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G. W. SARGENT.

APPARATUS FOR INDICATING THE MAGNETIC CONDITION OF HEATING METALS.

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NO MODEL.

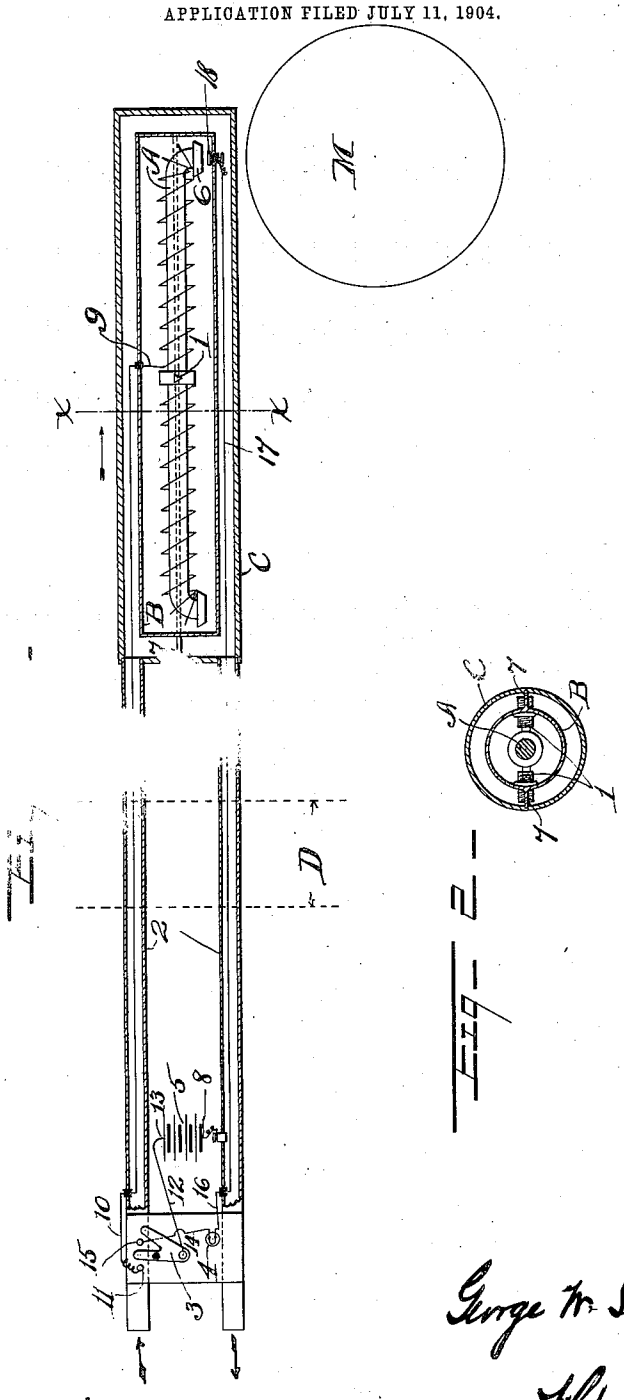

Fig. 2

Witnesses
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by [signature]
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No. 777,750. Patented December 20, 1904.

UNITED STATES PATENT OFFICE.

GEORGE W. SARGENT, OF READING, PENNSYLVANIA, ASSIGNOR TO THE CARPENTER STEEL COMPANY, OF READING, PENNSYLVANIA, A CORPORATION OF NEW JERSEY.

APPARATUS FOR INDICATING THE MAGNETIC CONDITION OF HEATING METALS.

SPECIFICATION forming part of Letters Patent No. 777,750, dated December 20, 1904.

Application filed July 11, 1904. Serial No. 216,011.

To all whom it may concern:

Be it known that I, GEORGE W. SARGENT, a citizen of the United States, residing in the city of Reading, county of Berks, State of Pennsylvania, have invented certain useful Improvements in Apparatus for Indicating the Magnetic Condition of Heating Metals, of which the following is a specification.

The proper heating of masses of steel preparatory particularly to subjecting them to a hardening process or for annealing is recognized as a matter of great importance. Excessive, insufficient, or uneven heating are all highly objectionable, and various means intended to indicate the temperature of the metal while it is heating for subsequent treatment or working have been devised.

The object of my invention is to provide means for directly and reliably indicating the condition of the mass of heating metal independently of the exterior temperature to which such mass of metal is subjected and without disturbance of the heating metal or interference with the heating operation.

