April 5, 1932. E. W. PIERCE 1,852,625

TEMPERING DEVICE

Filed April 2, 1930

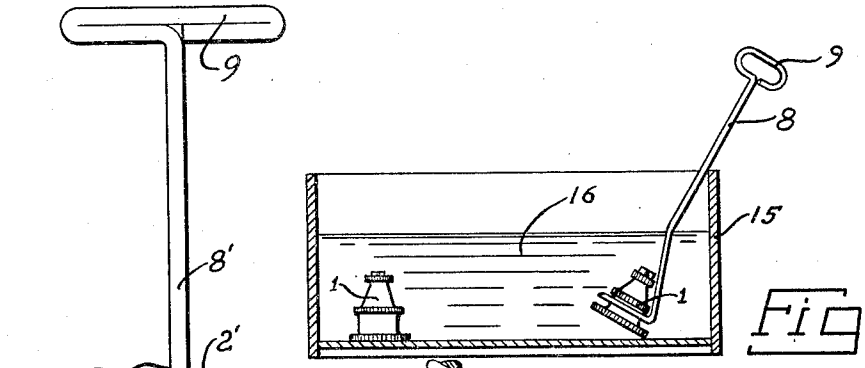

Fig. 2.

Fig. 3.

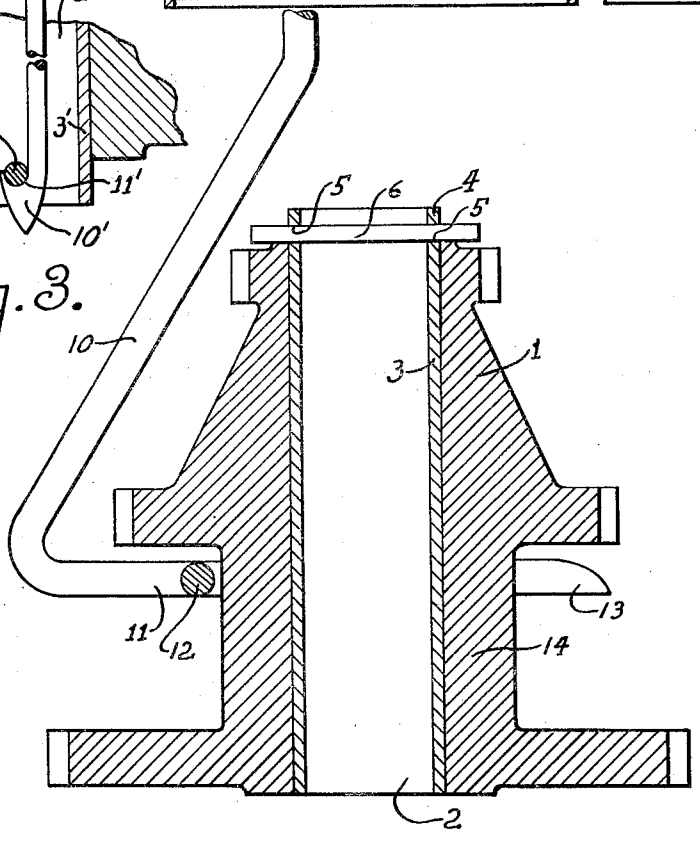

Fig. 1.

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TEMPERING DEVICE

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This invention relates to an improved method and means for tempering articles, particularly those of tubular shape, such as gear clusters.

The main objects of this invention are to provide an improved means for controlling the heat treatment of hollow articles; to provide means of this kind which are adapted to be conveniently applied to an article before the heating stage of the heat treatment so as to retard the cooling, contraction and accompanying hardening of predetermined parts of the article during the quenching stage; to provide means in a device of this kind for detachably connecting a handle to the articles by which they may be conveniently transferred during the heat treatment; and to provide an improved shield for preventing the inner surface of a cluster gear from cooling at the same rate as the outer surface thereof so as to obviate distortion of the gear and the creation of internal stresses.

An illustrative embodiment of my invention is shown in the accompanying drawings, in which:

Fig. 1 is a vertical section of a cluster gear embodying my invention.

Fig. 2 is a section of a tempering bath showing a cluster gear protected internally from the quenching liquid and a handle by which the gear may be manipulated.

Fig. 3 is a fragmentary section illustrating a further development of my invention.

