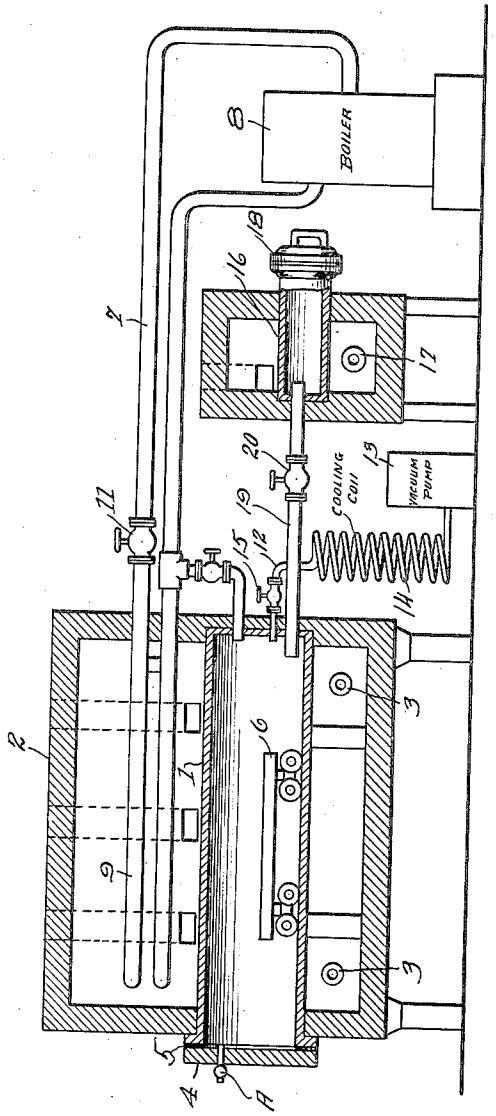
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RUST PREVENTING TREATMENT.

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RUST-PREVENTING TREATMENT.

1,346,473. Specification of Letters Patent. Patented July 13, 1920.

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To all whom it may concern:

Be it known that I, WILLIAM R. SWAN, a citizen of the United States, residing at South Bend, in the county of St. Joseph, State of Indiana, have invented a new and useful Rust-Preventing Treatment; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to an improved process for treating iron and steel with superheated steam and gases from heated or burning chemicals to form a rust resisting black finish thereon.

Among the objects of the invention is to provide a process of this character which will produce a durable and pleasing rust resisting black finish upon the metal in a comparatively short period of time, and which can be carried out with comparatively simple and inexpensive apparatus.

With these and other objects in view, the process consists in treating the metal by successive steps in a novel manner as will be hereinafter described.

One form of apparatus for carrying out the process is illustrated by the accompanying drawings in which the figure is a vertical sectional view through a muffle furnace and chemical retort adapted for use in carrying out the process.

According to the processes which have been previously used for forming a rust resisting finish upon iron and steel articles, the said articles have been treated with chemicals or gases while heated in a closed chamber such as a muffle furnace, although all of the steps of the process have been carried on at ordinary atmospheric pressure. The present process differs essentially and materially from these prior processes by treating the iron or steel articles with chemicals or chemical gases in a sealed chamber or furnace within which a partial vacuum is created. It has been found that a vacuum corresponding to a five inch mercury column gives excellent results, and where articles of iron or steel are treated by this process they can be directly electroplated with nickel, brass, or the like, without the necessity of using cyanid.

In carrying out the process the iron or steel articles to be treated, after being thoroughly cleaned, are placed in a gas-tight chamber such as a muffle furnace, and heated to a temperature of from 900° F. to 1050° F. While thus heated the articles are treated with superheated steam as in the Bower-Barff process, but under a pressure of substantially five pounds per square inch, for a period of approximately two hours. It may be explained that in the Bower-Barff process the articles to be treated are placed in a closed retort and heated to 871° F., after which super-heated steam is injected into the retort and forms a coating of the black magnetic oxid on the articles. The heating of the iron or steel articles acts to open up the pores thereof, and the superheated steam forms a rust resisting oxid base on which the chemical gases subsequently act to form a black finish. After the superheated steam has acted upon the iron or steel articles to the desired extent, the sealed chamber of the furnace is placed in communication with a vacuum pump and a partial vacuum produced in the chamber. Chemical gases or fumes are then introduced into the chamber, being drawn into the same by the action of the partial vacuum, said gases entering the open pores of the heated articles and forming a black finish thereon. The gases or fumes which are thus utilized may be of any suitable character, although it has been found that excellent results can be obtained by using asphaltum, pitch, coal tar or similar material mixed with sodium borate. The percentage of the sodium borate varies under different conditions and with different substances, although I have found that good results can be obtained where 20% of sodium borate is used. A small percentage of tannin may be used in the chemicals which are heated in the retort for the purpose of producing a dead black finish on the iron or steel articles, but for any articles other than polished hardware the tannin may be omitted.

The partial vacuum which is produced in the sealed chamber, as previously described, operates to draw the fumes or gases from the heated chemicals into the chamber from the retort containing the chemicals, and these fumes are permitted to act upon the iron or steel articles under the partial vacuum for a period of substantially one hour. The articles are then taken from the chamber or furnace and gradually cooled. After cooling

they are ready to be submerged in the oil bath which may be composed of a combination of 10% fernalin and 90% linseed oil. It may be explained that fernalin is a balsam product obtained from the long leaf pine tree, similar to turpentine. It is of an oily nature and is used to thin out the linseed oil to such an extent that it will drain freely from the material and the linseed oil will not dry on thick and spoil the appearance of the work. The treatment of the articles with the superheated steam acts in the well known manner of the Bower-Barff process to produce a rust resisting oxid on the iron or steel articles, and the subsequent treatment of the articles with the fumes from the materials in the retort imparts a dense black finish to the articles. The actual rust proofing is accomplished to a great extent by the action of the superheated steam, while the vapors from the asphaltum, pitch, or coal tar impart to the articles the much desired black finish. While I have especially mentioned asphaltum, pitch and coal tar, it will be obvious that any analogous other substance having similar chemical properties, such as pitch pine and pine tree tar can be substituted and substantially the same results obtained.

