July 6, 1937. R. A. BEDFORD 2,086,114

QUENCHING BATH FOR HARDENING AND TEMPERING ROCK DRILLS

Filed July 16, 1936 3 Sheets-Sheet 1

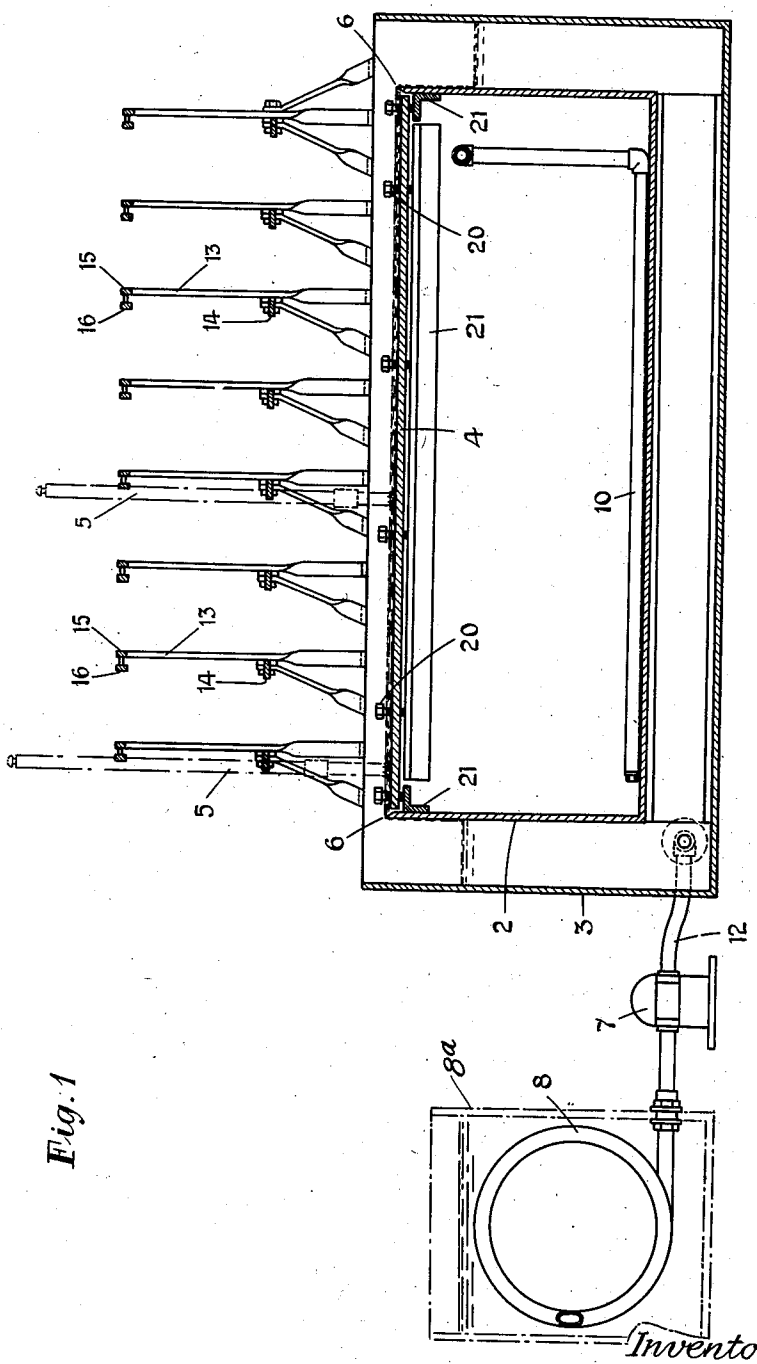


Fig. 1

Inventor:
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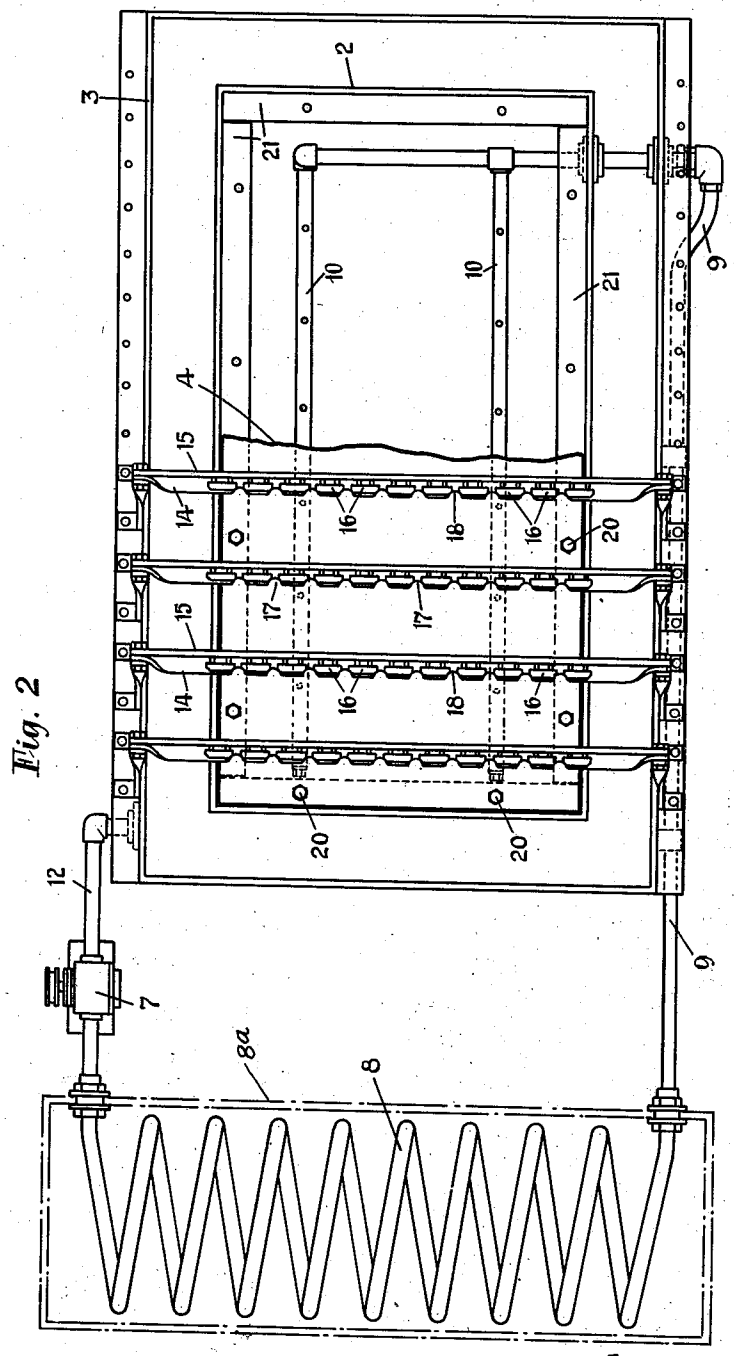


