Oct. 14, 1930. C. W. WYMAN 1,778,655

TEMPERATURE INDICATOR

Original Filed May 12, 1925

Fig. 1.

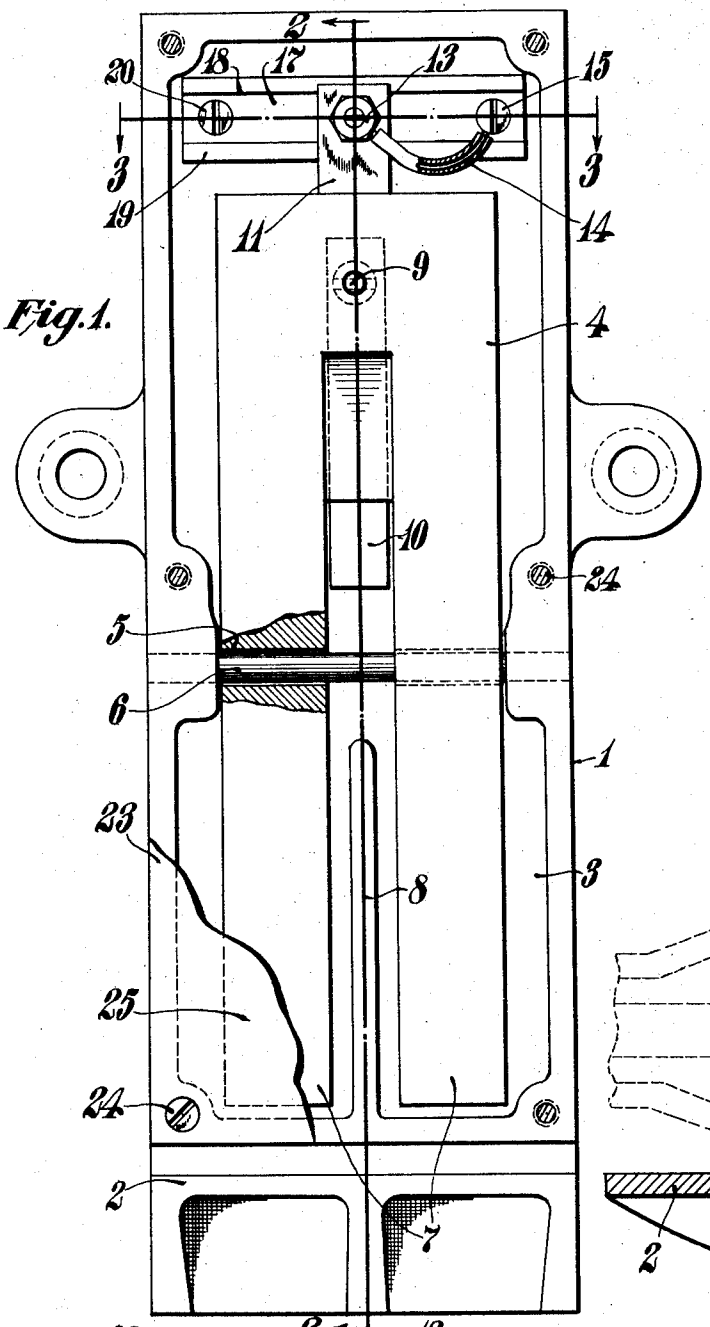


Fig. 2.

