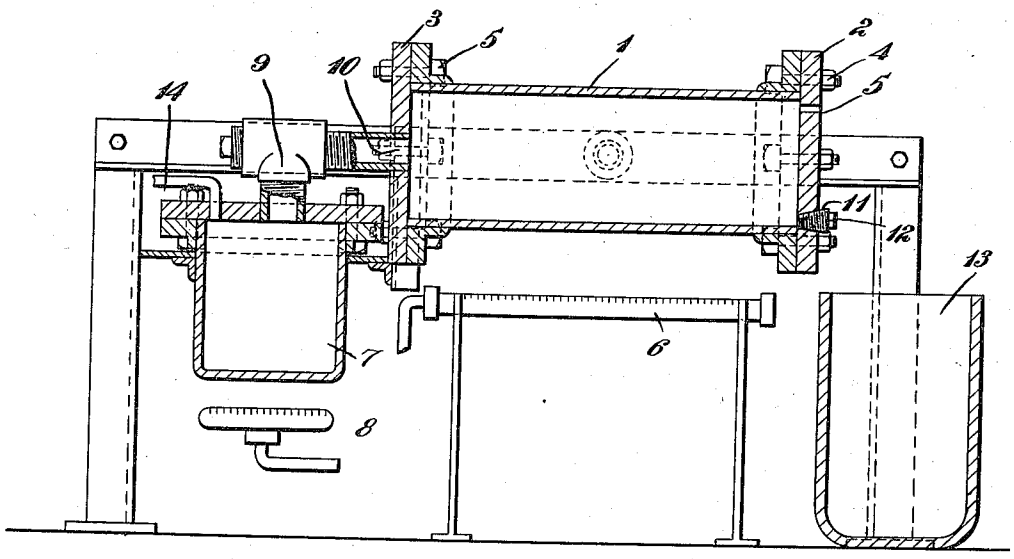
S. L. NICHOLSON.

METHOD OF PRODUCING PHOSPHOR METALS.

APPLICATION FILED NOV. 29, 1920.

1,425,679.

Patented Aug. 15, 1922.



WITNESSES:

J. P. Wurmb.

H. C. Bierman

INVENTOR

Samuel L. Nicholson.

BY

Wesley G. Carr

ATTORNEY

UNITED STATES PATENT OFFICE.

SAMUEL L. NICHOLSON, OF PITTSBURGH, PENNSYLVANIA, ASSIGNOR TO WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

METHOD OF PRODUCING PHOSPHOR METALS.

1,425,679. Specification of Letters Patent. Patented Aug. 15, 1922.

Application filed November 29, 1920. Serial No. 427,091.

To all whom it may concern:

Be it known that I, SAMUEL L. NICHOLSON, a citizen of the United States, and a resident of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Methods of Producing Phosphor Metals, of which the following is a specification.

This invention relates to phosphor-metals, and, more especially, to an improved method of producing the same, the present invention being directed to a modification of the Demmler process, described in the patent to Demmler, No. 1,287,653, issued December 17, 1918.

In accordance with the process of Demmler, a certain amount of metal to be alloyed with phosphorus is placed in a receptacle or retort in a neutral atmosphere, usually of carbon-dioxide, to prevent oxidization of the metal and of the phosphorus, and the retort is heated to a temperature above the boiling point of phosphorus but below the melting point of the metal to be phosphorized. Phosphorus vapor is then passed in to phosphorize the metal, after which the phosphorized metal is allowed to cool somewhat and the contents of the retort are discharged into another vessel, where the material is melted and cast into ingots or other forms suitable for use.

This latter step of removing the phosphor-metal into a separate vessel for further treatment has several disadvantages in that the workmen are exposed to the heat of the phosphor metal, which is at about 300°–400° C. during the removal thereof from the phosphorizing retort into the receptacle or crucible used for melting the same. Further, there is a considerable loss of heat units in the transfer of the metal since, during phosphorization, the metal, such as copper, is at a temperature of about 400° C., whereas, after being transferred to the crucible, it has fallen to probably 200° C.

It is among the objects of the present invention to obviate these disadvantages and, also, to obviate the necessity of the additional step of transferring the metal to the crucible, avoiding the use of such crucible in producing ingots.

In carrying the objects of my invention into effect, I phosphorize the metal in the retort, as described in the Demmler patent, but, instead of allowing the retort to cool after phosphorization, I increase the temperature thereof so as to melt the phosphorized metal and I allow the melted metal to flow into suitable ingot or other molds of any desired form.

Referring to the accompanying drawing forming a part hereof, which illustrates one form of apparatus suitable for carrying out my improved method, the single figure is a vertical cross-sectional view through the apparatus, some parts being shown in elevation.

The retort 1, of any suitable form, is closed at its ends by cover plates 2 and 3 held to the body of the retort by bolts 4. A vent opening 5 is formed in plate 2 and the retort 1 is heated by any suitable means, such as by gas burner 6. A retort 7, placed at a lower level than retort 1, is heated by a gas burner 8 and has a vapor pipe 9 leading into retort 1 through opening 10 in cover plate 3. A tap opening 11 is formed in the lower portion of cover plate 2, the opening being closed by plug 12. A receptacle 13, which is placed directly below opening 11, may be an ingot or other mold of desired size and shape for the reception of the molten metal from the retort.

The operation of my improved method for the production of a phosphor metal, such as phosphor copper, is as follows:— Copper turnings or millings are placed in retort 1, the cover plates 2 and 3 being in place, the plug 12 closing the tap opening 11, and the retort being heated to a suitable temperature, about 400° C., by gas burner 6. An inert gas, such as carbon dioxide is passed into the apparatus through pipe 14 escaping through vent opening 5 and displacing the air present in the system.

The retort 7, heated by burner 8, contains phosphorus which is vaporized and passes through vapor pipe 9 into the retort 1, phosphorizing the metal. When the process of phosphorization is complete, the heat in burner 8 is cut off while the retort 1 is heated to a still greater degree by burner 6 until the phosphor copper melts. The plug 12 is then removed from tap opening 11 and the molten phosphor copper allowed to flow into the receptacle or mold 13.

By providing a process in which the phosphor metal is melted in the same retort in the absence of any substantial amounts of air, I avoid the losses and difficulties often encountered in melting such materials in crucibles owing to oxidization of part of the phosphor metal, and I also prevent the loss of heat units which occurs in the transfer of the metal to the crucible. I also shorten the time necessary for the production of a certain amount of metal and make it easier for the workmen to operate the process, since they are less exposed to the heated metal and to fumes than in the processes hitherto used.

Although I have described specifically the production of phosphor-copper by my new method, it is to be understood that my invention is not limited to this material but includes broadly a new method of treating phosphor metals and alloys to render the production thereof more efficient and more economical.

I claim as my invention:

1. A method of producing phosphor-metals which consists in heating a metal to a temperature below its melting point in a retort, passing phosphorus vapors therethrough to phosphorize the same, raising the temperature of the metal to its melting point in the same retort, and casting the same into ingots.

2. A method of producing phosphor-metals which consists in heating a metal to a temperature below its melting point in a retort, passing phosphorus vapors therethrough to phosphorize the same, raising the temperature of said metal to its melting point in the same retort, and casting same into ingots, said metal being treated in said retort in the absence of substantial amounts of air.

In testimony whereof, I have hereunto subscribed my name this 26th day of November 1920.

SAMUEL L. NICHOLSON.