T. B. HEADY.

INDICATOR.

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1,187,833.

Patented June 20, 1916.

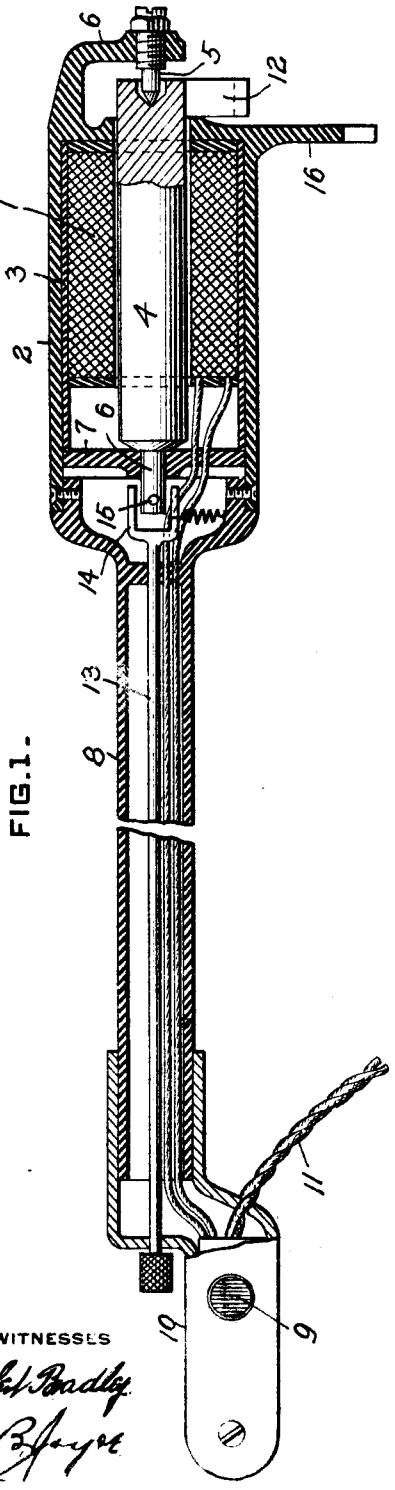


FIG. 1.

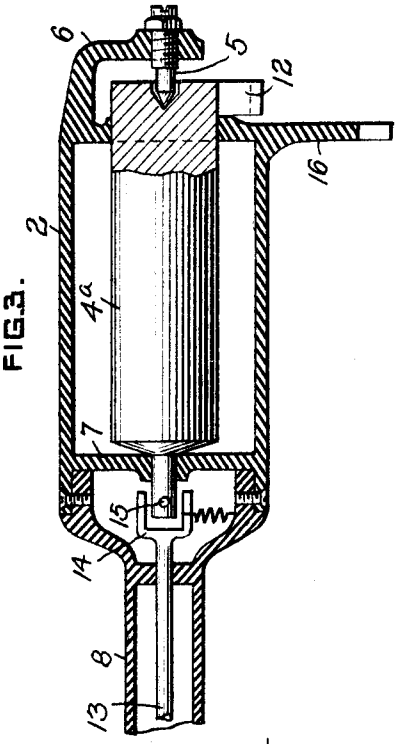


FIG. 3.

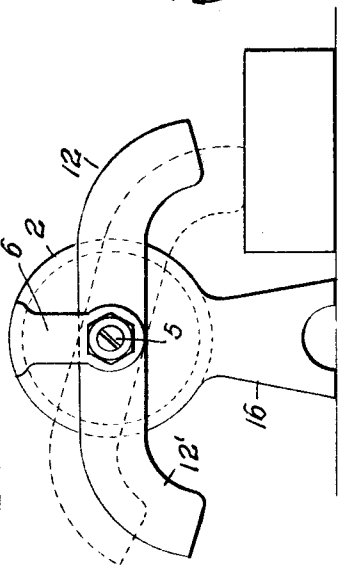


FIG. 2.