Fig. 2

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Fig. 3

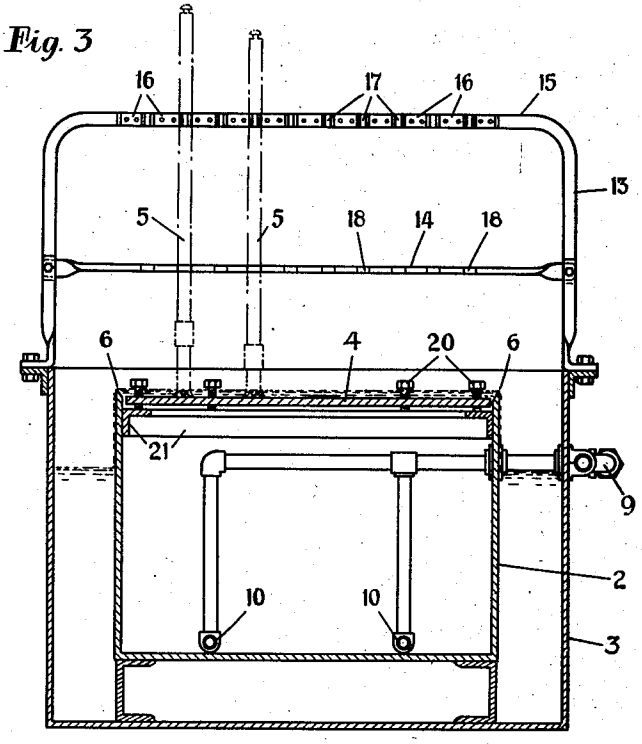


Fig. 4

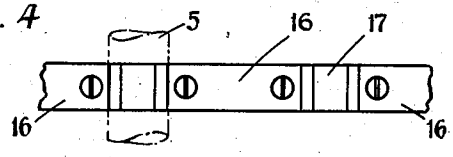
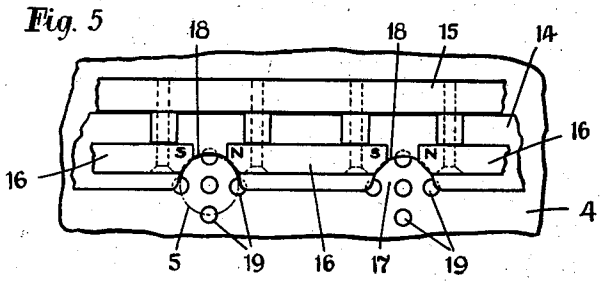


Fig. 5



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Patented July 6, 1937

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UNITED STATES PATENT OFFICE

2,086,114

QUENCHING BATH FOR HARDENING AND TEMPERING ROCK DRILLS

Reginald Asline Bedford, Stumperlowe, Sheffield, England

Application July 16, 1936, Serial No. 90,851
In the Union of South Africa March 9, 1936

5 Claims. (Cl. 266—6)

This invention relates to an improved quenching bath for hardening and tempering rock drills as used in mining and like operations and is particularly applicable to the use of oil as the quenching fluid although it is by no means limited to its use with this medium.

A known type of quenching bath for this purpose comprises a tank having a perforated removable false bottom for supporting the drills in their immersed positions, and having means for drawing off the surface liquid such as overflow outlet pipes connected adjacent the top edge thereof. Cold liquid is introduced into the bath at two or three points at or near the bottom and the supply is regulated. It is well known to those skilled in the art, that the correct temperature of the fluid in the quenching bath is a most important factor in securing the required degree of hardness in drill steel. The known type of quenching bath above referred to, owing to the uneven distribution of the quenching fluid, does not secure a uniform surface temperature. One of the main objects of the present invention is to provide a quenching bath in which a substantially uniform surface temperature can be maintained, with means for regulating this temperature to suit the particular class of drill steel being treated.

According to this invention the improved quenching bath for hardening and tempering rock drills comprises an inner quenching bath for containing quenching fluid located in an outer overflow container in spaced relation thereto, a perforated drill supporting plate removably supported in the bath and adapted to determine the extent of immersion of the drills in the bath, means for holding the drills, and means for withdrawing quenching fluid from the outer container and conveying it to the bath in a closed circuit including a pump and cooling means.

The holding means may include a plurality of permanent magnets adapted to magnetically hold the drills.

The quenching fluid, in circulating through the outer container and the inner bath, is conducted through a coil which is located exteriorly of the outer container and exposed to a cooling action.

Referring to the drawings filed therewith:—

Fig. 1 is a sectional elevation of one form of quenching bath made in accordance with this invention;

Fig. 2 is a plan of same, parts being omitted for clearness;

Fig. 3 is a sectional end elevation of Fig. 1;

Figs. 4 and 5 are detail views of the magnetic holding means for the drills.

