Patented June 12, 1923. 1,458,913

UNITED STATES PATENT OFFICE.

WILLIAM A. FARISH, OF BUFFALO, NEW YORK, ASSIGNOR TO BUFFALO REFRACTORY CORPORATION, OF BUFFALO, NEW YORK, A CORPORATION OF NEW YORK.

NONRECRYSTALLIZED REFRACTORY MATERIAL.

No Drawing. Application filed October 9, 1920. Serial No. 415,871.

To all whom it may concern:

Be it known that I, WILLIAM A. FARISH, a citizen of the United States of America, and a resident of the city of Buffalo, county of Erie, and State of New York, have invented certain new and useful Improvements in Nonrecrystallized Refractory Materials, of which the following is a full, clear, and exact description.

The general object of my invention has been to provide a refractory material which shall be of such a nature as to resist chemical action and which shall greatly increase the life of articles which are made therefrom.

Another object has been to provide a material which shall give elasticity to the articles which are made therefrom, thereby preventing cracking and disintegrating, as well as giving, to the articles, resistance against oxidizing and corroding, thus making it possible to produce articles which are very durable.

Furthermore my material is of such a nature that the articles made therefrom shall be unaffected by water or moisture and, therefore, may be used at any desired time without the necessity of giving to them a preliminary curing or drying.

Moreover, it has been an object to provide a refractory material the constituent ingredients of which may be permanently bound together in a refractory article without the necessity of raising the temperature of the material to the point of recrystallization. The ingredients of my material are inexpensive and heat resisting articles may be economically manufactured therefrom.

It is obvious that my material may be used for any heat resisting articles; but, for example, in this specification, I will describe the material as applied to the construction of a crucible.

It is well known to those skilled in the art, that the present day crucibles known to the trade as graphite crucibles are made either from plumbago or graphite and preferably German clay, together with a slight admixture of silica, usually sand. Due to the action of the furnace fires on the outside of such crucibles, and also from the affects of fluxes on the inside thereof, these graphite crucibles oxidize and disintegrate quite rapidly. Together with the above mentioned disadvantages, the repeated heating and cooling to which such crucibles are subjected in ordinary use, causes large sheets to flake off (termed scalping) and also causes them to crumble, which results in a crucible of comparatively short life.

My material is preferably composed of the following elements in the proportions named:

	Parts.
Silicon carbide, substantially	44.5
Crystalline graphite, substantially	20
Sand, substantially	11
Tar, substantially	20
Borax, substantially	4.5

In the making of a crucible, the ingredients of my refractory material are thoroughly mixed, after which they are placed upon a potter's wheel or other suitable spinning machine and formed or spun in the usual manner. Instead of spinning, the crucible or other heat resisting articles may be pressed or molded into shape, if desired. After being formed in the desired manner, the crucible is then baked at a temperature of approximately 1,000° C. It will be noted that this temperature is comparatively low and that it is far below the temperature necessary to recrystallize the ingredients of the refractory material, thus resulting in a great saving of heat necessary to bake the articles made from my material.

I have discovered, from repeated experiments, that if heat resisting articles are to be durable, it is necessary that a portion of natural crystalline graphite be employed. This crystalline graphite, lies in thin laminæ or layers overlapping one another which enables the article to withstand sudden changes in temperature without cracking, due to a certain amount of flexibility given to the whole body of the article by the overlapping layers of graphite.

While I have set forth tar as the carbonizing binder in my material, it is obvious that any other suitable carbonizing binder such as pitch or molasses may be used if desired. Furthermore, while I have set forth the use of sand and borax, either one of these may be used singly or any other fusion mixture which will protect the carbonizing binder from oxidation may be used if desired. I have found, however, that the use of the sand and borax produces an ideal fusion mixture, since the borax gives quickness of action to the mixture and the sand forms a body and

gives a more permanent flux than the borax would give if used alone. The use of the fusion mixture not only protects the carbonizing binder but also forms a protecting coating around the graphite.

While I have set forth certain proportions of the different ingredients, it is obvious that they may be varied somewhat without departing from the spirit of my invention or the scope of the appended claims and I do not wish, therefore, to be limited to the exact proportions of ingredients herein set forth.

While I have used the term "crystallized" in this application as applied to graphite, it is to be understood that this term also includes flake graphite which is the equivalent of crystalline graphite.

Having thus described my invention, what I claim is:

1. A non-crystallized refractory material for heat resisting articles comprising silicon carbide, crystalline graphite, a carbonizing binder, and sand.

2. A non-crystallized refractory material for heat resisting articles comprising silicon carbide, crystalline graphite, tar, and sand.

3. A non-recrystallized refractory material for heat resisting articles, comprising silicon carbide, crystalline graphite, a carbonizing binder, borax and sand.

4. A non-recrystallized refractory material for heat resisting articles, comprising silicon carbide, crystalline graphite, tar, borax and sand.

5. A refractory material for heat resisting articles comprising, substantially 44.5 parts of silicon carbide, substantially 20 parts of crystalline graphite, substantially 20 parts of tar, and substantially 15.5 parts of a fusion mixture.

6. A refractory material for heat resisting articles comprising, substantially 44.5 parts of silicon carbide, substantially 20 parts of crystalline graphite, substantially 20 parts of tar, and substantially 15.5 parts of a mixture of borax and sand.

7. A refractory material for heat resisting articles comprising, substantially 44.5 parts of silicon carbide, substantially 20 parts of crystalline graphite, substantially 20 parts of tar, substantially 4.5 parts of borax, and substantially 11 parts of sand.

In testimony whereof, I have hereunto signed my name.

WILLIAM A. FARISH.