No. 812,801 PATENTED FEB. 13, 1906.

J. E. OBER.

ELECTRIC FURNACE.

APPLICATION FILED JULY 15, 1904.

Fig. 1.

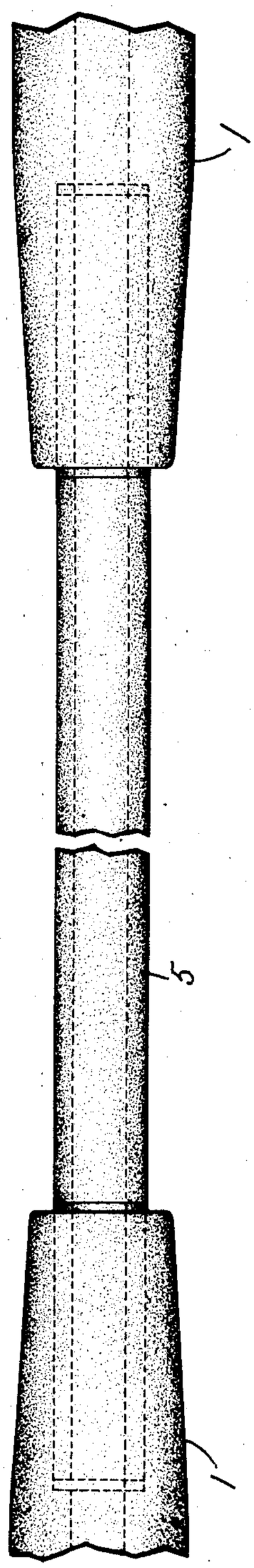
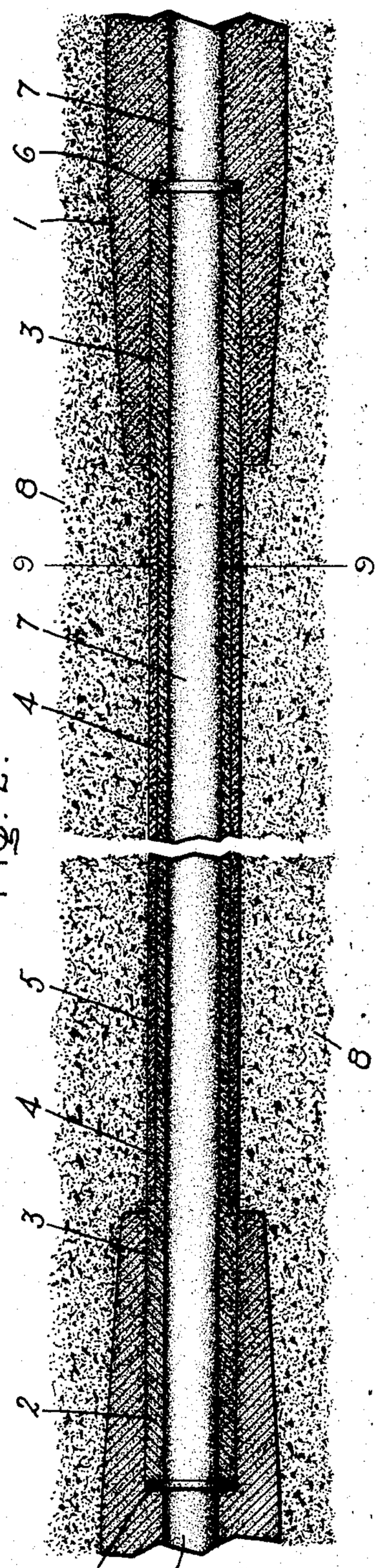


Fig. 2.



Witnesses:

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Att'y.

UNITED STATES PATENT OFFICE.

JULIUS E. OBER, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

ELECTRIC FURNACE.

No. 812,801. Specification of Letters Patent. Patented Feb. 13, 1906.

Application filed July 15, 1904. Serial No. 216,675.

To all whom it may concern:

Be it known that I, JULIUS E. OBER, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Electric Furnaces, of which the following is a specification.

My present invention relates to electric furnaces, and more particularly to that class of electric furnaces known as "carbon-tube" furnaces, in which a tubular member made out of suitable conducting material, such as carbon, is heated by the passage through it of an electric current. The objects to be heated by the furnace are placed in the bore of the tubular member.

When furnaces of this character are operated, the tubular member when heated rapidly deteriorates unless steps are taken to prevent its oxidation. Heretofore the tubular member in furnaces of this character when made of carbon has frequently been packed in coke to prevent oxidation. I have found, however, that tubular members made out of carbon surrounded by coke when operated at high temperatures deteriorate rapidly from some cause, the exact nature of which I am unable to state with certainty. From my observations it seems probable that this deterioration is caused by or at least assisted by the presence of impurities, such as silica, in the coke. My observations also lead me to believe that a portion of the current is shunted from the tubular member into the surrounding coke or other medium surrounding the tube. Whatever the cause of deterioration may be, however, I find that by surrounding the working portion of the carbon tubular member with a layer of titanium carbid the deterioration of the member is very much decreased. Ordinarily I surround the tubular member with a comparatively thin layer of titanium carbid, and then surround it in turn by a packing of coke. The packing of coke serves to protect the titanium carbid from oxidation, and also serves as a refractory shield to prevent the dissipation of heat from the furnace.