2 is an inner container, constituting the quenching bath proper, which is disposed inside of an outer larger container 3. The inner container 2 is of substantial volume and is provided adjacent its top edge with a foraminous false bottom 4 for supporting the drills 5, which is adjustable as regards its distance below said top edge. The top edge of the inner container is in the form of a continuous dead level knife edge which forms a sill 6 across which the quenching fluid overflows into the outer container 3 after welling up through said false bottom, the inner container 2 being disposed in the middle of the outer container 3 so that it is spaced therefrom and is surrounded on all sides for a portion of its height, by the quenching fluid which overflows across the sill 6.

The quenching fluid circulates in a closed circuit including a pump 7 and a cooling coil 8 immersed in a tank of water, being delivered through pipe 9 to perforated distributing pipes 10 in the bottom of the inner container 2 and extracted from the outer container at a level below the level of the top knife edge of the inner container by means of the pipe 12. The pump 7 may be of the variable discharge type whereby to control the rapidity of the flow of the quenching fluid through the cooling coil 8 and thus to afford control over the temperature at which said fluid is maintained. The provision of the perforated distributing pipes 10 secures an even distribution of the entering cooled fluid over the whole area of the bottom of the inner container 2 and is an aid to maintaining the quenching fluid at a uniform temperature.

Fixed to the edge of the outer container 3 are a plurality of racks 13 for temporarily securing the drills in a vertical position. The racks comprise a lower horizontal notched member 14 and an upper horizontal member 15 vertically spaced therefrom which is provided with a plurality of permanent magnets 16 so disposed as magnetically to hold the drills in a vertical position during the quenching operation. As shown, the said magnets are spaced so as to provide locating notches 17 vertically in line with the notches 18 in the notched member 14.

The false bottom 4 is preferably a perforated metal plate with groups of perforations 19 (Fig. 5) arranged at the resting places of the ends of the drills 5 thereon and a convenient means for adjusting the plate as regards its level, resides in the provision of a plurality of set screws 20

engaging in screw-thread holes therein, and bearing against a plurality of fixed brackets 21 projecting from the inside of the inner container 2.

The provision of the inner container 2 being spaced from the outer container assists in maintaining the quenching fluid at a uniform temperature.

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

1. In a quenching bath for hardening and tempering rock drills, means for holding and immersing the drills in an inner container comprising a foraminous drill supporting plate removably and adjustably supported interiorly of said container upon projections thereon, an outer overflow container in spaced relation to said inner container, a plurality of racks secured in spaced relation to one another to said outer container and extending across and above the inner container, means on said racks for magnetically holding the drills in spaced relation to one another and a member secured to each of said racks having spaced locating notches for vertically positioning the drills.

2. In a quenching bath for hardening and tempering rock drills, means for holding and immersing the drills in an inner container comprising a foraminous drill supporting plate removably and adjustably supported interiorly of said container upon projections thereon, an outer overflow container in spaced relation to said inner container, a plurality of racks secured in spaced relation to one another to said outer container and extending across and above the inner container, means on said racks for magnetically holding the drills in spaced relation to one another, said means comprising a plurality of permanent magnets secured in horizontal alignment and spaced apart to provide a plurality of magnetized gaps for receiving the drills, a member secured to each of said racks having a plurality of horizontally spaced locating notches in vertical register with the magnetized gaps.

3. In a quenching bath for hardening and tempering rock drills, means for holding and immersing the drills in the bath comprising inner and outer stationary containers in spaced relation, means removably and adjustably carried interiorly of the inner container for supporting the drills, and cooperative magnetic and non-magnetic holding means for the drills on the outer container.

4. In a quenching bath for hardening and tempering rock drills, means for holding and immersing a drill in a container, comprising a drill supporting plate within said container, a rack extending across and above said container and a pair of coacting magnetic elements on said rack having spaced apart, substantially vertical surfaces adapted to grip therebetween the shank of a drill supported upon said supporting plate, whereby to hold such a drill in a substantially vertical position.

5. In a quenching bath for hardening and tempering rock drills, means for holding and immersing a drill in a container, according to claim 4, further characterized in that the drill supporting plate is adjustable vertically whereby to permit variation of the depth of immersion of a drill supported by said plate.

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