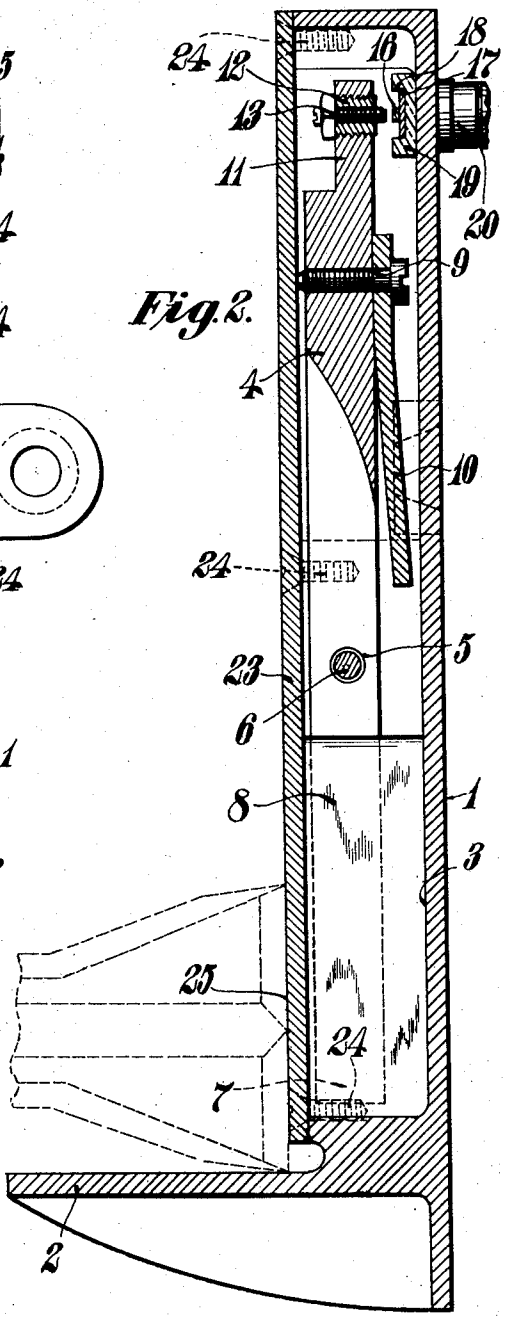
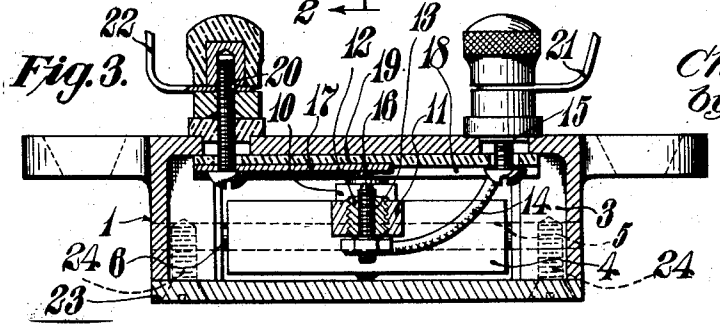


Fig. 3.



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Patented Oct. 14, 1930 1,778,655

UNITED STATES PATENT OFFICE

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TEMPERATURE INDICATOR

Application filed May 12, 1925, Serial No. 29,809. Renewed March 12, 1930.

My invention relates to temperature indicators and more particularly to magnetic temperature indicators adapted to use in connection with drill steels or other like article and having provision for indicating when the steel or other article has reached the desired temperature preparatory to the hardening process.

It is a well established fact that when the magnetism leaves the heated steel, that is, when the point of decalescence or "critical" point is reached, it is the proper time to quench the steel in the hardening bath.

The main object of the present invention, therefore, is to provide improved means for ascertaining with accuracy when the heated steel has reached the point of decalescence. Another object of my invention is to provide an improved temperature indicating device of exceedingly simple and rugged character which may be manufactured at a minimum of expense.

In the preferred embodiment herein described, I have shown improved temperature indicating means of the magnetic type. Preferably, this indicating means comprises a pivotally supported magnet of the permanent type provided with novel means for providing the desired degree of responsiveness to magnetic force and enclosed within a suitable non-magnetic casing and having electric indicating means operated by the swinging movement of the magnet caused by the magnetism in the heated drill steel or other similar article.

In the accompanying drawings I have shown for purposes of illustration one form which my invention may assume in practice.

In these drawings—

Fig. 1 is a front view of an indicator constructed in accordance with one embodiment of my invention, a portion of the casing being broken away to facilitate illustration.

Fig. 2 is a vertical sectional view taken substantially on line 2—2 of Fig. 1 with a drill steel being shown in dotted lines in operative position.

