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MEANS FOR HEAT TREATING METALLIC ARTICLES.

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1,270,520. Patented June 25, 1918.

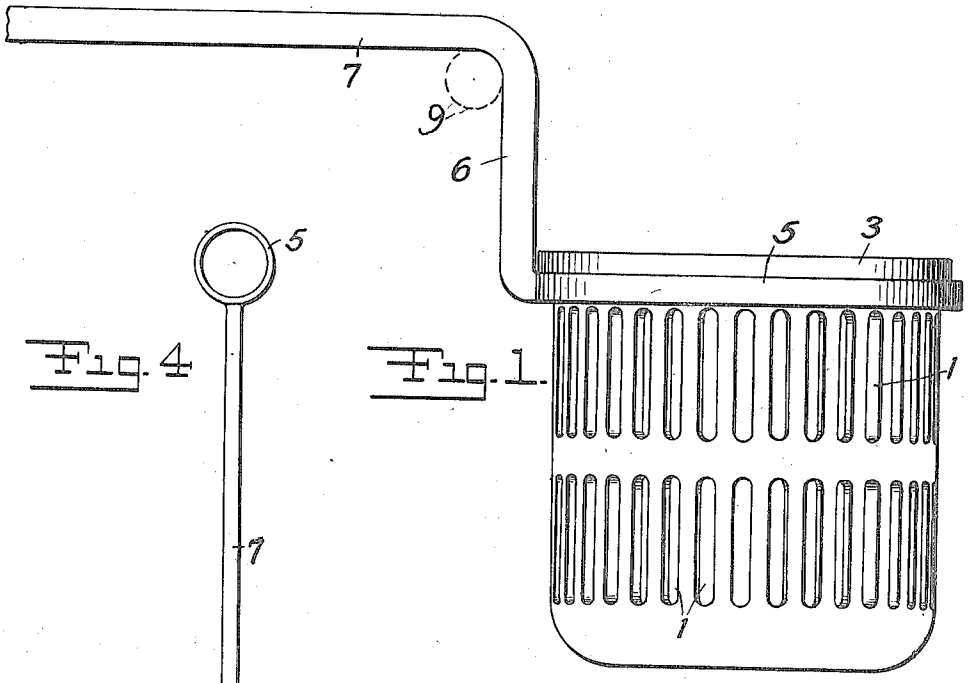


Fig. 1.

Fig. 4.

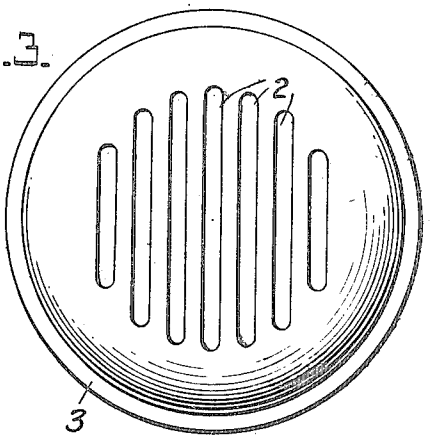


Fig. 3.

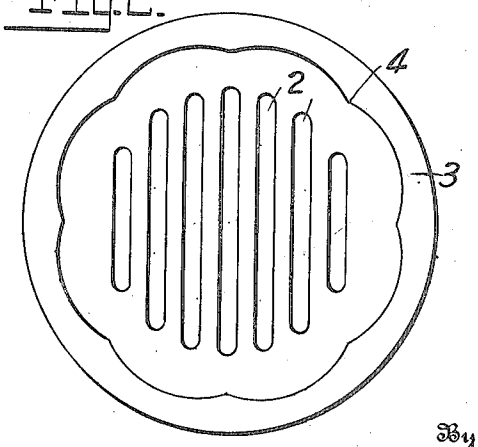


Fig. 2.

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MEANS FOR HEAT-TREATING METALLIC ARTICLES.

1,270,520. Specification of Letters Patent. Patented June 25, 1918.

Application filed February 1, 1918. Serial No. 214,851.

To all whom it may concern:

Be it known that I, JOHN C. HENDERSON, a citizen of the United States, residing at 415 Hobart Place, Washington, District of Columbia, have invented a certain new and useful Improvement in Means for Heat-Treating Metallic Articles, of which the following is a full, clear, and exact description.

My invention relates to the heat treatment of metallic articles and has for its object to provide a new and improved means for handling such articles for the purpose of so treating them.

The following is a description of an embodiment of my invention, reference being had to the accompanying drawings, in which,

Figure 1 shows in elevation a carrier in the form of a basket for containing the articles when treated, and a holder therefor, constituting one embodiment of my improved means;

Fig. 2 is a top plan view of the basket;

Fig. 3 is a bottom plan view of the same, and

Fig. 4 is a detail view of the holder on a reduced scale.

It has been heretofore customary to harden steel articles by immersing them in a molten bath of sodium cyanid or other molten salt. It has also been customary to anneal such articles by immersing them in a bath of molten lead heated to the proper temperature and allowing them to cool slowly. Either heat treatment may be carried out by my means. The heat treatment involving the use of molten sodium cyanid has been the more difficult because of the absence of carriers which would substantially resist the action of the high temperature and molten cyanid combined. I have provided for the heat treatment of articles either in the sodium cyanid or in the molten lead a carrier of cast metal, this carrier as now used being in the form of a basket of cast metal as shown in Fig. 1. This basket is about six inches high and with an internal diameter of about six inches, and three-eighths of an inch thick. It is provided in its sides with series of openings 1, some two inches long and about a quarter-inch in width, separated by bars of about the same width. The bottom of the basket also is provided with openings 2 of similar width. The top of the basket is provided with an external flange 3. The interior of the basket is preferably provided with ribs 4 which aid in guiding the material as it is dumped out of the basket. In order to support the basket, I provide a holder having a ring 5, from which extends a riser 6, from which leads a horizontal portion 7. The basket and handle as thus described are cast of an alloy which is highly resistant to the action of heat and to acids and alkalis and of great strength even when highly heated so as to maintain its shape and support its contents. I prefer an alloy such as described in my Patent No. 1,190,652 granted July 11, 1916. The alloy I actually use consists of sixty (60) per cent. nickel, twenty-six (26) per cent. iron, twelve (12) per cent. chromium and manganese one and one-half ($1\frac{1}{2}$) per cent.

