

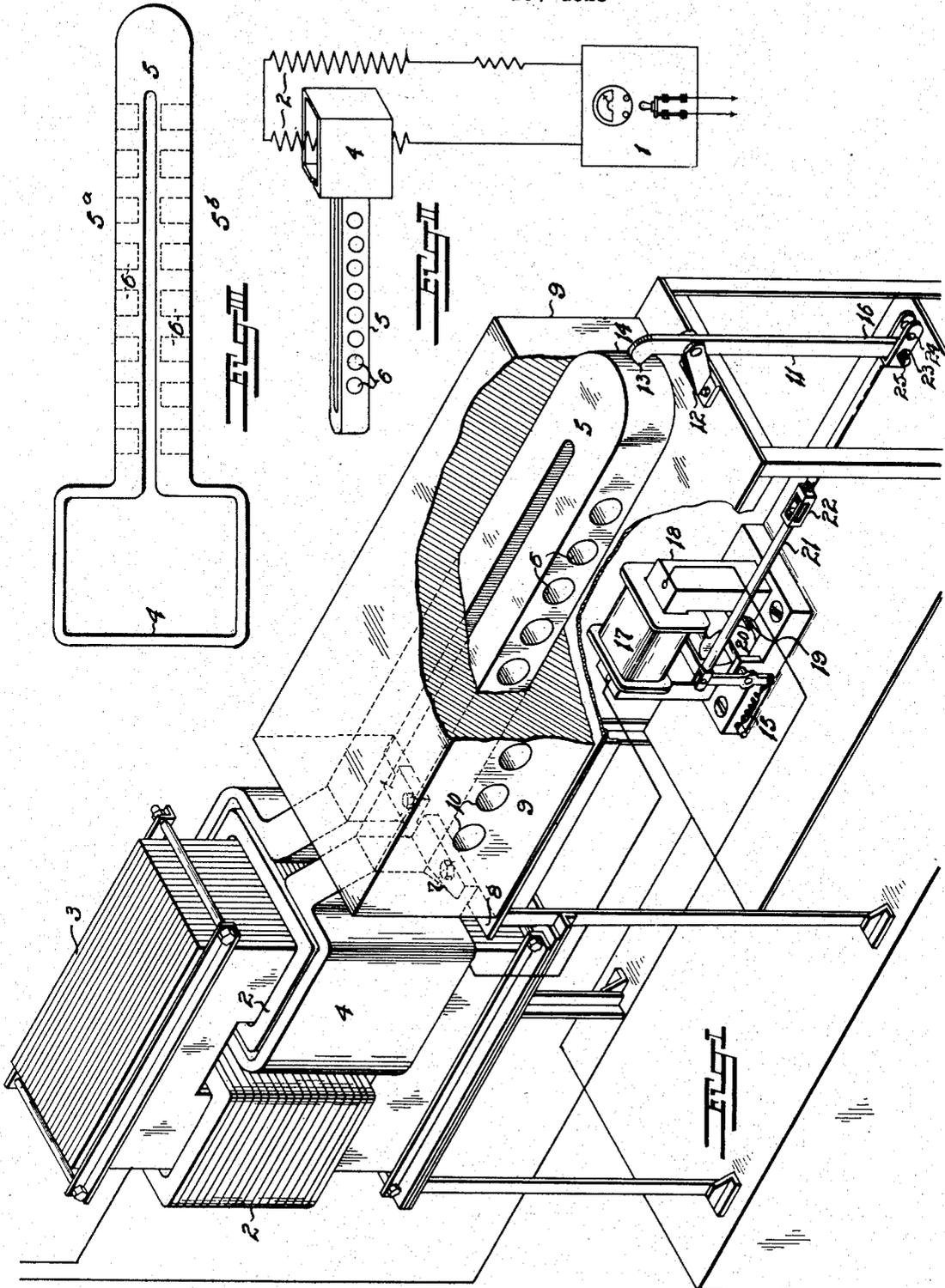
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W. ELSDON-DEW ET AL

HEATING ROCK DRILL BITS AND THE LIKE

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HEATING ROCK-DRILL BITS AND THE LIKE.

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To all whom it may concern:

Be it known that WILLIAM ELSDON-DEW and LESLIE PRYCE, British subjects, and LEON BYRON WOODWORTH, a citizen of
5 United States of America, residing at Corner House, Commissioner Street, Johannesburg, Transvaal Province, Union of South Africa, have invented new and useful Improvements in Heating Rock-Drill Bits and the like,
10 of which the following is a specification.

The present invention has reference to the heating of rock drill bits and the like in order that they may be forged or hardened.

The purpose of the invention is to permit
15 the drills to be brought up to a definite predetermined temperature with certainty and without danger of overheating, whilst obviating deterioration of the steel by exposure to heated gases; and to provide a
20 means of heating the drills which will not emit obnoxious fumes, and which may therefore be operated underground, thus obviating the necessity for transferring the drills to and from the surface for sharpening.

The invention is illustrated in the accompanying drawings in which—

Fig. I is a projected view of a drill heating furnace

Fig. II is the wiring diagram thereof.

30 Fig. III is a plan of a modified secondary element.

According to this invention the drills are heated by means of an induction furnace, that is an apparatus similar to an electric
35 transformer, but in which the secondary unit, forming the heated element, is constructed as a short circuit of low ohmic resistance and high inductance, and in which the primary winding is correspondingly
40 wound to suit these conditions.