It is a well-known fact that there is a so-called "critical point" in the temperature of steel above which crystallization takes place, while below it there is no such molecular change. It is essential to the securing of satisfactory results in hardening or annealing or in working a mass of steel that it should first be so uniformly heated as to secure the same molecular structure throughout. In providing for attaining a direct and positive indication of the condition of the heating metal I make use of the additional well-known fact that steel is magnetic at temperatures below this critical point and non-magnetic at higher temperatures, my invention consisting in providing means for indicating the magnetic or non-magnetic condition of the mass of metal while the latter is being continuously subjected to the action of a heating apparatus.

In the accompanying drawings I have illustrated a preferred form of apparatus adapted to carry my invention into effect, which I will now particularly describe, the distinctive features being thereafter definitely pointed out in the claims.

Figure 1 is a sectional elevation indicating the construction of the apparatus and its arrangement relative to the mass of metal being heated. Fig. 2 is a cross-sectional view on the line *x x* of Fig. 1.

A indicates the soft-iron core of an electromagnetic needle which is centrally mounted in pivotal bearings 1 1, provided in an inclosing tube B, which latter is itself inclosed, as shown, in a tubular water-jacket C, having waterway-conduits 2 2, extending through the wall D of the furnace, as indicated. This conduit extension carries at its outer end a switch device 3, an indicator 4, and a battery 5 or other electrical source. The tube B and jacket C may be made of copper tubing or any suitable material adapted to permit the passage of the magnetic influence to the heating metal M in the furnace, above which metal one pole 6 of the magnetic needle is located. The tube B is centrally supported in the jacket C, as shown, by means of longitudinal wings 7 on the former engaging interior grooves in the jacket-wall, said wings serving as partitions whereby water admitted through one of the conduits 2 is caused to circulate around the tube B and thence through the exit-conduit 2 for the purpose of cooling the magnet and the connections extending therefrom through the conduits 2.

One end of the wrapping-wire of the magnet is connected to a pole 8 of the battery 5 through the conducting-jacket C and the other end through wires 9 and 10 to the switch-bed 11, from which it connects through the contacting switch 3 and wire 12 with the other pole 13 of the battery, when the needle is magnetized. The indicator 4, which may be an alarm, electric light, or other suitable signal, is arranged in a shunt-circuit having one connection 14 to a switch-bed 15, which is engaged by an arm of the switch 3, and another connection, including wires 16 and 17, to an insulated post 18 in the tube B, located adjacent to the pole 6 of the magnetic needle.

When the switch is turned so as to engage

he beds 11 and 15, the needle will be magnetzed, and the indicator will be operated or ıot, depending upon the magnectic condition ›f the heating metal M. So long as this heatng metal remains substantially magnetic the ›ole 6 of the magnetized needle will be delected toward it and the indicator will be op›rated; but when the mass of metal has been ;ufficiently heated to be approximately denagnetized the needle will not be deflected so ıs to establish the shunt-circuit, and the fact will be shown by the failure of the indicator to show response to the magnetic influence.

It is evident that the form and arrangement of the the magnet, of the protecting means therefor, and of the indicator mechanism may be readily varied from the specific construction shown and described without departing from the spirit of my invention, and I do not desire to limit myself thereto.

What I claim is—

1. The combination with a metal-heating apparatus of a magnet arranged to include in its field the heating metal, and means for indicating the response or non-response of the heating metal to the magnetic influence.

2. The combination with a metal-heating apparatus of a magnet arranged to include in its field the metal to be heated, means for indicating the response or non-response of the metal to the magnetic influence, and means for protecting the magnet from the heating action.

3. The combination with a metal-heating apparatus of a magnet arranged to include in its field the metal to be heated, an indicator of the response or non-response of the metal to the magnetic influence located substantially without the influence of the heating apparatus, and indicator connections to the magnet.

4. The combination with a metal-heating apparatus of a magnet arranged to include in its field the metal to be heated, an indicator of the response or non-response of the metal to the magnetic influence located substantially without the influence of the heating apparatus, indicator connections to the magnet, and a water-jacket inclosing said connections and magnet.

In testimony whereof I affix my signature in the presence of two witnesses.

GEORGE W. SARGENT.

Witnesses:
D. M. STEWART,
W. G. STEWART.