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APPARATUS FOR HEAT TREATING

Filed Feb. 9, 1925

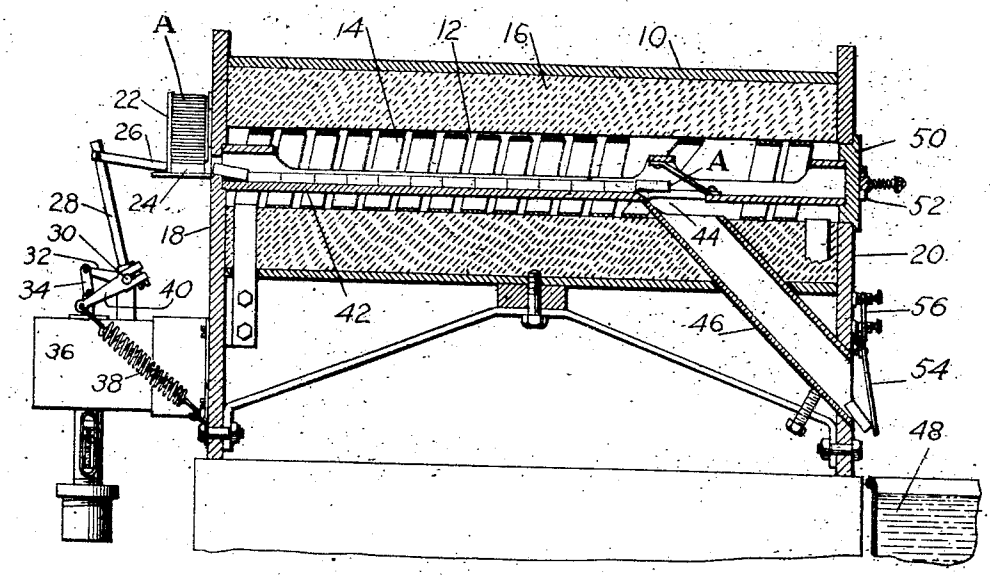


Fig. 1

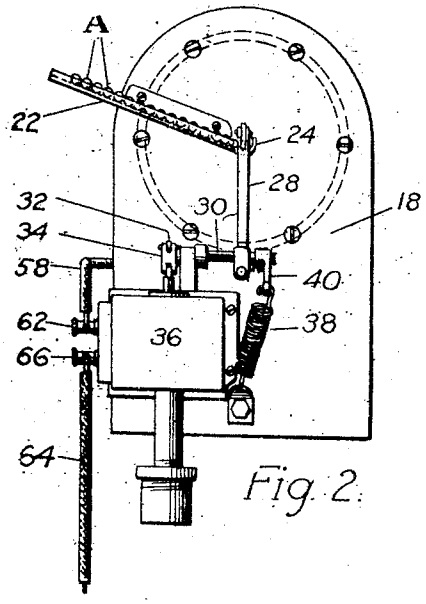


Fig. 2.

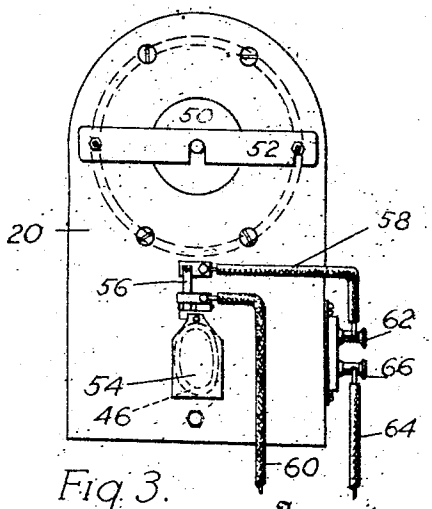


Fig. 3.

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR HEAT TREATING.

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This invention relates to heat treating and is herein disclosed as comprising an improved method and apparatus for heat treating magnetic articles to be hardened by quenching.

Steel, as is well known, has certain qualities which are obtained by heating it to different temperatures and quenching, and the steel, depending on the amount of carbon and other substances in it, has certain critical temperature points. It is frequently desirable to quench steel articles near the critical temperature to secure a desired internal structure and hardness and at this temperature steel loses its permeability and becomes non-magnetic.

An object of the invention is to provide a method and an apparatus for heat treatment in which the quenching temperature is magnetically controlled. This is accomplished in one way by heating articles in a magnetic field where the articles are retained by magnetic attraction until they are automatically released for quenching by loss of magnetism. Another object is to provide an improved control of articles to be heat treated and this is herein accomplished by utilizing the escape of one article from the heat to control the feed of following articles.

To these ends and also to improve generally upon the heat treatment of magnetic articles, the invention also consists in the various matters hereinafter described and claimed.

In the drawings, Figure 1 is a vertical longitudinal section of an illustrative apparatus.

Figure 2 is a front end elevation.

Figure 3 is a rear end elevation.

