

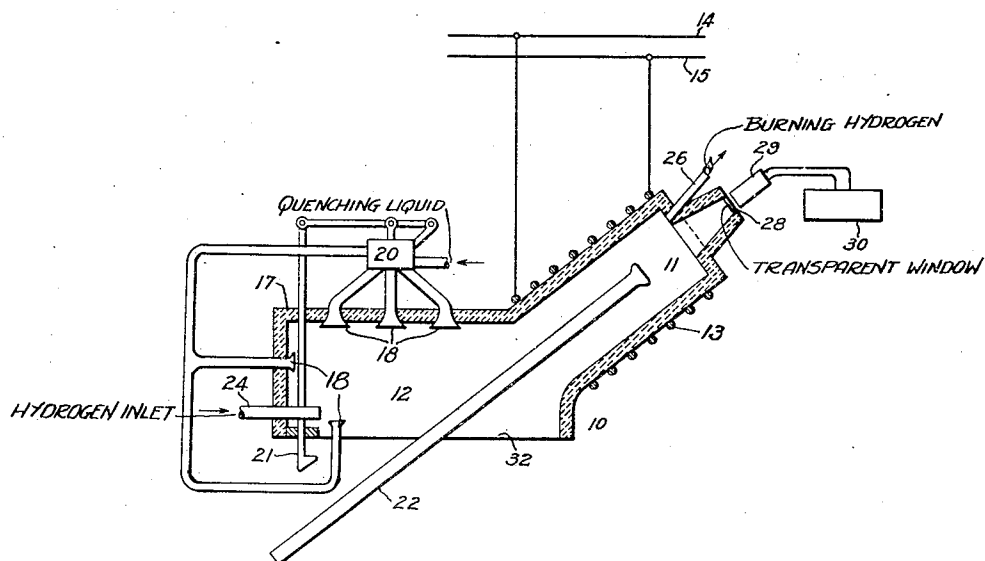
Aug. 29, 1933.

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1,925,028

HEAT TREATING APPARATUS

Filed July 28, 1932



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UNITED STATES PATENT OFFICE

1,925,028

HEAT TREATING APPARATUS

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Application July 28, 1932, Serial No. 625,258, and in Germany August 3, 1931

3 Claims. (Cl. 266—4)

My invention relates to heat treating apparatus, more particularly high frequency furnaces suitable for the heat treatment of materials and has for an object the provision of a simple and inexpensive apparatus for heating and hardening materials in the absence of oxygen.

Heretofore it has been customary to heat in a suitable furnace tools or other metal articles to temperatures somewhat above the recalescence temperature of the material and thereafter remove the article to a quenching bath. Inasmuch as the recalescence temperature is quite high for high carbon and alloy steels, rapid oxidation of the metal has taken place in the transfer of the work from the furnace to the quenching bath.

In accordance with my invention in one form thereof I provide the combination of a furnace and a quenching means so constructed that a protective gas prevents the work from being exposed to atmospheric oxygen both during the heating and quenching operations. More specifically, I provide a heating chamber arranged above a cooling chamber and in communication therewith. The heating of the work is accomplished by means of a high frequency inductor coil surrounding the heating chamber while the cooling chamber is provided with a plurality of spraying devices arranged to be brought into operation by movement of the work against a valve operating lever.

For a more complete understanding of my invention reference should now be had to the drawing in which I have illustrated a sectional elevation of a furnace embodying my invention.

Referring to the drawing, I have shown my invention in one form as embodied in a heating and cooling apparatus 10. The heating chamber 11 is arranged above the cooling chamber 12 and an inductor coil 13 is wound about the heating chamber 11 with its respective ends connected to a source of high frequency supply indicated by the supply lines 14 and 15. Extending through the upper wall 17 of the cooling chamber 12 there are provided a plurality of spray devices 18. A normally closed valve 20 is arranged to be opened by engagement of the work with a valve operating lever 21. For example, the work 22 may be moved against the valve operating lever 21 to open the valve thereby permitting the quenching fluid to flow from a supply pipe 23 through the valve to the respective spray devices 18 which devices are provided in the walls of the chamber 12 so that the quenching fluid will be uniformly directed against all sides of the work 22.

In order to prevent atmospheric oxygen from

coming into contact with the work 22 a protective gas, such as hydrogen or the like, is introduced through the pipe 24 at such a rate that the cooling chamber 12 and the heating chamber 11 are always filled with hydrogen gas. A pipe 26 of relatively small inside diameter permits the continuous escape of small quantities of hydrogen and as is well understood in the art the hydrogen flowing through this pipe can be ignited and will burn as a small flame during the operation of the furnace.

At the upper end of the heating chamber 11 there is provided a transparent window 28 together with a thermal responsive device 29 so that the temperature of the work 22 may be measured. As shown, a signaling device 30 may be operated so that either an audible or a visible signal may be given when the work 22 has reached the temperature for quenching.

In the operation of the invention the work 22 is inserted through the opening 32 provided in the lowermost portion of the furnace 10 into the heating chamber 11. As soon as the thermal responsive device 29 and the signaling device 30 indicate that the desired temperature for quenching has been reached, the work 22 is withdrawn from the heating chamber until it is in position beneath the spray devices 18.

By introducing the work 22 through the lowermost portion of the apparatus 10 it will be seen that the hydrogen forms a fully protective atmosphere for the work as it is moved from one chamber to the other. Furthermore, by using the inverted bell type of construction a natural trap is formed by the walls of the furnace for the hydrogen gas thereby facilitating the maintenance of the protective atmosphere within the apparatus.

By moving the work 22 against the valve operating lever 21 the valve 20 is opened permitting flow of quenching fluid through the pipe 23, the valve 20, the spray devices 18 and over the work 22. It will, therefore, be seen that heating of the work 22 takes place in a protective gas and that the work remains in the protective gas during the quenching operation and during its transfer from one chamber to the other.

While I have shown a particular embodiment of my invention, it will be understood, of course, that I do not wish to be limited thereto since many modifications may be made, and I, therefore, contemplate by the appended claims to cover any such modifications as fall within the true spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. Means for heating and quenching charges of work in a protective atmosphere comprising walls
5 arranged to form closed heating and cooling chambers, said cooling chamber being provided with an opening in the lower position through which work may be introduced to either of said chambers, said heating chamber being arranged
10 above said cooling chamber, heating means for said heating chamber, quenching means within said cooling chamber and means operable by the engagement of the work therewith for operating said quenching means to quench said works.
15 2. Means for heating and quenching charges of work under a protective atmosphere comprising walls arranged to form adjoining heating and cooling chambers with a common opening at the lower portion thereof, said heating chamber being arranged above the cooling chamber, supply
20 means for supplying hydrogen to said chambers to form a protective atmosphere within said chambers, an inductor coil associated with said

heating chamber for heating said charges, quenching means within said cooling chamber for quenching said charges after said charges are transferred from the heating chamber to the cooling chamber said transfer taking place under the protection of said protective atmosphere. 80

3. A heat treating apparatus comprising walls arranged to form a heating chamber above a cooling chamber with a single opening at the lowermost portion of said apparatus for the introduction of work into said apparatus, means
85 for introducing hydrogen or the like into one of said chambers to form a protective atmosphere in both of said chambers, an inductor coil surrounding said heating chamber, quenching means supported from the walls of said cooling chamber and means operable by the engagement of said work therewith for controlling said quenching means to quench said work after it has been moved from said heating chamber to said
95 cooling chamber.

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