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QUENCHING APPARATUS.

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Fig. 1.

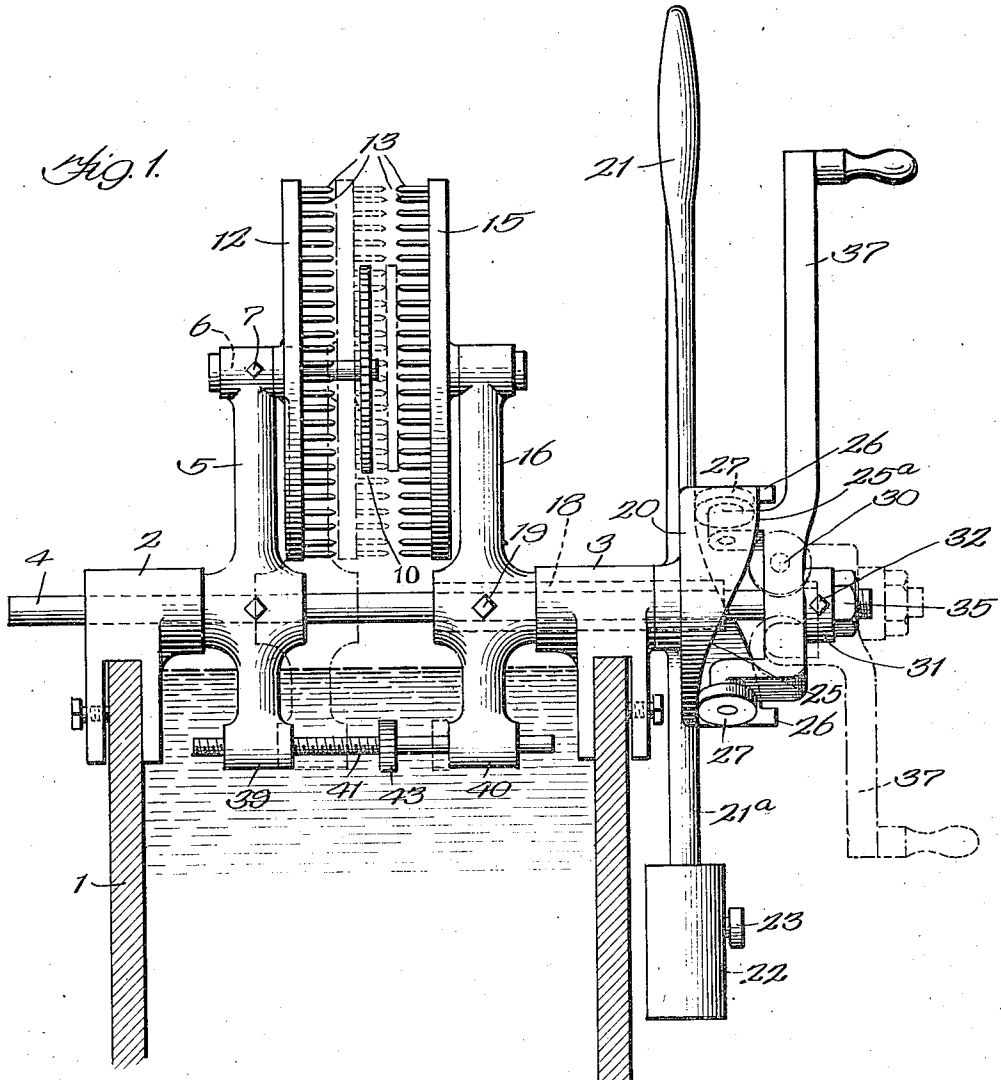
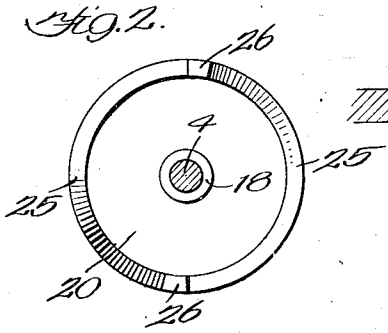



Fig. 2.




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# UNITED STATES PATENT OFFICE.

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## QUENCHING APPARATUS.

1,327,443. Specification of Letters Patent. Patented Jan. 6, 1920.

Application filed January 31, 1919. Serial No. 274,170.

*To all whom it may concern:*

Be it known that I, CARL G. OLSON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Quenching Apparatus, of which the following is a specification.

My invention relates to tempering or quenching apparatus and is especially applicable to the tempering of circular saws, disks, and similar thin and flat metallic articles. The general object of the invention is to provide apparatus for facilitating the quenching or immersing of articles of this kind in a tempering bath and at the same time holding them in such manner as to prevent warping. This general object is contributed to by the coöperation of a number of coöperating elements which will be readily understood from the following description taken in connection with the accompanying drawings in which—

Figure 1 is a front elevation of the complete machine, showing the tank in vertical section, and

Fig. 2 is an end view of the controlling cam looking toward the left in Fig. 1.