WITNESSES

J. Ezekiel Bradley

Thos. B. Hayes

INVENTOR

Thomas B. Heady

by Dennis S. Wolcott

Atty

UNITED STATES PATENT OFFICE.

THOMAS B. HEADY, OF PITTSBURGH, PENNSYLVANIA.

INDICATOR.

1,187,833. Specification of Letters Patent. Patented June 20, 1916.

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To all whom it may concern:

Be it known that I, THOMAS B. HEADY, residing at Pittsburgh, in the county of Allegheny and State of Pennsylvania, a citizen of the United States, have invented or discovered certain new and useful Improvements in Indicators, of which improvements the following is a specification.

It is well known that the critical temperature or point of recalescence to which steel should be heated for hardening, annealing, etc., varies with the carbon content of the steel. Although the critical temperatures for different grades of steel, *i. e.*, having different percentages of carbon are known or can be easily determined, so that a pyrometer might be employed to ascertain when an article being heated has reached the proper temperature, such method has been found cumbersome and unsatisfactory.

The invention described herein has for its object a construction of indicator, which will become operative and indicate to the heater that the article being heated has attained the critical temperature, regardless of whether that temperature is high or low for that particular article.

The invention is hereinafter more fully described and claimed.

In the accompanying drawing forming a part of this specification, Figure 1 is a sectional elevation of an indicator embodying my invention, Fig. 2, is an end elevation of the same, and Fig 3 is a sectional elevation of a second embodiment of the invention.

In the practice of my invention, a hollow spool 1 having insulated wire wound thereon to form the coil of an electro-magnet, is arranged in a shell 2 formed of non-magnetic material as aluminum. It is preferred to interpose asbestos or other non-conductor of heat between the coil and the shell, as indicated at 3 to protect the coil from injury. A core 4 of soft iron or mild steel is passed through the spool 1, said core being of such a size and cross-sectional shape as to be capable of rotating freely in the spool. This core is made of such a length that its ends extend beyond the ends of the spool, in order that it may be supported to rotate freely by suitable bearings. One end of the core projects through an opening in the closed end of the shell, and the bearing for such end is preferably formed by the conical end of a screw 5 passing through an angular arm 6 and projecting into a correspondingly shaped seat in the end of the core. To form a bearing for the end of the core within the shell, it is preferred to reduce a portion of the end of the core to form a journal 6, which has a bearing in a disk or diaphragm 7 suitably secured in the shell. The shell is carried by a hollow stem 8 having a head or enlargement closing the open end of the shell. The wires or conductors from the coil pass through the hollow stem and are connected to a switch 9 preferably embodied in the handle 10, said switch being also connected to the wires 11 extending from a suitable generator. The end of the core extending beyond the casing is provided with oppositely arranged arms 12 which curve downwardly so that the greater portion of the weight of said arms will be below the axis of the coil, thereby insuring the return of the arms and core to normal or horizontal position, when free to move as hereinafter described. The shell or casing is provided with a leg 16 adapted to support the shell or case, said leg being preferably of such a length that the distance from the axis of the core to the end of the leg, will be less than the distance between the core axis and the ends of the arms, so that the ends of the arms may be brought by a rotation of the core into contact with the surface on which the leg may bear. The rotation of the core is preferably effected by a rod 13 extending through the hollow stem. Suitable means are provided intermediate the inner end of the rod and core, whereby the former can be caused to engage and rotate the core and then be shifted from such engagement, leaving the core entirely free to return automatically to normal or horizontal position. A desirable construction to that end consists in forming a fork 14 on the end of the rod 13 and passing a pin 15 through the core so as to be engaged by the fork when rotated. In order to insure the disengagement of the fork and pin, a spring is employed for returning the fork and rod to normal position.

