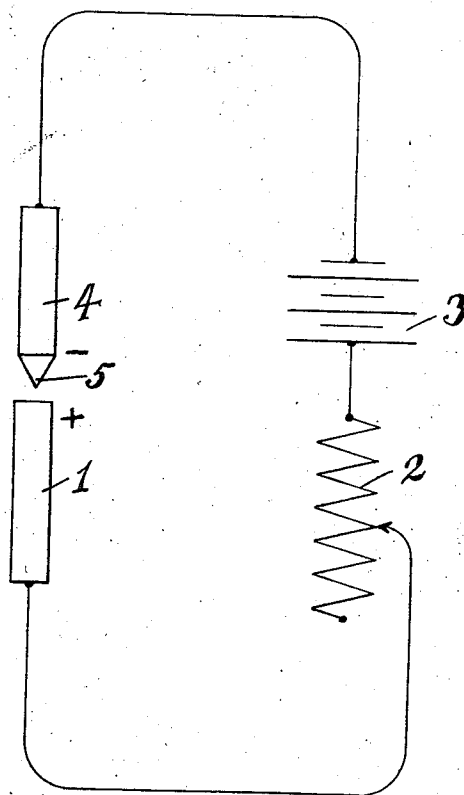


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COATED PHONOGRAPH STYLUS AND OTHER ARTICLE.
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UNITED STATES PATENT OFFICE.

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COATED PHONOGRAPH-STYLUS AND OTHER ARTICLE.

1,162,285.

Specification of Letters Patent.

Patented Nov. 30, 1915.

Continuation of application Serial No. 867,955, filed October 22, 1914. This application filed February 25, 1915. Serial No. 10,585.

To all whom it may concern:

Be it known that I, ENGELHARDT A. ECKHARDT, a citizen of the United States, residing in the city of Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented new and useful Coated Phonograph-Styli and other Articles, of which the following is a specification.

My invention resides in articles of iron, steel or other metal, or combination of metal or alloy having a coating of metal, or combination of metals, or alloy, alloyed therewith, for the purpose of making the point, edge, surface or the whole mass of such articles hard, hard and abrasive, wear withstanding, or having other desirable properties.

More particularly my invention relates to such an article having such a coating of tungsten, chromium, cobalt, molybdenum, etc., or an alloy of any of these with another metal, or an alloy of one of these with one or more of the others mentioned.

My invention resides in a stylus or needle for use in making phonographic sound records, or for reproducing sounds from sound records. Such a stylus consists preferably of a metallic stylus or needle having at its point and vicinity thereof a coating of tungsten, or tungsten alloyed with the metal of a needle or stylus. Such a stylus or needle is very hard, harder than tungsten itself, and successfully withstands wear and lasts many times longer than the ordinary stylus which, as well known, serves for reproducing from a relatively small amount of sound record and must then be replaced by a new needle. A stylus or needle of the character herein described I have found will serve to reproduce from a very great number of average sized records without any substantial wear. And such a stylus or needle is inexpensive because of the very small amount of tungsten or tungsten alloy or other metal required and from the further fact that the process of making the same is simple and inexpensive.

My invention resides also in the process of making the articles described.

The accompanying drawing illustrates a mode of carrying out my invention.

In the drawing, 4 represents a phonograph stylus or needle having the pointed end 5. It is shown connected by a conductor with the negative terminal of the source of cur-

rent 3, preferably a source of direct current, as a storage battery or dynamo-electric generator whose positive terminal is connected through the adjustable resistance 2 with the positive electrode 1 of tungsten, tungsten alloy, or other suitable material, as molybdenum, cobalt, chromium, etc., or an alloy of any one of these, or an alloy of any one of them with any other or others of them.

The operator touches the point 5 of the stylus 4 to the electrode 1 and upon withdrawing it slightly from the member 1 an arc will be struck between the point 5 of the stylus and the electrode 1. During the existence of this arc vapor of the metal 1 will be transmitted through the arc and be deposited upon the point 5 where the tungsten, tungsten alloy or other material referred to forms a coating upon the point 5. This coating consists of an alloy of the tungsten or other deposited metal with the metal of the stylus, which is generally of iron or steel. During the manipulation the stylus may be turned in suitable directions to cause the arc to strike all those parts of the surface which it is desired shall be coated.

