March 5, 1929. E. F. KENNEY ET AL 1,704,327

DEVICE FOR HEAT TREATMENT OF METALS

Filed April 14, 1927 2 Sheets-Sheet 1

Fig. 1.

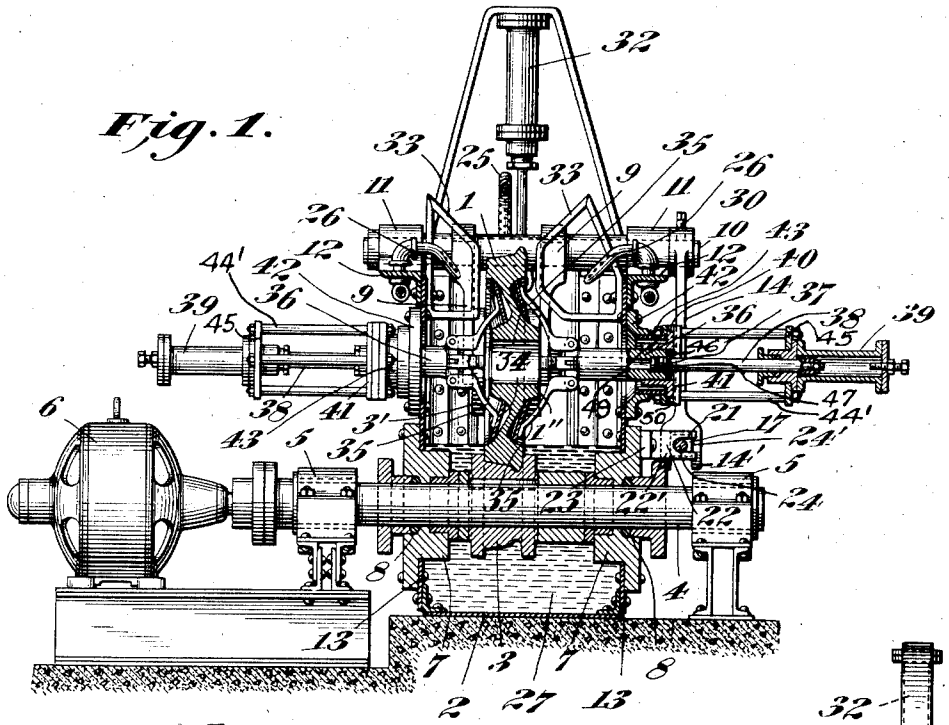
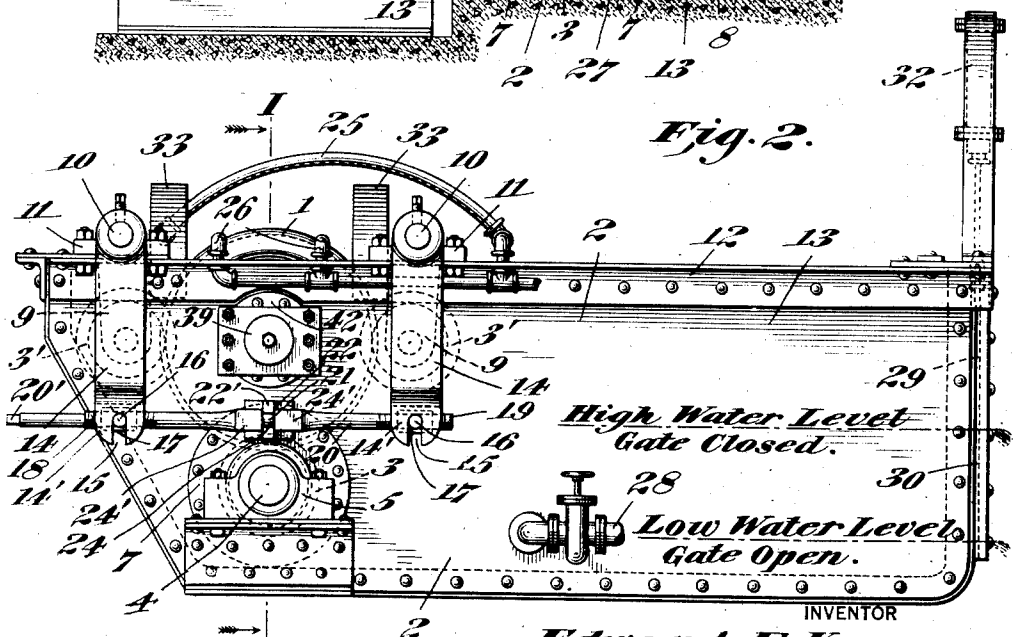


Fig. 2.



