of electrostatic action, I am enabled to separate the said two classes of particles, winnowing out the globules of cathode material and preventing their impact upon the anode.

Referring to the drawing for a more detailed understanding of my invention, the container of a metal-case vapor converter is shown at 1 and is provided with main anodes 2 and 3, an auxiliary anode 4 and a cathode 5 consisting, preferably, of vaporizable reconstructing material, such, for example, as mercury. An arc proceeding from the anodes 2 and 3 to the cathode 5 is retained in the central portion of the cathode by means of a suitable refractory ring 6. A shield 7 surrounds each of the main anodes and comprises a cylindrical member closed at its upper and lower ends, except for the opening admitting the anode stem, and provided with a peripheral window or opening adjacent to the active portion of the anode. A plurality of shutter members 8 of L-shape in cross section, are vertically disposed across said opening in overlapping relation to each other, as shown in Fig. 2, whereby a spiral path is provided for an arc passing to the associated anode.

Having thus described the structure of a converter embodying my invention, the operation is as follows: A power arc is initiated by the starting and keep-alive anode 4, energized from any suitable source of direct current, not shown, and, thereafter, alternate-current waves flow from the anodes 2 and 3 to the cathode 5, as is well known and understood in the art. Said current waves are carried by a jet or spray of electrons emitted from the cathode 5 and impinge alternately upon the anodes 2 and 3. The electron stream entrains mercury globules of relatively large size and carries them upwardly toward the main anodes. As hereinbefore pointed out, the globules have a relatively weak charge in proportion to their mass and, hence, they are but little affected by the electrostatic action of the main anodes and, moving rapidly under the initial impulse, they strike the outer

faces of the member 8 and are either vaporized or fall back to the cathode, doing no harm. All globules and electrons which penterate between two members 8 are forced to swing around abruptly in a more or less spiral path and, hence, their momentum opposes the electrostatic action of the associated anode. The globules, because of their relatively weak charge, move in a substantially straight path, under the influence of their momentum, and impinge upon the shutter members 8, whereas the current-carrying electrons, with their relatively strong electric charge, are drawn to the anode and permit the operation of the device. In this manner, the electrons are effectively winnowed out from the cathode globules and the latter are prevented from impinging upon the main anodes.

By my structure, a relatively free path is provided between either anode and the cathode, the vertical spaces between the shutter members 8 offering their major axes in line with properly moving electrons and, hence, permitting said electrons to approach the anode along a path of easy curves; whereas electrons attempting to pass from anode to anode necessarily approach an electrode in the direction of the minor axis of the shield openings thereof and must, furthermore, encounter many abrupt changes of curvature in its path. All of these features combine to provide a converter in which normal operation is smooth and efficient and in which short circuiting is minimized.

I have disclosed the shutter members 8 as of L-shape in cross section but, obviously, like results may be obtained by providing said member with arc shaped or various other equivalent cross sections, the essence of my invention residing in providing shutter members for the anode shields which are straight in a direction radiating from the cathode and are curved or broken in cross section in a transverse direction.

While I have shown my invention in its preferred form, it will be obvious to those skilled in the art that it is susceptible of various minor changes and modifications without departing from the spirit thereof and I desire, therefore, that only such limitations shall be placed thereupon as are imposed by the prior art or are specifically set forth in the appended claims.

I claim as my invention:

1. In vapor electric apparatus, the combination with an anode, of means for causing a stream of electrons to impinge symmetrically thereupon, and means for causing said electrons to assume a spiral path about said anode when in the neighborhood thereof.

2. In vapor electric apparatus, the combination with an anode, of a shield therefor,

said shield offering a plurality of symmetrically disposed spiral paths to an arc impinging upon said anode.

3. In vapor electric apparatus, the combination with an anode, of a shield therefor, said shield comprising a plurality of longitudinally disposed members of devious cross section arranged around said anode in overlapping relation to each other, and means for preventing an arc from impinging upon said anode except through the spaces between said members.

4. In vapor electric apparatus, the combination with a vaporizable reconstructing cathode, of an elongated main anode mounted with its longitudinal axis substantially normal to the surface of said cathode and provided with an opening in the side thereof, and a plurality of overlapping shutter members of devious cross section disposed across said opening parallel to the longitudinal axis of said anode.

5. In vapor electric apparatus, the combination with a main anode, of a vaporizable reconstructing cathode, means for producing a difference of potential between said electrodes for establishing an arc therebetween, said arc including globules of cathode material carrying a relatively small charge in proportion to their mass and particles of ionic dimensions carrying a relatively large charge in proportion to their mass, and means for causing said arc to take a circular path in the neighborhood of one of said electrodes while impacting symmetrically upon said electrodes, whereby the joint action of momentum and the relatively weak electrostatic action on said globules causes the separation thereof from said ionic particles which are subject to momentum and a relatively strong electrostatic action.

6. A shielding structure for a vacuum-type converter comprising two spaced supporting ring members and a plurality of similar overlapping shielding members extending therebetween.

7. A shielding structure for a vacuum-type converter comprising two spaced supporting ring members and a plurality of overlapping shielding members of deformed cross section extending therebetween.

8. A shielding structure for a vacuum-type converter comprising two spaced supporting ring members and a plurality of overlapping shielding members of L-shaped cross section extending therebetween.

9. A substantially cylindrical shielding member for an electrode of vacuum-type electric apparatus comprising a collar member, a plurality of elemental members extending therefrom and parallel to the longitudinal axis thereof, and a diaphragm supported by said members at the outer end thereof.

10. A substantially cylindrical shielding member for an electrode of vacuum-type electric apparatus comprising a collar member, a plurality of overlapping elemental
5 members of deformed cross section extending therefrom and parallel to the longitudinal axis thereof, and a diaphragm sup-

ported by said members at the outer end thereof.

In testimony whereof, I have hereunto 10
subscribed my name this 14th day of Dec.,
1915.

EDMUND F. SIPHER.