In the particular form shown in the drawing the bath 1 consists of a tank which contains the quenching or cooling liquid. This forms a support for two bearings 2, 3 in which the horizontal main shaft 4 is journaled. Rigidly fastened to the shaft adjacent to one of the bearings is an arm 5 the outer end of which carries a horizontally arranged pin 6 secured by a set-screw 7, or other suitable device. This pin projects inward toward the center of the machine and forms a support for the work 10. The pin also supports a disk 12 which may be ribbed on its inner surface, but in the present case is shown as being rather thickly studded with spikes 13.

In juxtaposition to the disk 12 is a similar disk 15 secured to the free end of an arm 16 which is practically a counterpart of the arm 5. Arm 16, however, is not fastened to shaft 3 but is fastened to a sleeve 18 by means of a set-screw 19 or otherwise. Disk 15 is studded with spikes 13 as is disk 12. Sleeve 18 is slidable on shaft 4 and is journaled in a bearing 3 here shown at the right side of Fig. 1. The hub of arm 16 abuts the inner end of bearing 3. A cam 20 is rigidly fastened to sleeve 18 in such a manner as to abut the outer end of bearing 3. It is provided with a handle 21 which normally stands upright and a rod $21^a$ which normally stands downright and supports the counter-weight 22. A set-screw 23 is provided for securing the counter-weight at the proper position on rod 21 to counter-balance the weight of the parts mounted upon shaft 4 and sleeve 18. The cam has two tracks 25, 25 which are duplicates of each other and arranged about 180° apart. They are separated by stops 26, 26. Rollers 27, 27 roll upon said tracks to produce a longitudinal movement of the shaft 4 and arm 5. Each cam has a dwell $25^a$ at the high end which renders the action self-locking. The movement of the rollers on the cam tracks is limited by the said stops 26. The rollers are journaled on the arms of a yoke 30, which is supported upon shaft 3 and is rotatable independently thereof. A collar 31 is fastened to the shaft by a set-screw 32 or otherwise and serves to hold the rollers in contact with the cam tracks. It is desirable to thread the outer end of shaft 4 and to screw a nut 35 upon it for coöperating with the set-screw to absorb the thrust of the yoke toward the outer end of the shaft while the rollers are in the act of climbing the cams or are in a holding position upon the dwells thereof. Yoke 30 is rotated by means of the hand-lever 37.

The arms 5, 16 extend in both directions from the shaft 4 and at the ends opposite to the disks 12, 15 are provided with hubs 39, 40. Hub 39 is internally threaded to take the threaded end of the guide and spacer rod 41. Hub 40 has a smooth bore which makes a sliding fit with the smooth right end of said rod. Rigidly fastened to the rod is a collar 43 which forms a stop adapted to abut the inner end of the hub 40 when the hub 39 moves toward it, as will occur during the clamping action of the disks 12, 15.

To operate, the saws or plates 10 are heated to the proper temperature for hardening and, with a pair of tongs, are placed between the spiked disks. Circular saws are usually apertured at the center and thus may be slipped over the end of the pin 6 to be supported thereby prior to the closing of the disks. The operator then grasps the cam lever 21 with one hand and with the

other rotates the yoke lever 37 about one-half revolution, causing the rollers 27 to climb the cams 25. By thus holding the lever 21 the operator prevents rotation of the sleeve 18, and consequently of the arm 16. The guide and spacer rod 41 prevent relative rotation of the arms 16, 5, and hence the latter is also prevented from rotating. The movement of the rollers on the cams draws the shaft 4 toward the right, which forces the arm 5 and disk 12 toward the right and causes the two sets of spikes to engage the work 10 between them. The disks are kept in alinement—that is directly opposite to each other—by the action of the rod 41 which slides in the hub 40 until the collar 43 engages it. The parts should be so adjusted that the collar 43 will engage the hub at the same time that the spikes close firmly upon the work. The result is that rod 41 prevents the reactive force of the spikes from bending shaft 4. After lever 37 has been revolved nearly half a revolution the rollers 27 reach the dwells $25^a$ of the cams, which portions lie in a plane perpendicular to the shaft. As soon as this position of the rollers upon the cams is reached the thrust of the rollers becomes normal to the surface of the cam and hence there is no tendency for the rollers to roll backward down the cams. The mechanism may now be said to be "locked" with the disks 12, 15 clamping the work between them, and the rollers in engagement with the stops 26. The operator now takes his hand off the lever 21 but continues to rotate lever 37 approximately another half revolution in the same direction, which causes the arms 5, 16 and their disks to revolve approximately one-half revolution, and bring the work down into the bath. After the work has been tempered the operator rotates the lever 37 a half revolution until the cam lever 21 again stands upright. He then grasps the latter with his left hand and with his right pulls the lever 37 toward him to permit the rollers 27 to ride down on the cams 25 and unclamp the spikes from the work. The mechanism is then in condition to permit the operation to be repeated.

