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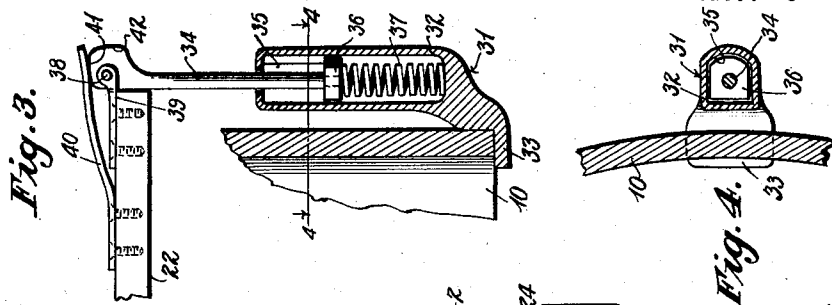
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METHOD AND APPARATUS FOR HARDENING BRAKE DRUMS AND THE LIKE

Filed July 22, 1925

2 Sheets-Sheet 1



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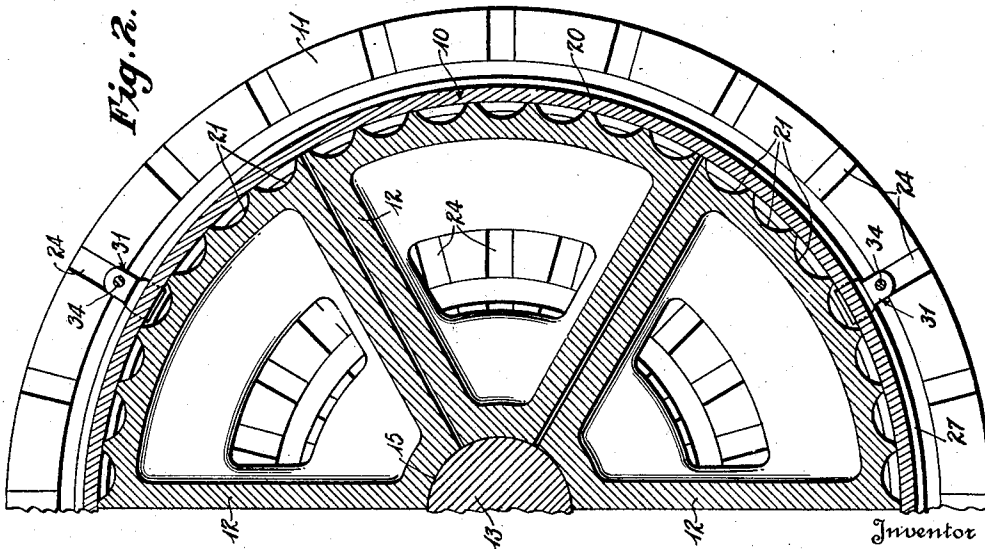
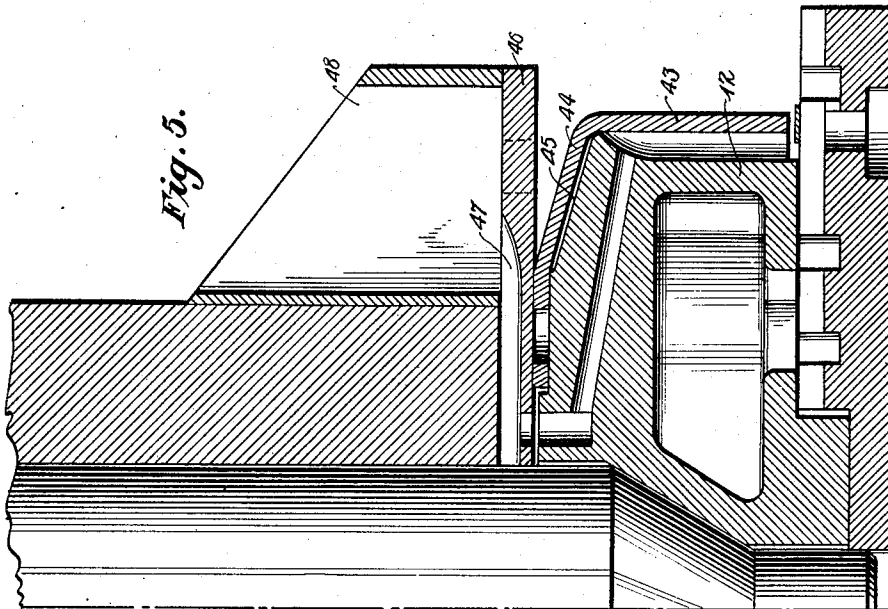
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UNITED STATES PATENT OFFICE.