The numeral 10 indicates generally a furnace having a central heating chamber 12 preferably heated by an electric heating medium in the form of a metallic ribbon 14 helically coiled. The coil also creates a magnetic field and is enclosed in an insulating cylindrical wall 16 of refractory material held between front and rear heads 18 and 20. Other heating means might be employed and a magnetic field otherwise produced. At the front, an inclined chute 22 forms a magazine down which articles A may roll or slide into a hooked portion 24 which lies in alignment with an opening in the front wall or head 18. A pusher 26 is reciprocated intermittently to push the articles one-by-one into the heating chamber. The pusher is actuated through an upwardly extending arm 28 on a rock shaft 30, a second arm 32 on the shaft being connected by a link 34 to the core piece of a solenoid in the casing 36. The solenoid is energized periodically by a circuit completed when an article is quenched as will later appear. The pusher 26 is retracted by a coil spring 38 connected to a third arm 40 on the rock shaft.

The articles A are pushed onto a guide or support 42 which may be made from a pipe which is cut away at the top and sides to give the heat access to the articles. At a certain place near the rear of the heating chamber, the guide 42 has a bottom opening 44 through which an article will drop when it is heated sufficiently to lose its magnetism. The article is however retained magnetically by the surrounding coil if it arrives at the opening 44 before its temperature reaches the critical point, as usually intended. The article, when released, slides by gravity down an inclined chute 46 into a bath of quenching fluid indicated at 48. The guide or pipe 42 is supported at one end in a door 50 removably held in the rear wall or head 20 by a swinging latch bar 52.

The lower end of chute 46 has a hinged closure or flap valve 54 which is forced open by the falling article and operates a switch plate 56 which establishes electrical contact between the wires 58 and 60. Wire 58 leads to a binding post 62 on the housing 36 of the solenoid and wire 60 is electrically connected, through any suitable source of current, to a wire 64 which in turn leads to another binding post 66 on said housing. Hence, whenever an article escapes from the heating chamber, it controls the mechanism which gives a feeding movement to the following article, and work pieces are thereby fed intermittenly into the chamber with the same regularity that they leave it.

Although the invention has been described by reference to certain specific construction and steps, it should be understood, that, in its broader aspects, it is not necessarily limited to the selected illustrations.

I claim:

1. Heat treating apparatus comprising, in combination, a heating chamber, a guide for articles fed into said chamber, said guide having an opening, and a coil forming a

magnetic field at said opening to retain an article temporarily during heating.

2. Heat treating apparatus comprising, in combination, a heating chamber, a guide for a stream of articles in said chamber, said guide having an opening, a chute leading from said opening to the outside of the heating chamber, and a coil for magnetically retaining an article temporarily at said opening.

3. Heat treating apparatus comprising, in combination, a heating chamber, means for conducting articles through the chamber, a closure member actuated by said articles, and article feeding means controlled by the actuation of the closure member.

4. Heat treating apparatus comprising, in combination, a heating chamber, a guide in said chamber for a stream of articles, said guide having an opening, a coil for magnetically retaining an article temporarily at said opening, and means actuated by the release of an article for controlling the feed of the following article.

5. Heat treating apparatus comprising, in combination, a heating chamber, means for conducting articles through the chamber, a switch member actuated intermittently by discharge of said articles from said chamber, an article magazine, and mechanism controlled by the switch member for intermittently introducing articles from the magazine into the chamber.

6. Heat treating apparatus comprising a heating chamber, means for introducing articles intermittently into said chamber, means for conducting articles through said chamber and means actuated by the discharge of an article from said chamber for causing the actuation of said article introducing means.

7. Heat treating apparatus comprising a heating chamber, means for conducting articles through said chamber, means for introducing articles successively into said chamber, a closure for the discharge end of said chamber, and means controlled by the actuation of said closure for causing the actuation of said introducing means.

8. Structure as set forth in claim 7, said introducing means including electric motor mechanism and said closure controlled means including a device for controlling said motor mechanism.

9. Apparatus for applying heat treatment to articles of magnetic material comprising a heating chamber, means for conveying articles through said chamber and discharging them therefrom, means for supplying articles to said conveying means, means operating magnetically to retain articles in said heating chamber until they attain a predetermined condition, and means actuated by discharge of an article from said chamber for controlling said supplying means.

10. Apparatus for applying heat treatment to articles of magnetic material comprising a heating chamber, a guideway adapted to support a series of articles in said chamber and along which such articles may be propelled, a chute positioned to receive articles falling from the end of said guideway, and means for creating a magnetic field beyond the end of said guideway and above said chute whereby an article, after leaving said guideway, may be magnetically retained in the heating chamber until the magnetic attraction is sufficiently reduced to permit the article to fall.

11. Heat treating apparatus comprising, in combination, a heating chamber, an electric heating element arranged to produce a magnetic field, means for supplying articles to said chamber and into said field, said means arranged to permit discharge of said articles from said field when, by reason of the heating of the article the magnetic attraction of the field therefor becomes reduced to a predetermined extent.

In testimony whereof I affix my signature.

JOHN B. DAILEY.