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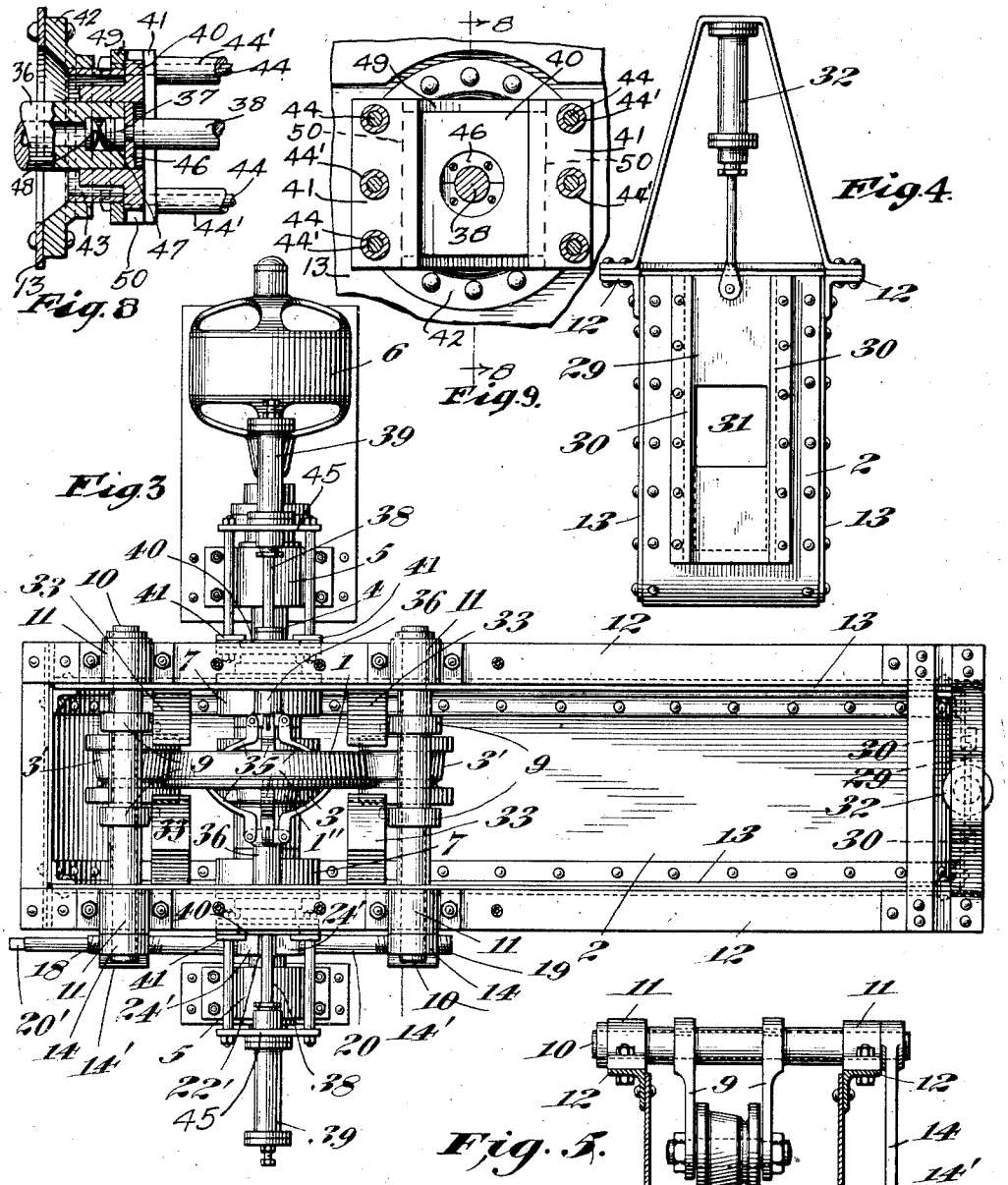


Fig. 8

Fig. 9.

Fig. 4.

Fig. 3

Fig. 5.

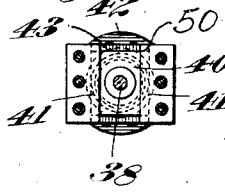


Fig. 6.

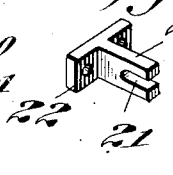


Fig. 7.

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UNITED STATES PATENT OFFICE.

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DEVICE FOR HEAT TREATMENT OF METALS.

Application filed April 14, 1927. Serial No. 183,819.

Our invention relates to a machine for quenching metals, as a step in processes for the heat treatment thereof. More particularly, it relates to an apparatus wherein metallic bodies having an irregular distribution of metal, are to be treated by rotating them in contact with cooling media.

