UNITED STATES PATENT OFFICE.

CHARLES M. HALL, OF NIAGARA FALLS, NEW YORK.

PAINT.

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To all whom it may concern:

Be it known that I, CHARLES M. HALL, of Niagara Falls, Niagara county, New York, have invented a new and useful Paint Pigment, of which the following is a full, clear, and exact description.

The object of my invention is to provide a durable metallic pigment for the manufacture of paints.

I have discovered that a pigment having superior qualities of endurance and easy mixing with oils can be made from an alloy of iron with some other more electropositive element—such as silicon, titanium, aluminium, manganese, or the like—which is present in such proportion as to make the alloy very brittle and capable of being easily pulverized and ground. A metallic alloy having these qualities can be made by combining iron with silicon, titanium, and aluminium in the proportion of about sixty per cent. of iron with forty per cent. of the other elements. The proportion of iron may be varied within wide limits, and in the example given above it is not of much consequence in what proportion the other elements are individually present provided the total is sufficient to render the product very brittle. I have obtained good results from the use in a sixty per cent. iron alloy of twenty per cent. titanium, fifteen per cent. silicon, and about five per cent. aluminium, and I have obtained like good results in an alloy of iron, silicon, and titanium with no aluminium. An alloy of iron and silicon or of iron and manganese alone may be used.

In addition to the elements above mentioned the alloy generally contains necessarily a small percentage of carbon and other impurities.

In making the alloy of iron, titanium, and silicon I preferably employ an electrical furnace in which I may charge bauxite or other material containing iron, titanium, and silicon. I mix it preferably with carbon and fuse it with the electric current. The iron reduced from this mixture is collected as an alloy with silicon, titanium, and some aluminum. The alloy is first pulverized to a very fine state by the use of suitable pulverizing-mills and is then mixed or ground with oil to constitute a paint.

The following is a description of a process which will produce satisfactorily the alloy above mentioned: I take bauxite, which may be approximately of the following composition, though the process is applicable to the treatment of bauxite of various grades and kinds of impurities: alumina, sixty per cent.; ferric oxid, eighteen per cent.; silica, two to three per cent.; titanic acid, three to four per cent., and water seventeen per cent. I preferably calcine the bauxite to remove the water, and before calcination I may mix with it some powdered carbon, (charcoal, coke, &c.,) which may be in the proportion of about five to ten per cent., in order to remove the water more completely and reduce to some extent the contained oxid of iron to the metallic form or to a lower state of oxidation, and thus lessen the work required in the subsequent operation. I then place the bauxite in a suitable electric furnace, preferably lined with carbon, and fuse it therein, preferably first mixing with it powdered carbon sufficient with that remaining from the previous calcination to amount to eight to ten per cent., more or less, in order to assist in the reduction, although this is not always necessary, since the carbon of the electrodes and of the furnace-lining will suffice. A more impure bauxite will require a greater percentage of carbon. I deem it desirable to avoid any large excess of carbon, which causes a waste of the alumina and has a prejudicial effect on the working of the process. I may use either a direct or an alternating current at an electromotive force of, say, twenty-five to thirty volts with a suitable volume. Working on a small scale with a furnace of about eight inches internal diameter I have employed about twenty-eight volts and about fifteen hundred amperes. I subject the mass to the fusing action of the current for some time, depending upon the size of the operation. When working on the small scale above mentioned, I have found one hour sufficient to accomplish both the fusion of the bauxite and the reduction of the impurities. During this time by the action of the carbon and where a direct current is used and the conditions for electrolysis are present by the electrolytic action of the current the iron, silicon, and titanium are reduced and unite to form a fused alloy, the bulk of which settles to the bottom. The mass

is then allowed to cool and is taken from the furnace, and the iron containing the other impurities is separated from it, the finer particles of the alloy which remain shotted through the mass being picked out by a magnet or otherwise. When working on a large scale, it may be found desirable to tap off the purified alumina and the reduced alloy in a melted condition.

I claim—

1. As a new article of manufacture, paint pigment composed of finely-pulverized metallic alloy containing iron with a sufficient proportion of a more electropositive element or elements to render the alloy easily pulverized.

2. As a new article of manufacture, paint pigment composed of finely-pulverized metallic alloy containing iron with a sufficient proportion of a more electropositive element or elements to render the alloy easily pulverized, such powdered material being mixed with oil.

3. A paint pigment composed of an easily-pulverized alloy of iron containing silicon, such metallic alloy being finely pulverized.

4. A paint pigment composed of an easily-pulverized alloy of iron containing silicon and titanium, such metallic alloy being finely pulverized.

In testimony whereof I have hereunto set my hand.

CHARLES M. HALL.

Witnesses:
W. S. FERGUSON,
C. HOLLAND MORITZ.