In the accompanying drawings, of which Figure 1 is an elevation and Fig. 2 a sectional elevation, I have illustrated a portion of an electric furnace embodying my invention.

In the drawings, 1 represents somewhat massive end pieces, which may be formed of carbon, graphite, or the like, and 2 represents the tubular member of the furnace. The tubular member 2 in the construction shown comprises two cylindrical portions 3 and an intermediate concentric cylindrical portion 4, the external diameter of which is less than that of the end portion. A layer 5 of titanium carbid surrounds the portions 4 of the member 2. The outer surfaces of the layer 5 may be flush with the outer surfaces of the end portions 3. The inner ends of the end members 1 are socketed at 6 to receive most of the end portions 3, as shown. A cylindrical passage 7, ordinarily of uniform cross-section, extends centrally through the end members 1 and the member 2. The objects to be heated are placed in this passage. The portions of the end member 1 shown in the drawings and the member 2 and its protective layer 5 are embedded in a mass of coke 8. Suitable connections (not shown) are provided for supplying suitable current to the end members 1. The means for supplying current to the end members 1 and for protecting and supporting them are not shown in the drawings, as they form no part of my present invention.

I have found that to obtain the best results it is desirable that the layer 5 of titanium carbid should be substantially uniform in thickness. A uniform layer can be advantageously obtained in the following manner: A sheet of material, such as paper, is wrapped about the enlarged end portions 3. This forms a cylindrical casing concentric with the portion 4, but separated therefrom by a space equal to the thickness of the layer 5. The section of this casing is represented in Fig. 2 by the lines marked 9. I then fill the space between the casing and the portion 4 of the member 2 with titanium carbid in a finely-powdered form. The member 2 is then surrounded by a packing of coke 8.

As soon as the furnace thus formed is heated to the working temperature the powdered titanium carbid sinters together to form a shell having considerable mechanical strength The shell or casing, formed of paper or similar material, chars as the furnace heats up.

The protective layer 5, formed of titanium carbid, is a good conductor of electricity and is non-hygroscopic and is refractory. The titanium-carbid layer 5 is less affected by any electric discharge which may take place

from it to the mass of coke 8 in the operation of the furnace than is the carbon tubular member 2 by a similar discharge when the protective coating is omitted. The use of the protective layer 5 serves to materially increase the life of the tubular member 2.

While I have described the best form of my invention now known to me, it is obvious that it may be used in other forms from that shown in the drawings.

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

1. In an electric furnace, a carbon tube, and a coating therefor formed of titanium carbid.

2. An electric furnace comprising a carbon tube heated by the passage of current through its wall, and a protective shell formed of titanium carbid.

3. In an electric furnace, a carbon tube, a layer of titanium carbid surrounding the tube, and a packing of coke surrounding the titanium carbid.

4. In an electric furnace, a tubular member formed of conducting material comprising two cylindrical end portions, and intermediate portions of reduced diameter.

5. In an electric furnace, a tubular member comprising two end portions and an intermediate portion of reduced diameter, and a protective sheath surrounding said reduced portion.

6. In an electric furnace, a tubular member comprising two end portions and an intermediate portion of reduced diameter, and a protective sheath surrounding said reduced portion, said protective sheath being formed of titanium carbid.

7. In an electric furnace, a tubular member comprising two end portions, and a reduced intermediate connecting portion, a packing of refractory non-oxidizable material formed with a passage in it of a diameter substantially the same as that of the end portions, and a mass of protective material located in the space between said refractory material and the reduced intermediate portion of the tubular member.

8. In an electric furnace, a tubular heating member, a sheath therefor of titanium carbid, and a packing of finely-divided, heat-resisting material surrounding said sheath.

9. In an electric furnace, a tubular heating member of carbon, and a sheath therefor consisting of a sintered mass of finely-divided titanium carbid.

10. In an electric furnace comprising a carbon tube heated by the passage of current through it, a protective sheath for the tube formed of titanium carbid, and a mass of coke surrounding said sheath and the carbon tube inclosed thereby.

11. In an electric furnace, a carbon-tube heating member comprising end portions and an intermediate portion of reduced diameter, and a sheath for the reduced portion formed by wrapping paper about the heating member and then filling the space left between the paper and the reduced portion of the heating member with titanium carbid.

12. In an electric furnace, a heating member, and a protective sheath or coating therefor formed of non-hygroscopic carbid.

13. In an electric furnace, a heating member, and a protective sheath or coating therefor formed of a non-hygroscopic refractory carbid.

In witness whereof I hereunto set my hand this 12th day of July, 1904.

JULIUS E. OBER.

Witnesses:
BENJAMIN B. HULL,
HELEN ORFORD.