Fig. 3 is a transverse horizontal sectional view taken substantially on line 3—3 of Fig. 1.

In this illustrative form of my invention I have shown an upstanding frame or casing 1 having a laterally extending support 2, herein a plane shelf at its lower end and suitably attached thereto, herein formed integral therewith, the lateral support 2 being adapted to support an article to be tested when laid horizontally thereon contiguous to an improved abutment and temperature indicating means carried by the frame 1 and hereinafter more fully described.

Referring more particularly to the casing member 1, it will herein be noted that it is formed of a non-magnetic conducting material, preferably of brass, and provided with an interior chamber 3. Disposed substantially vertically in this chamber 3 is a magnet 4, herein of the permanent horseshoe type, pivoted between its ends for a limited movement, as at 5, on a transversely disposed rod or shaft 6 suitably secured at its ends within the sides of the casing 1. It will herein be noted that the magnet 4 is formed of a piece of flat stock milled out centrally a portion of its length in such manner as to form the poles thereof. As illustrated, this magnet has its poles 7 disposed at the lower end of the chamber 3 and movable on opposite sides of an upstanding partition or spacer member 8, herein likewise of non-magnetic material, formed on the back wall of the chamber 3 and projecting to the front of the latter. The magnet is traversed by the rod 6 at a point substantially off center, that is to say, the axis of the rod is substantially nearer one surface, herein the rear one, of the magnet than the other, and so the magnet, since the pivot is also below its center of gravity, normally tilts counterclockwise. As an important feature of the invention there is shown, in Figs. 1 and 2, secured adjacent the upper end of the magnet 4 as by a screw 9, a balancing piece or weight 10, herein in the form of a strip of metal such as soft spring steel, this weight permitting the proper variation in the degree of unbalance of the magnet by bending the piece 10 towards or from it thereby altering the center of gravity. The screw 9 serves as a stop to keep the magnet from tilting further coun-

terclockwise. In the position indicated in Fig. 2, the center of gravity of the magnet lies to one side of the vertical plane including the magnet pivot and the magnet is movable to lessen the distance between its center of gravity and the vertical plane including the pivotal axis when influenced by a body of magnetic material.

It will herein be observed that the upper end of the magnet 4 has formed thereon an upwardly extending extension or lug 11 having threadedly secured therein a suitable brass bushing 12 and this bushing in turn has threadedly secured therein an adjustable screw 13. The screw 13 is connected by means of a conductor wire 14 with a suitable terminal plug 15 and this screw forms an electrical contact member which is adapted to cooperate with an electrical contact member 16. The contact member 16 is connected by means of a strip of conducting material 17, which is disposed within a transverse slot 18 formed within a strip of insulating material 19, to a suitable terminal plug 20 and these terminal plugs 15 and 20 are connected by means of conductor wires 21 and 22 to suitable indicating means herein in the form of an electric light, not shown. Herein, it will be noted that a cover 23 seals the chamber 3 and is attached to the casing member 1 by suitable means such as screws 24 and removable to permit access to the parts inside the chamber whenever desired. It will also be noted that herein the lower end of the cover 23 presents an upstanding abutment 25 of non-magnetic conducting material for the articles to be tested, although obviously a separate abutment plate may be utilized if desired. Attention also is directed to the fact that the abutment 25 is engaged and braced by the partition member 8 in such manner as to prevent damage thereto.

In the operation of my improved temperature indicator it will be evident that when it is desired to determine the temperature of a drill steel or the like under treatment in a furnace, it is only necessary to place the end of the steel on the support 2 with its extremity preferably closely adjacent the lower outer surface of the upstanding abutment 25, as indicated by dotted lines in Fig. 2. With the article to be tested in this position, if the temperature has not reached the desired point, i. e. that at which the steel loses its magnetic quality, the magnet 4 will be attracted, and will swing about its pivot toward the steel, thus moving the contact member 13 toward the right in Fig. 2, and thereby engaging the cooperating contact member 16, consequently causing a circuit between the conductor wires 21 and 22 to be closed and lighting the indicator light so as to advise the operator that further heating is necessary preparatory to the hardening process. If, however, the steel has reached the point of decalescence or "critical" point, i. e. when the heated steel loses its magnetic quality, the contact between the members 13 and 16 will not be made and the light not lighted. The operator will then know that no further heating is necessary and that the steel is of proper temperature to be quenched in the hardening bath. It will herein also be noted that the balancing piece or weight 10 may be adjusted to insure the proper position of the center of gravity of the magnet with facility by merely bending the flexible metal inwardly or outwardly as desired.