From the above description it will be noted that this machine is capable of exerting great force upon the work to hold it perfectly flat while it is being immersed in the cooling liquid. The pressure is generated through the medium of cams and hence by employing levers 21 and 37 of reasonable length a very strong clamping effect may be produced. As the parts are simple in form they may be made of rugged proportions. The reaction of the clamps on the work is neutralized so far as the bending strains of the arms 5, 16 on the shaft are concerned by the spacer rod 41, thus making it possible to employ a main shaft of comparatively small diameter. The manipulation is simple because the yoke lever 37 moves continuously in the same direction both for the clamping action and for the dipping action. The operator is not called upon to exercise any judgment as to when the clamps are set because all he has to do is to rotate lever 37 until the rollers engage the stops 26, after which the continued movement of the lever will necessarily cause the cam and the clamping parts to rotate in unison in a direction to bring the work into the bath.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:—

1. A tempering machine having a bath, two oppositely placed arms adapted to move toward and from each other for engaging and releasing the work, said arms being rotatable in unison about a horizontal axis for dipping the work into the bath, and cam mechanism having two coöperating parts rotatable about an axis coincident with the produced axis of the arms for moving the latter toward and from each other.

2. A tempering machine having a bath, two arms movable toward and from each other for engaging and releasing the work, said arms being adapted to rotate about a horizontal axis for immersing the work, one of the arms having a cam and the other having a part traveling upon said cam for drawing the two arms toward each other, the cam itself also being movable, and means for causing the traveling part to engage the cam after said traveling part has completed a predetermined portion of its travel to thereafter move the cam for causing its arm to rotate for the purpose of immersing the work.

3. A tempering machine having a bath, two arms movable toward and from each other for engaging and releasing the work, said arms being adapted to rotate about a horizontal axis for immersing the work, one of the arms having a cam and the other part having a traveling part traveling upon said cam for drawing the two arms toward each other, both the cam and the traveling part being rotatable relatively to each other and also rotatable absolutely, and means for causing the traveling part to engage the cam after said traveling part has completed a predetermined portion of its travel to thereafter rotate the cam for causing its arm to rotate for the purpose of immersing the work.

4. A tempering machine having a bath, two arms movable toward and from each other for engaging and releasing the work, said arms being adapted to rotate about a horizontal axis for immersing the work, a cam rigidly fastened to the first of said arms, a rotatable handle having a part traveling upon said cam, a shaft connected to the han-

dle for drawing the second arm toward the first when the handle is rotated relatively to the cam, the handle and the second arm being rotatable independently of each other, and the handle being adapted to "pick up" the cam after rotating through a predetermined angle and thereafter rotate the cam, and means for causing the two arms to rotate always in unison.

5. A structure as specified in claim 4 in which the last mentioned means is in the form of a guide-rod adapted to keep the arms always in alinement and at the same time permit them to move toward and from each other.

6. A tempering machine having a bath, a horizontal shaft located above the bath, an arm rigidly fastened to said shaft, a sleeve mounted on said shaft and making a running fit therewith, an arm rigidly fastened to the sleeve, and cam mechanism one part of which is rigidly fastened to the sleeve and the other part is connected to the shaft, whereby a relative rotation of said parts of the cam produces a shifting movement of the shaft in the sleeve and hence draws the arms toward each other for causing them to clamp the work between them.

7. A tempering machine having a bath, two arms movable toward and from each other for engaging and releasing the work, said arms being adapted to rotate about a horizontal axis for immersing the work, a handle, a cam device including two elements which are rotatable both absolutely and relatively to each other, said handle being adapted to rotate one of said parts relatively to the other to thereby cause the arms to approach each other to clamp the work between them and the continued rotation of the handle thereafter causes the two parts of the cam to rotate in unison to thereby revolve the arms in unison to immerse the work in a bath, and a spacer for limiting the approach of said arms toward each other.

8. A tempering machine having a bath, two arms movable toward and from each other for engaging and releasing the work, a horizontal shaft for supporting said arms, said shaft being adapted to draw the first of said arms toward the second one, a rotatable sleeve fitting loosely upon the shaft and being rigidly secured to the second arm, a cam rigidly fastened to the sleeve, a handle rotatable independently of said arms, said handle having a part adapted to travel upon the cam for causing the shaft to shift the first arm toward the second arm when the handle is rotated, and a stop upon the cam adapted to be engaged by the handle after the handle has rotated through a predetermined angle, whereby additional rotary movement of the handle will produce a rotary movement of the cam, and means for maintaining the arms in alinement with each other.

9. A structure as specified in claim 8 in which a second handle is provided for preventing premature rotation of the cam.

10. A structure as specified in claim 8 in which the arms extend in both directions from the shaft, and at the ends opposite to the work are provided with a spacer for the purpose described.

11. A machine for tempering substantially flat pieces of metal, said machine having a bath, two work holding members arranged in parallel vertical planes, said members being studded with spikes extending horizontally toward each other for making point contact during the dipping operation, a main shaft arranged horizontally, arms adapted to rotate about said shaft, the work holding members being carried at the free end of said arms, means for rotating said arms to bring the work into and out of the bath, and means for locking the two sets of spikes in engagement with the work.

In witness whereof I have hereunto subscribed my name.

CARL G. OLSON.