In the form shown, the cluster gear 1 has a central tubular passage 2 in which a metal sleeve 3 is inserted. The sleeve preferably consists of a nickel and chromium alloy such as nichrome. The upper end 4 of the metal sleeve 3 projects beyond the corresponding end of the cluster gear 1 and is provided with a pair of registering diametrically opposite apertures 5 through which a pin 6 extends. The sleeve 3 has a loosely fitting engagement with the inner periphery of the cluster gear 1 and the pin 6 is seated against the upper extremity 7 of the cluster gear so as to prevent downward movement of the sleeve 3 in the passage 2.

A handle 8 which has a loop 9 at its upper end and a lower, angularly offset portion 10 terminating in a forked extremity 11 substantially normal to the length of the handle 8, is provided for placing the cluster gear 1 in a quenching bath and removing the same therefrom. The forked extremity 11 of the handle includes prongs 12 and 13 which are spaced sufficiently to embrace the hub part 14 of the cluster gear 1.

During the heat treating operation, the cluster gear and sleeve 3 are placed in a furnace and heated to a desired temperature. The handle 8 is then inserted into the furnace and maneuvered until the forked end 11 is engaged around a hub part 14 of a cluster gear. With the handle in this position, as shown in Figs. 1 and 2, the forked extremity 11 abuts the face of one of the gears of the cluster which may then be conveniently removed from a heating atmosphere and transferred to a quenching bath or tank in which oil 16 or other quenching liquid is contained. The handle 8 extends above the level of the liquid in the bath and may be rested upon the side wall of the tank 15 as shown in Fig. 2.

In the form shown in Fig. 3, the cluster gear represented at 1′ has a tubular passage 2′ in which a sleeve 3′ is inserted. The lower end 4′ of the metal sleeve 3′ projects beyond the corresponding end of the cluster gear 1′ and is provided with a pin 6′ which extends diametrically across the interior of the sleeve 3′, the end portions of the pin 6′ extending beyond the outer side of the sleeve 3′ and engaging the lower end of the gear cluster.

Extending axially through the sleeve 3′ is a handle 8′ having a loop 9′ at one end and an enlargement 10′ at the other end having inclined, converging side edges. Formed in the enlargement 10′ is a notch 11′ in which the pin 6′ is inserted.

The handle 8′ can be detachably connected to the pin 6′ by inserting it through the sleeve 3′ and maneuvering it until the pin 6′ becomes seated in the notch 11′.

When the heated cluster gear is submerged in the quenching liquid the outer periphery of the gear is directly exposed to the cooling action of the liquid and as a result the material of the gear which is in close proximity to the outer periphery is cooled, contracted and hardened rapidly. The sleeve 3 serves as a shield to prevent direct contact of the quenching liquid with the inner periphery of the cluster gear. This causes the metal adjacent the inner periphery of the gear to cool and harden at a slower rate than the material at the outer portions of the gear.

In this manner, the outer periphery of the article is cooled, hardened and contracted rapidly and the inner periphery thereof is not allowed to cool and contract excessively in advance of the intermediate part. Distortion, growth and the creation of internal stresses is obviated in this way.

When the temperature of the device has decreased substantially to atmospheric temperature, it may be conveniently removed from the quenching bath by the handle 8 which may then be disconnected from the cluster and employed in the treating of another article. The sleeve is then removed from the cluster gear 1 and may be employed in another gear.

Although but two specific embodiments of this invention have herein been shown and described, it will be understood that various changes including the size, shape and arrangement of parts may be made without departing from the spirit of my invention and it is not my invention to limit its scope other than by the terms of the appended claims.

I claim:

1. A shield for protecting the inner surface of hollow articles from a quenching bath comprising a tubular member having an outer periphery conforming in shape with the contour of the interior of said hollow article extending substantially the entire length thereof and adapted to loosely fit within said hollow article, and means for preventing the passage of said shield through said article in one direction.

2. A sleeve for protecting the inner surface of a tubular article from a quenching bath comprising a tubular member, and means extending transversely through one end of said member and seated against the adjacent end of said article, to prevent separation of said sleeve and article when the latter is lifted.

3. A shield for protecting the inner periphery of a cluster gear from a quenching liquid comprising a tubular member, a pin extending transversely of said tubular member for preventing separation of said sleeve and gear, and a handle detachably embracing said pin at one end and extending outwardly through said sleeve.

4. For use within a cluster gear, a sleeve for protecting the inner periphery thereof from a quenching liquid, one end of said sleeve protruding from the corresponding end of said gear, a pin extending transversely of said sleeve at said protruding end and seated against said gear, and a handle having a notch therein and extending axially of said sleeve, said pin being receivable in said notch.

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