A purpose of our invention is to provide structure whereby metallic solids of revolution, of varying sizes may be turned in contact with a cooling medium.

A further object is to provide supporting and guiding means for such solids, adjustable to different sizes thereof.

A still further, and important, object of this invention is to provide means for protecting portions of these solids from contact with the cooling medium, while the remaining portions thereof are being subjected thereto.

Our invention consists essentially of means for adjustably supporting solids of revolution and rotating them in contact with a cooling medium. It further consists in means whereby portions of such a solid can be shielded from contact with the cooling medium, such shielding means being easily moved into or out of operative engagement with the object being treated.

In the specific description following, a wheel is given as an example of an object to be treated, but it is obvious that the device is applicable to other solids of revolution as well.

It is well known that in quenching wheels, and similar objects of irregular conformation, undesirable stresses are frequently brought into play because of the unequal rate at which they cool. In the car wheel which is here given as an example, obviously there is such a large amount of metal in the hubs and rim portions, as compared with the web that if the wheel were to be subjected to the same treatment throughout the web would be cooled long before the remaining portions had been lowered in temperature to any substantial extent. Accordingly, in our invention we provide means whereby the portions from which it is desired to most rapidly remove heat, namely the rim portions, are subjected to a more rapid engagement with the cooling medium than the other parts. The hub portion, from which it is desired to abstract heat rapidly, but not so rapidly as the rim portions, are subjected to a lesser amount of the cooling fluid and the web is provided with protection from the cooling agent to delay cooling as much as is desirable or practicable.

These purposes we accomplish by rapidly rotating the wheel so that the rim portions pass through a bath of water, while simultaneously spraying portions of the rim and hub portions, and protecting the web with shielding members.

Referring to the accompanying drawings for description of a specific embodiment of our invention:

Fig. 1 is a transverse vertical section through the machine taken along the line I—I of Fig. 2;

Fig. 2 is a side elevation;

Fig. 3 is a plan view;

Fig. 4 is a view of the end of the tank, showing the gate;

Fig. 5 is a detail view of one of the supporting rollers and part of the structure for changing the position thereof;

Fig. 6 is an end view of certain details of the structure for operating the shield plates; and,

Fig. 7 is a perspective view of a detail of the centering lock.

Fig. 8 is a longitudinal section showing the connection between the actuating plunger and the spindle for operating the shield plates, this figure being on a larger scale than the showing of this structure in Fig. 1.

Fig. 9 is a view at right angles to that of Fig. 8 of the same structure, also being on an enlarged scale.

The wheel 1 to be treated is adapted to be supported and rotated in tank 2. This wheel is supported by rollers 3 and 3′, roller 3 being keyed to shaft 4, supported in bearings 5, and actuated by motor 6. This shaft is additionally supported by bearing structures 7, glands 8 being provided to secure against leakage along the shaft from the tank. Rollers 3 and 3′ are grooved to a shape appropriate to that of the shape of the rim of the wheel being treated.

Rollers 3′ are mounted, one to each side of the wheel, and are adapted together with roller 3 to support and guide it. They are carried by arms 9 keyed to shafts 10, which are rotatably mounted in bearings 11 on angles 12, bolted to side plates 13 of the tank.

At the end of shafts 10 are keyed arms 14 provided at their lower ends with slots 15 which engage trunnions 16 of the trunnion nuts 17. These trunnion nuts are seated in the space between ears 14′ of arms 14 and have threaded engagement, internally thereof, with the screw portions 18 and 19 of rod 20, these screw portions being right handed and left handed respectively. This adjusting rod is provided with a squared end 20′, adapted to be engaged by a wrench for turning. Half way between arms 14, this rod, at a reduced portion 24 thereof, is seated in slot 21 of the projecting portion 22′ of T member 22, fastened at 23 to the tank. Adjacent the reduced portion 24 are the squared portions 24′, forming shoulders which, abutting on opposite sides of the projection 22′, act to hold the rod from accidental displacement in either direction. Rollers 3′ can be adjusted in position to accommodate wheels of varying sizes and, by means of the centering lock just described, they are held firmly in any adjusted position.

A swinging spray pipe 25 is mounted so that water may be sprayed upon the outer portions of the wheel as it is being rotated. Spray nozzles 26 are positioned for spraying the more central portions of the wheel, particularly the hub 1″.

For rendering the abstraction of heat from the rim portions much more rapid than in the remaining parts, the wheel is adapted to be rotated so that the rim is continually immersed in bath 27 in the tank. Water is admitted through pipe 28 and gate 29 is provided at the end of the tank, sliding in guideways 30, for controlling the amount of liquid therein. The opening 31 in the gate is at such a height that when the gate is closed water will flow therefrom when a height of the bath suitable for treatment of the wheel rim has been reached. This gate may be operated by any appropriate means, as for example by fluid pressure acting in the cylinder 32.