The operation of my improved indicator is dependent upon the well known fact, that when steel is heated to the critical temperature or recalescence, it becomes non-magnetic. In using the indicator, it is pushed into the furnace, the switch 9 being closed so that the coil and core may be energized. The leg 16 resting on the article or on the furnace bottom adjacent thereto, the operating rod 13 is rotated to turn the core and

bring one or the other of the arms 12 in contact with the article being heated, and as soon as such contact has been effected, the operating rod is released so as to be turned by the spring from engagement with the core. If the article has reached the state of recalescence, the arms 12 will automatically return to normal or horizontal position, as soon as released from engagement with the operating rod, but if the article is still magnetic, the arms will remain in the position to which they were shifted. In case the article is still magnetic, the switch 9 is opened to deënergize the coil permitting the arms to return to normal, and the indicator is withdrawn from the furnace.

It will be understood that while it is preferred to employ an electro-magnet and a switch, so that the arms 12 may be deënergized when the indicator may be withdrawn without subjecting the instrument to strains when the article is still magnetic, the switch may be omitted and the coil continuously energized and also that the core itself may be permanently magnetized, the coil being omitted, as shown in Fig. 3. In this form, the electric coil is omitted and the core 4^a is permanently magnetized. This instrument is used in the same manner as the construction shown in Fig. 1, but as it cannot be deenergized, some force is required to detach it from the article being treated, if at the same time of making the test, the article has not been treated to the point of recalescence. Hence the form of indicator having the electromagnet controlled by a switch is preferable for use in testing small articles or articles of a weight within the limit of the lifting power of the magnet, so that when making a test before recalescence has been attained, the article will not be withdrawn when removing the instrument.

By constructing the core with oppositely arranged arms, the ends of which extend below the axis of rotation, one arm will operate as a counterbalance to shift the arm which has been in contact with the article, to normal position. This return or indicating movement of the core can be effected in many ways, which will readily suggest themselves to one skilled in the art, and hence the invention as regards the production of an indicating movement is not limited to the specific construction herein shown and described.

It will be understood that as regards the broader claims, the term magnet is used generically as including both permanent and electro-magnets.

I claim herein as my invention:

1. An instrument for indicating the point of recalescence of steel having in combination a support, a magnet pivotally mounted on said support and provided with an arm at an angle to the axis of movement of the magnet, means for shifting the magnet to bring said arm into contact with the heated article and automatic means for returning the magnet to normal position.

2. An instrument for indicating the point of recalescence of steel, having in combination a support, a magnet pivotally mounted on said support and provided with oppositely extended arms, means for shifting the magnet to bring one of said arms into contact with the heated article, and automatic means for returning the magnet to normal position.

3. An instrument for indicating the point of recalescence of steel having in combination a hollow coil of wire, a core provided at one end with oppositely extending arms and rotatably arranged in said coils, detachable means for rotating the core, and automatic means for returning the core to normal position.

4. An instrument for indicating the point of recalescence of steel, having in combination an electro-magnet provided with a rotatable core, oppositely disposed arms on one end of the core, the ends of the arms extending to one side of the axis of rotation of the core, means for rotating the core, and adapted to be returned to normal position independent of the core.

5. An instrument for indicating the point of recalescence of steel, having in combination a shell or casing formed of non-magnetic material, and provided with a supporting foot, an electro-magnet arranged within the shell and having a rotatable core, one end of the core projecting through the casing, oppositely disposed arms on such projecting end, the ends of the arms extending to one side of the axis of rotation of the core, a rotatable rod adapted to engage and shift the core, and automatic means for returning said rod independent of the core to normal position.

6. An instrument for indicating the point of recalescence of steel having in combination a shell or casing formed of non-magnetic material and provided with a supporting foot, a magnet rotatably mounted on the shell or casing, and provided at one end with an arm outside of the casing, means for turning the magnet to bring said arm into contact with the article to be heated, and means for automatically returning the magnet to normal position.

In testimony whereof, I have hereunto set my hand.

THOMAS B. HEADY.

Witnesses:

ALICE A. TRILL,

THOS. B. JOYCE.