As a result of my improvement it is made possible to obtain greater certainty of the temperature of the steel preparatory to the hardening operation. It will also be noted that the entire mechanism while totally enclosed is readily accessible whenever desired to permit replacement or repair and that the indicator mechanism while exceedingly accurate is of such a simple and rugged mechanical character as to permit it to be kept in repair by the average furnace operator or repair man. It will still further be noted that an improved temperature indicating device is provided which is of exceedingly simple and rugged character which may be manufactured at a minimum of expense.

While I have in this application specifically described one form which my invention may assume in practice, it will be understood that this form of the same is shown for purposes of illustration and that the invention may be modified and embodied in various other forms without departing from its spirit or the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent is:

1. In a magnetic temperature indicator, the combination comprising a vertically disposed magnet of the permanent type pivoted between its ends at a point below its center of gravity and having both of its poles disposed at its lower end, indicator controlling means carried by said magnet and adapted to control an indicator upon pivotal movement of said magnet, and means adjustable independently of said indicator controlling means and carried by said magnet at its upper end above its pivot for shifting the center of gravity to secure proper responsiveness to magnetic bodies.

2. A magnetic temperature indicator including a magnet, means for pivotally supporting the same, means engageable with the magnet to maintain the latter in a position in which its center of gravity is offset toward the front part of the indicator from a vertical plane including its axis of pivotal movement, means for varying the force necessary to effect pivotal movement causing the center of gravity to approach said vertical plane, and controlling means carried by said magnet adapted to control an indicator upon pivotal

movement of said magnet causing the center of gravity of the latter to approach said vertical plane.

3. A magnetic temperature indicator comprising a substantially vertically disposed magnet pivoted about an axis which lies below its center of gravity and offset toward the rear of the indicator from a vertical plane including the center of gravity of the magnet, means for normally maintaining said magnet in a position with its center of gravity spaced a predetermined distance from a vertical plane passing through the axis of pivotal movement of the magnet, and indicating means governed by said magnet when the latter is swung from its first mentioned position.

4. A magnetic temperature indicator comprising a substantially vertically disposed magnet pivoted about an axis below its center of gravity and offset toward the rear of the indicator from a vertical plane passing through the center of gravity and to which the axis of pivotal movement is parallel, means for normally maintaining said magnet in a certain position, indicating means adapted to be operated by said magnet when the latter is swung out of said position, and means for adjusting the position of said center of gravity relative to the pivotal axis.

5. In a magnetic temperature indicator, a permanent magnet, means for pivotally supporting the same at a point offset from its center of gravity, a stop limiting the movement of said magnet which results from the offsetting of its center of gravity from its pivot point, means for varying the locus of the center of gravity of said magnet with respect to said stop and pivot to regulate the force required to swing said magnet toward a position in which the pivot and center of gravity thereof lie in the same vertical plane, and other means carried by said magnet and controlled by the movements thereof for governing the operation of the indicator.

6. In a magnetic temperature indicator, a frame, a magnet mounted for swinging movement therein about an axis offset from its center of gravity, a stop carried by the frame for normally maintaining said magnet in a predetermined position with its center of gravity and its pivot in parallel vertical planes, means for positioning an article adjacent said magnet at a point where a magnetic force will cause said magnet to be swung away from said stop, an adjustable weight carried by said magnet for varying the force required to swing said magnet away from its stop, and other means controlled by the movement of said magnet for controlling the operation of an indicator.

In testimony whereof I affix my signature.

CHARLES W. WYMAN.