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METHOD AND APPARATUS FOR HARDENING BRAKE DRUMS AND THE LIKE.

Application filed July 22, 1925. Serial No. 45,372.

This invention relates to a method and apparatus for hardening brake drums and the like.

The invention finds particular utility in connection with brake drums formed of pressed steel which during manufacture are made from metal which has first been rolled into sheets and then pressed into drums. The inherent resiliency of the metal creates a tendency when thus distorted, to spring back into its original shape so that brake drums formed of pressed steel do not accurately retain their shape with the result that they are inefficient in operation and as regards durability. It is furthermore essential that relatively hard bearing surfaces be provided on the brake drum to prevent the formation by wear, of particles of metal from the drum, which charge or become lodged in the fabric of the brake band, as such particles cause a rapid wearing out and deterioration of the drum.

These aforementioned objections are overcome by forming the brake drum of a steel having a sufficiently high percentage of carbon to enable the same to be hardened and during the manufacture of the brake drum to heat the same and shape it on dies and to then uniformly chill the drum to harden it particularly at its wearing surfaces while holding it on a die to prevent distortion from irregular shrinkage. The invention also contemplates protection to the web during quenching whereby the same may retain its toughness and its ability to resist shocks.

An object of the present invention is to provide a method and apparatus for uniformly chilling the brake drum to harden the bearing surfaces thereof while protecting the web and for retaining the drum during this hardening process in the shape previously imparted thereto.

The invention also has among its objects to simplify, render more efficient, and improve generally methods and apparatus of this character, and these, as well as other objects, advantages, features of construction, and novel steps in the method will be made more apparent as this description proceeds, especially when considered in connection with the accompanying drawings wherein

Figure 1 is a central vertical sectional view through an apparatus constructed in accordance with this invention,

Fig. 2 is a fragmentary horizontal sectional view taken substantially on the plane indicated by the line 2—2 in Figure 1,

Fig. 3 is a fragmentary sectional view showing the details of construction,

Fig. 4 is a detailed sectional view taken substantially on the plane indicated by the line 4—4 in Fig. 3, and

Fig. 5 is a fragmentary vertical sectional view showing a modified form of construction.

In practice the brake drum is formed preferably of steel of a high carbon content which is first rolled into sheets, heated and pressed into drums such as shown in Fig. 1, having the desired shape and dimensions. In order to harden the steel so that it will retain the shape previously imparted thereto, and to produce sufficiently hardened surfaces to withstand the strains imparted thereto during use, I provide the following apparatus which receives the previously shaped heated drum during the quenching or chilling and hardening operation.

This apparatus consists essentially of a base or bed plate 11 upon which is mounted a plurality of segmental die or form members 12 arranged radially to a centrally disposed ram 13. The segmental die members 12 are radially displaceable by the ram 13, this adjustment or displacement of the segmental members 12 resulting from the engagement of the tapered portion 14 of the ram with the cam surface 15 formed on each segmental member 12. Consequently during the downward movement of the ram the segmental members 12 move outwardly and assume a position in which their outside diameter is coincident with the desired inside diameter of the brake drum.

Each segmental die member is formed with a recessed or cutaway portion 18, which together form substantially a circumferential recess adapted to receive the web portion 19 of the brake drum 10. The drum portion 20 of the brake drum lies adjacent to and is engaged by the outer face of each die segment 12, these faces being provided with a plurality of vertically extending grooves or scallops 21 for a purpose to be more fully hereinafter referred to. Secured to the ram 13 is a cap plate 22, which in the lowered position of the ram, engages the upper face of the web 19 of the brake drum

and securely clamps the brake drum, holding the same in the circumferential recess 18 and against the segmental die members 12. A fixed relationship exists between the cap plate 22 and the tapered portion 14 of the ram so that when the web 19 of the drum has been gripped by the cap plate 22 the segments 12 will be expanded to the proper diameter.