Little if any experience is required to direct the arc on to any part of the surface, so that the operator may at will cause the alloy or coat to form on any desired areas or points.

In case such metals are used as will readily oxidize in the practice of the process, the operation may be carried out in an atmosphere of neutral gas, as hydrogen, nitrogen, etc.

The result of the above described treatment is a stylus or needle, or any other article, which will have a coating which gives to the article desirable qualities and characteristics. In the case of an iron or steel phonograph stylus there will be formed a tungsten or other alloy of iron or steel at the point of the stylus, giving it great wear-withstanding properties, such an alloy being very hard indeed. And with styli or phonograph needles which I have so treated the hardness is such that it resists the action of any good file, though it will be understood that my invention is not limited to such degree of hardness. And with a stylus so treated I have found it is useful in reproducing sounds from sound records to be very many times longer than the life of the ordinary untreated stylus.

Where the coating process has caused undesired irregularity or deformation of the point, the same may be ground to suitable sharpness or shape after the coating process, and after grinding the point may be polished so that, while having great hardness and wear-withstanding properties itself, it will not seriously abrade the sound record. Or a stylus may be made by first treating the end of a rod or wire of suitable dimensions by my process, and thereafter grinding or otherwise forming it to desired shape.

Besides phonograph styli other previously shaped articles may be similarly treated to provide a hard wear-withstanding point, edge or surface. For example, the points of pens may be so treated, in which case the pen replaces the stylus in the electric circuit. Or in place of the stylus in the electric circuit may be placed a drill, or a chisel, and by practising the process the cutting edge of the drill or the chisel may consist of such a hard wear-withstanding alloy or coat. Or the tube and stylus of stylographic pens may be so treated to render them wear-withstanding and non-corroding.

While tungsten steel is well known and is known to have great hardness, it is a material which is very difficult to operate upon or work and it would be a relatively expensive stylus, chisel, pen, drill, or other article which would be made in its entirety or largely of tungsten steel. By my process, however, the article may be made of ordinary steel commonly used for such articles, and then locally treated with a coat of tungsten or alloy to give it the desired hardness, wearing or other qualities.

It will be understood that for the electrode I may be substituted an electrode of carbon, in which case the tungsten or other material to be applied to the article may be thrust into the arc between the two electrodes and there be vaporized and carried by the arc to the article to be treated.

Where the article to be treated is of iron the electrode I may be of carbon and with the result that carbon is transferred to the iron which may be converted locally or on its surface to steel. And this steel may then be alloyed with tungsten or other suitable material transmitted through the arc after the carbon treatment, or simultaneously by inserting in the arc between the carbon and iron electrodes the tungsten or other material. And it will be understood that in

the case of a phonograph stylus as well as the other articles referred to, when of steel, that they may be tempered before the coating or alloying process; or they may be tempered after such process.

In the appended claims the term "iron" is generic and includes "steel" as a specific form of iron.

This application is a continuation of my co-pending application Serial Number 867,955, filed October 22, 1914.

What I claim is:

1. An article having a body of iron having a hard wear-withstanding coat consisting of a refractory metal alloyed on the iron body.
2. An article having a steel body having a hard wear-withstanding coat comprising tungsten alloyed on the steel body.
3. A phonograph stylus having a metallic body having a hard wear-withstanding coat of iron and tungsten alloy.
4. A phonograph stylus having a body portion and a hard wear-withstanding point consisting of a coat of an alloy of a refractory metal which can be tempered.
5. A phonograph stylus having at or near its point a hard coating formed of refractory metal alloyed with the stylus material.
6. A metallic article having a hard wear-withstanding alloy coating formed by a refractory metal combined with the metal of the article.
7. A phonograph stylus having a polished point having a coating of refractory material alloyed with the stylus material.
8. An article having a body of steel having a hard wear-withstanding coat consisting of a refractory metal alloyed on the steel body.
9. An article having an iron body having a local admixture of carbon, and a coat comprising a refractory metal alloyed with said iron containing carbon.
10. An iron article having a hard alloy coating formed by a refractory metal combined with the metal of the article.
11. A steel article having a hard, wear-withstanding alloy coating of steel and tungsten.

In testimony whereof I have hereunto affixed my signature in the presence of the two subscribing witnesses.

ENGELHARDT A. ECKHARDT.

Witnesses:

NELLIE FIELD,
ALICE S. MARSH.