In the drawing, which is a sectional view through a muffle furnace and chemical retort, the numeral 1 designates the chamber of the furnace and 2 the outer walls or casing within which the chamber is mounted. Suitable means such as the burners 3 are provided for heating the furnace to the required temperature, which is ordinarily from 900° to 1050° F. The chamber 1 has a gas-tight formation and the door 4 is constructed to provide a gas-tight seal for the chamber when closed, this door being fitted with a relief pop-off valve A. The tight fitting may be accomplished in any suitable manner, although on the drawing asbestos packing 5 is shown as interposed between the mouth of the chamber and the door. The iron or steel articles 6 to be treated are placed in the chamber 1 of the furnace and the furnace then tightly sealed by means of the door 5.

A steam pipe 7 leads from an ordinary boiler 8 to superheating coils 9 which are arranged within the upper portion of the casing 2 so that they will be heated by the burners 3. A pipe 10 leads from the end of the coil 9 to the chamber 1, and valves 11 control the steam supply. After the articles 6 have been heated to the required temperature, as previously indicated, superheated steam is introduced into the chamber 1 by opening the valves 11. This steam is under a pressure of substantially five pounds per square inch and acts upon the iron or steel articles for a period of approximately two hours, serving to form a rust resisting metallic oxid base thereon.

A vacuum pipe 12 leads from the front end of the chamber 1 to a suitable vacuum pump or a vacuum jet 13, a cooling coil 14 being shown as interposed in the length of the pipe. A valve 15 controls this pipe, and after the superheated steam has acted upon the articles, the valve 15 is opened and a partial vacuum corresponding to a five inch mercury column produced in the chamber. The asphaltum, pitch, coal tar, or other non-corrodible hydro-carbon substance is placed in the retort 16 which is heated by a suitable burner 17. A gas-tight cover 18 closes the rear end of the retort, while a gas pipe 19 leads from the retort to the chamber 1. A gas-cock 20 is interposed in the length of this pipe, and when this cock is opened the partial vacuum draws the gases or fumes from the retort into the chamber 1, where they act upon the heated metal articles and form a film thereon. The articles to be treated are thus subjected to the vapor or gas of a non-corrodible hydro-carbon substance, and it has been found that much more satisfactory results are obtained by the use of a partial vacuum than is possible where all the steps of the process are carried on at ordinary atmospheric pressure.

While I have described one manner of carrying out the process with great particularity of detail, it is not to be understood therefrom that the invention is restricted to the exact steps which I have disclosed, since various changes and modifications may be made by those skilled in the art without departing from the spirit of the invention.

Having thus described my invention, what I claim as new is:

1. The process of treating iron and steel articles to form a rust resisting finish thereon, which involves the heating of the articles sufficiently to open the pores thereof while they are positioned in a sealed chamber, producing a partial vacuum within the sealed chamber, and drawing the vapor or gas of a non-corrosive substance into the sealed chamber by the action of the partial vacuum.

2. The process of treating iron and steel articles to form a rust resisting finish thereon, which involves the heating of the articles sufficiently to open the pores thereof, treating the articles while thus heated with superheated steam under a pressure greater than atmospheric pressure, and subsequently treating the articles while heated with a vapor or gas of a non-corrosive substance while under a pressure less than atmospheric pressure.

3. The process of treating iron and steel articles to form a rust resisting finish thereon, which involves the heating of the articles to a sufficiently high temperature to open the pores thereof, subjecting the articles while heated to the action of superheated steam, and subsequently subjecting

the articles while still heated to the vapor of a non-corrosive hydro-carbon substance.

4. The process of treating iron and steel articles to form a rust resisting finish thereon, which involves the placing of the articles in a sealed chamber, heating the articles to a sufficiently high temperature to open the pores thereof, introducing superheated steam into the chamber and permitting the same to act upon the articles, producing a partial vacuum within the chamber, and permitting the partial vacuum to draw the vapor or gas into the chamber from a separate retort containing a non-corrosive hydro-carbon substance.

5. The process of treating iron and steel articles to form a rust resisting finish thereon, which involves the placing of the articles in a sealed chamber, heating the articles to a sufficiently high temperature to open the pores thereof, introducing superheated steam into the chamber to act upon the articles, heating a hydro-carbon substance having the properties of asphaltum in a separate retort, and producing a partial vacuum within the chamber, said partial vacuum being permitted to draw the vapors or fumes from the retort into the chamber.

6. The process of treating iron and steel articles to form a rust resisting finish thereon, which involves the subjection of the articles while heated to a sufficiently high temperature to open the pores thereof to the vapors or gases from a retort containing a non-corrosive hydro-carbon substance.

7. The process of treating iron and steel articles to form a rust resisting finish thereon, which involves the placing of the articles in a sealed chamber, heating the articles to a sufficiently high temperature to open the pores thereof, and the utilization of a partial vacuum for drawing the fumes of a non-corrodible substance from a separate retort into the chamber to act upon the heated articles.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM R. SWAN.

Witnesses:

R. C. HIGGINS,

LYMAN B. WEBER.