The chilling or quenching fluid flows or issues upwardly through bed plate 11 through a plurality of openings 23 which communicate with a plurality of radially arranged grooves or channels 24. These grooves or channels 24 extend outwardly past the outer periphery of the brake drum where a circumferential plate 27 may be arranged beneath the outer peripheral edge of the drum to constitute a baffle or interceptor. The stream of chilling or quenching fluid divides at the baffle plate 27, part flowing upwardly against the outer surface of the brake drum and part through the channels or grooves 21 formed in the die segments 12, thus engaging the inner surface of the drum portion 20 of the brake drum, and then through apertures 28 to grooves 29, through apertures 30 in cap plate 22 and out through passages in the head of the upper die.

While the baffle plate 27 has been described as an element of this apparatus it may be eliminated if desired. However this baffle plate protects the edge of the drum from the sudden shock of the quenching medium whereby a uniform cooling of the drum is assured and the possibility of warpage due to uneven cooling eliminated.

The web portion 19 of the drum is clamped between the cap plate 22 and the recessed portions 18 of the segments 12 and is consequently protected from the quenching medium so that it will not be hardened to the same extent as the bearing surfaces of the part 20 of the drum and will therefore be relatively tougher.

The upper head indicated generally at 25, serves as a support for the cap plate 22 and these parts together with the ram 13 move as a unit and comprise the upper part of the die. After the heated brake drum 10 has been placed loosely upon the lower die part comprising the segments 12 and plate 11, the upper die part is moved toward the lower die part to expand the segments and grip the drum in the aforesaid manner. The upper and lower dies now descend together into the quenching medium causing the quenching medium to issue in streams through the apertures 23 as also above described. During this descent both die parts as well as the drum are completely submerged in the quenching medium and are allowed to remain stationary for a period of time sufficient to permit the drum to fully cool. The die parts then ascend together

until the lower die part reaches a point adjacent the top of the quenching tank (not shown) whereupon the upper die continues thus separating the die parts. The relative movement of the upper die part disengages the tapered part 14 of the ram from the segments allowing these segments to free themselves from the drum whereupon the strippers, about to be described, function.

For removing the chilled drum from the die members or form I provide a plurality, preferably three, of strippers 31 secured to the cap plate 22. Each stripper consists essentially of a hollow member 32 having a hooked portion 33 adapted to engage under the edge of the drum. A second member 34 projects into the hollow portion 35 of member 32 and is provided with a head 36 having an irregular shape substantially similar to the cross-sectional shape of the hollow portion 35 whereby relative rotative movement between the two stripper parts is prevented. A spring 37 extends between head 36 and the lower end of recess 35 whereby the stripper is both extensible and compressible.

One of the strippers is hinged by pivotally connecting the member 34 thereof as at 38 to a hinge part 39 secured to cap plate 22. A spring 40 also secured to the cap plate extends over and bears against a flattened portion 41 formed on the upper end of stripper part 34. Owing to the arrangement of pivot 38 spring 40 tends normally to swing the stripper inwardly toward the brake drum whereby the hook portion 33 will engage thereunder. However, when cap plate 22 has been raised and brake drum 10 stripped from the die segments 12 the drum may be removed by swinging this hinged stripper upwardly to a substantially horizontal position, the stripper being retained in this position by the engagement of the spring 40 with the flat face 42 of the stripper. Since all of the strippers are of the same length and are equally spaced circumferentially of the drum, the drum may be vertically lifted without appreciable tilting and binding. The springs 37 also permit an initial extension of the strippers sufficient to insure a freeing of the drum by the die segments prior to the stripping operation.