Referring to the drawings, 1 indicates a switch board from which alternating electric current is led to the primary windings
45 2 of the furnace. The core is indicated by 3.

The secondary unit is shown as a single closed conductor 4, 5 in which a heavy alternating electric current is induced. That
50 part 4 of it which immediately surrounds the core is made of relatively large cross sectional area or otherwise to conduct the induced currents without being substantially heated; and it is advantageously made of flattened form as shown.

The part 5 which receives the drills has
55 a cross sectional area such as to cause it to be heated to the desired temperature by the induced current. This part is formed with a number of cells 6 for receiving the
60 drill ends. Said part 5 is preferably straight in order that the drills, which stand out at right angles to it, may be conveniently handled; and in the construction illustrated
it is of hair-pin form with two straight
65 legs, in each of which the cells 6 are provided.

The part 5 of the secondary is made massive enough to constitute a substantial reservoir of heat which can readily impart the
70 necessary quantity of heat to the drills without its own temperature being materially affected thereby and is of sufficiently robust construction to withstand rough usage.

The secondary is bolted at 7 to a supporting plate 8, from which however it is electrically insulated. Said plate 8 may also
75 carry a refractory enclosure 9 for the part 5 of the secondary. Said enclosure is designed to prevent undue radiation from the heated secondary, which would cause excessive
80 energy loss and discomfort to the attendant; but a reasonable amount of radiation can be allowed since it tends to effect the automatic regulation of the temperature of the
85 secondary. Holes 10 corresponding to the cells 6 are formed in the enclosure 9 for the reception of the drills.

The regulation of the temperature of the secondary unit may be effected in any suitable manner. A convenient method is by
90 controlling the current in the primary winding 2; and a thermostatic control of such current is illustrated. The extended portion 5 of the secondary, when heated lengthens as compared with the support 8.
95 A lever 11 is pivoted to the support at 12 and its point 13 touches the end 14 of the secondary, being held in contact therewith by a spring 15. The end 14 of the secondary
100 may be thickened to reduce the heating at this point. The movement of the free end 14 of the secondary is magnified at the lower end 16 of the lever and this magnified movement is utilized to operate an electrical device which regulates the primary
105 current.

The device shown consists of a choking coil 17 in series with the primary windings

2. Said coil is wound on a core 18 formed with an air gap 19 in which works a pivoted gap piece 20 of magnetic material. Said gap piece 20 is connected to the lower end 5 16 of the lever 11 by a link 21 fitted with an adjusting turn-buckle 22 so as to be angularly moved by the swinging movement of the lever. When the furnace is cold said gap piece 20 extends to a material extent transversely to the gap, leaving the latter open and causing the choking effect of the coil 17 to be a minimum. As the temperature of the secondary increases, the gap piece 20 comes more nearly horizontal, so closing 15 the gap and causing the primary current to be diminished by choking. This arrangement also permits a specially heavy initial current to be passed for rapidly bringing up the temperature to the working point.

20 Drills which are to be sharpened require to be heated to a higher temperature than those which are to be hardened, and the furnace may be adapted to be utilized for both these purposes.

25 In the Fig. I arrangement the link 21 is provided with two holes 23, 24 into either of which the pin 25, which connects it to the lever 11, may be inserted. This alters the position of the gap piece with relation to the moving end 14 of the secondary and so permits either the higher or lower temperature to be readily attained.

30 In the arrangement illustrated in Fig. III one leg 5^a of the extended portion of the secondary unit is made of less cross sectional area than the other leg 5^b. The leg 5^a accordingly attains a relatively high temperature and is used for heating drills which are to be forged; whilst the temperature of the 40 leg 5^b is lower and suitable for heating drills for hardening.

We claim:

45 1. An electric induction furnace comprising a core, a primary winding, and a short circuited secondary unit including a part of relatively high conductivity surrounding the core and a part of relatively low conductivity formed as a loop projecting away from the part which surrounds the core, such

second mentioned part being formed with 50 cells for receiving articles to be heated.

2. An electric induction furnace comprising a core, a primary winding, and a short circuited secondary unit including a part of relatively high conductivity surrounding the 55 core and a part of relatively low conductivity formed as a loop projecting away from the part which surrounds the core, such second mentioned part having a straight portion in which are formed cells for receiving 60 articles to be heated.

3. An electric induction furnace, a thermostat means operating in accordance with the temperature of the secondary unit for controlling the primary current, the secondary 65 unit forming a part of the thermostat.

4. In an electric induction furnace comprising a secondary unit expansible by heating, a primary current controller actuated by expansive movement of the secondary 70 and adjustments for varying the effect of secondary expansive movement on the primary current controller.

5. An electric induction furnace comprising a core, a primary winding, and a short 75 circuited secondary unit including a hair-pin shaped localized heating section of relatively low conductivity.

6. An electric induction furnace, comprising a core, a primary winding and a short 80 circuited secondary unit, and means actuated by expansion of the secondary for regulating the primary current.

7. An electric induction furnace comprising a core, a primary winding, and a short 85 circuited secondary unit, a relatively non-expansible support to which one point of the secondary is fixed, means distantly mounted on the support and contacting with an adjacent 90 point of the secondary to acquire movement from the expansion thereof, and means operated by such movement for regulating the primary current.

In testimony whereof we have signed our names to this specification.

WILLIAM ELSDON-DEW.

LESLIE PRYCE.

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