Guides 33 are provided on each side, and somewhat above, the wheel for facilitating the placing of the wheel to be treated.

An important phase of our invention is the structure whereby the web of the wheel may be shielded from contact with the cooling medium. This consists essentially of an annular shielding ring 34, mounted upon the outer portions of spider 35, the inner portions of which are attached to spindle 36 which is rotatably connected with the end 37 of plunger 38. The shielding member is movable into and out of engagement with the wheel by means of plunger 38 actuated by fluid pressure in cylinder 39. This cylinder is supported on the frame as follows: The flanged annulus 42, secured to the frame, carries the sleeve 43; near the outer end of this sleeve is fixed the annular member 49, to which are secured the inner ends of bolts 44, the outer ends of these bolts passing through plate 45 which supports cylinder 39, bolts 44 passing through sleeves 44′ which serve to space members 49 and 45. End 37 of plunger 38 is provided with a constriction in which rotatively fits split ring 46 which is secured to the outer end of spindle 36, whereby longitudinal movement of the plunger gives a corresponding movement to the spindle.

End 37 of the plunger is provided with a rounded bearing head 47 which is adapted to rotatively engage the rounded bearing head 48 mounted within the end of spindle 36.

Spindle 36, during its longitudinal movement slides in the opening of the flanged annular member 40. This member 40 is prevented from longitudinal movement by means of members 41 which are secured to member 49 but are spaced therefrom to provide the guide-way 50, whereby member 40 has a limited lateral play.

The fluid actuated cylinder 39 is of course a partly conventional showing, it being obvious that in an actual structure there are provided the usual means for causing an actuating flow of fluid to and from the cylinder.

The operation and use of our device are more or less obvious. By means of a hoist, and aided by guides 33, the heated wheel is placed in position, rollers 3′ being adjusted by turning rod 20.

Next, the web shield is brought into position against the web by means of the plunger actuated by spindle 36 and spider 35. The motor is set in operation and roller 3, by frictional engagement therewith, rotates the wheel, the web shield also rotating therewith.

Water is admitted into the tank to a suitable height, determined by the opening 31 on gate 29. The rotation of the wheel continually brings the material of the rim portions into contact with the bath. In addition water may be sprayed upon the rim or periphery of the wheel and also upon the hub portions. The cooling of the web obviously is delayed because of it being shielded.

After the cooling of the wheel has been sufficiently completed the gate is raised to empty the tank, the motor stopped, and the web shield withdrawn from engagement with the wheel.

Obviously, for certain purposes the cooling of the rim may be effected by rotation thereof in the bath alone, or, in certain cases by the spraying alone, or again, it may be advantageous to cool partially by rotation of the wheel in the bath and then completing the cooling by means of the spray, the bath being lowered for this purpose by raising the gate.

Then, too, the device permits of shielding the web during a portion of the time of cooling of the other parts of the wheel, followed by a removal of a shielding member to per-

mit of the application of the cooling medium to the web, so as to effect a positive but delayed cooling thereof.

Having described our invention what we desire to claim is as follows:

1. In a device for cooling metal bodies of unequal conformation, rollers for supporting the metallic body to be treated, means operative through one of the supporting rollers to rotate the body, means for applying a cooling fluid to the rotating body, and means for shielding portions of the body during such application of cooling fluid.

2. In a device for cooling metal bodies of unequal conformation, means for rotating the body being treated, means for applying fluid to the rotating body, a shielding means for portions of the body, and means operable during the rotation of the body for applying the shielding member to the body or removing it therefrom.

3. In a device for cooling metal bodies, a tank adapted to contain a cooling liquid, means for rotating an object to be treated so that a portion of the object is continually immersed in the liquid, means for spraying cooling fluid on the rotating object, and means for applying a shielding member to the object and removing it therefrom.

4. In a device for cooling metal bodies, a tank adapted to contain cooling liquid, rollers in the tank for supporting and guiding the object to be treated, means operative through one of the rollers for rotating the object, additional means for applying cooling fluid to the rotating object, means for adjusting certain of the supporting rolls operative from the outside of the tank, so as to position them for objects of different sizes, and shielding means for portions of the object being treated, and means whereby the shielding means are brought into or out of engagement with the object during rotation thereof.

In testimony whereof I hereunto affix my signature.

EDWARD F. KENNEY.

In testimony whereof I hereunto affix my signature.

LOUIS H. WINKLER.