The alloy is and should be one which is very highly resistant to heat, requiring a high melting temperature, and very strong and durable when in a very highly heated condition and substantially non-oxidizing. It is and preferably should further be of low heat conductivity and of sufficient bulk to retain a large amount of heat for a considerable period, when once heated, which contributes to the carrying out of my process. These characteristics are present in a basket of the above given dimensions when made of the alloy specified. The parts 5, 6 and 7 of the handle as described are made of material similar to that of the basket so as to withstand the heat and not contract more rapidly than the basket when under the influence of the sodium cyanid bath. When the alloy above described is used, there is practically no unequal contraction or expansion of the basket and the handle, and the alloy specified is substantially proof against chemical or other action, due to the ingredients of the bath. The outer end of the handle 8 is made of any suitable inexpensive material, such as iron or steel, since it is so far removed as not to be exposed to the bath and heat required for the extreme heat treatment.

In using my device for submitting steel articles to a molten cyanid bath for the purpose of surface hardening, I first heat the basket to a high temperature if the articles to be treated are in a dirty or oily condition. This may be done by placing the basket within the handle and immersing the basket in

the molten cyanid bath. When the basket is highly heated I then place the oily articles to be treated in the basket, which, on account of its bulk and low heat conductivity, retains sufficient heat to heat up the articles before immersion so as to drive off the oil and water which may be on them when delivered to the heat treating department. After the oil and dirt have thus been driven off, I then immerse the basket with its contents in the molten cyanid bath, holding it suspended by means of the handle which rests on a suitable support 9. The rim of the handle and the basket are kept beneath the surface of the bath, until the molten soduim cyanid has acted upon the articles sufficiently to surface harden them, this period of time being well understood by those skilled in the art. I then remove the basket and dump out the articles and add a new supply, permitting them before immersion to be heated by the hot basket until the oil, etc., are driven off and then immersing them as before. By using several baskets the residual heat in some of the baskets can be utilized for the purpose of the preliminary cleaning when necessary, while other baskets are in the bath.

Where the articles are oily and dirty, this preliminary heating is necessary, since if they were introduced into the molten bath without it, an explosion might and probably would result. Heretofore this cleaning operation has been a distinct operation, requiring means and movements other than the means and movements employed in the surface hardening process. It has also been necessary heretofore to heat treat articles to be heated separately, or to combine them in bundles, so as to require a separate preliminary operation. By my means and my process the necessity for this preliminary work is avoided, saving both time and labor.

The devices may be used equally well for heat treatment consisting of annealing in molten lead, the mechanical process being substantially the same when articles are oily or greasy. The danger of explosion with molten lead baths is not the same as with molten sodium cyanid baths, but it is highly desirable to have the articles as clean as possible before immersing them in the lead bath.

My handling means may be used with other hardening solutions than molten sodium cyanid, such for instance as molten barium chlorid or sodium chlorid, or in other relations where it is necessary to subject separate articles to heat treatment at very high temperatures. Of course, where the articles are supplied in a sufficiently clean condition, the preliminary heating of them is unnecessary. Where, however, it is necessary, the use of the basket made of the alloy specified is of very great advantage on account of its high residual heat, aside from the advantage of strength and durability which are present when the articles are being submerged.

So far as I am aware, I am the first one to provide for the handling of articles to be subjected to heat treatments, such as hardening or annealing in molten baths at very high temperatures, metallic means of high melting point and of such low heat conductivity and bulk as to retain a large amount of residual heat. The means which I have described, to wit, a cast basket of the above named alloy, are being used very successfully and on account of the simplicity is at present the preferred embodiment of my invention so far as means are concerned.

As will be evident to those skilled in the art, my invention permits of various modifications without departing from the spirit thereof or the scope of the appended claims.

What I claim is:

1. A carrier for articles to be subjected to heat treatment at high temperatures, composed of a heat resisting and substantially non-oxidizing alloy of low heat conductivity and being of sufficient bulk to retain a large amount of residual heat for a considerable period after being subjected to the action of high temperature and heated thereby.

2. A carrier for articles to be subjected to heat treatment at very high temperatures, consisting of a cast perforated basket composed of a highly refractory and substantially non-oxidizing alloy containing nickel and chromium and of low heat conductivity.

3. A carrier for articles to be subjected to heat treatment at very high temperatures, consisting of a cast basket composed of a highly refractory and substantially non-oxidizing alloy containing nickel and chromium and of low heat conductivity, said basket being provided with perforations in its bottom.

4. A carrier for articles to be subjected to heat treatment at very high temperatures, consisting of a cast perforated container composed of a highly refractory and substantially non-oxidizing alloy containing nickel and chromium and of low heat conductivity, and a removable handle therefor having the parts adjacent to said container also composed of a similiar highly refractory and substantially non-oxidizing material.

JOHN C. HENDERSON.