In Fig. 5 a slightly modified form of apparatus is illustrated, the construction being altered for the accommodation of a slightly different shaped brake drum 43 which is shaped to provide an intermediate inclined portion 44. Consequently the guide segments 12 have an inclined surface 45 arranged to lie adjacent to but slightly spaced from the inclined portion 44 of the drum. In this form of apparatus the cap plate 46 is formed with grooves 47 for conducting the quenching fluid to an outer walled portion 48 of the cap plate. In all other respects the modified form of apparatus shown

in Fig. 5 is substantially identical with the form previously described.

While the invention has been described and illustrated herein somewhat in detail it will be immediately apparent that various modifications may be resorted to without departing from the spirit and scope of the invention and to this end reservation is made to make such changes as may come within the purview of the accompanying claims.

What I claim as my invention is:

1. In a method of hardening brake drums, the steps consisting of, supporting the heated previously shaped drum upon a die member preventing shrinkage of said brake drum beyond the desired diameter while maintaining the outer periphery free from contact, and simultaneously chilling both sides of the drum member to insure uniform shrinkage.

2. In an apparatus for treating brake drums, an adjustable die adapted to loosely receive a heated brake drum, means for adjusting said die to the desired inside diameter of the drum portion of the brake drum, means for clamping the web portion of the brake drum upon said die and means for substantially simultaneously supplying a quenching fluid to both sides of said drum portion to cause the same to uniformly shrink into engagement with said adjusted die.

3. In an apparatus of the class described, a die comprising a plurality of adjustable segments, means for adjusting said segments, means for clamping a brake drum to be hardened by its web portion to said die, and means for supplying a quenching fluid to the drum portion only of said brake drum.

4. In an apparatus of the class described, a die formed of a plurality of hollow channeled segments, means for adjusting said segments radially, means carried by said adjusting means for clamping a drum in place on said die, and means for directing a quenching fluid through said segments and into engagement with said drum for chilling the same.

5. In an apparatus for hardening brake drums and the like, a shape retaining die adapted to receive a drum to be chilled, means for adjusting said die, means for directing a quenching fluid into engagement with said drum, and means for initially deflecting said fluid away from the outer free edge of the drum.

6. In an apparatus for hardening brake drums and the like, a holding die adapted to receive a drum to be hardened, clamping means therefor, and strippers mounted for movement relative to the die, for engaging said drum.

7. In an apparatus of the class described, an adjustable holding die adapted to receive

a brake drum to be chilled, reciprocable means for adjusting said die and for clamping said drum in place, and strippers carried by said means, and mounted for engagement with said drum for removing the same from said die.

8. In an apparatus of the class described, an adjustable holding die adapted to receive a brake drum to be chilled, reciprocable means for adjusting said die, and for clamping said drum in place, strippers, a hinge connection between a stripper and said reciprocable means, and a spring member associated therewith for holding said stripper in operative or inoperative position.

9. In an apparatus of the class described, an adjustable holding die adapted to receive a brake drum to be chilled, reciprocable means for adjusting said die, and for clamping said drum in place, and strippers carried by said means, and mounted for engagement with said drum for removing the same from said die, said strippers each comprising a pair of resiliently connected sections.

10. An apparatus for treating brake drums comprising, a die, means engaging the web portion of the brake drum for holding the same upon said die and for protecting the same and means for chilling the drum portion of the brake drum by a quenching fluid to harden the same.

11. In an apparatus of the class described, a die formed of a plurality of channeled segments, adjusting means for said segments, means for clamping a brake drum upon said die and means for directing a quenching fluid through said channels into engagement with said drum for chilling the same.

12. In an apparatus of the class described a die formed of a plurality of segments provided with channels on their outer periphery, means for adjusting said segments and for clamping a brake drum upon said die and means for directing a quenching fluid through said channels into engagement with said drum for chilling the same.

13. An apparatus of the class described comprising, a shape retaining die adapted to receive a brake drum to be chilled, means for directing a quenching fluid into engagement with said drum and means for initially deflecting said fluid away from the outer free edge of the drum.

14. An apparatus of the class described comprising, a shape retaining die adapted to receive a brake drum to be chilled, means for directing a quenching fluid substantially simultaneously into engagement with both sides of said drum and a baffle for initially deflecting said fluid away from the outer free edge of said drum.

In testimony whereof I affix my signature.

WALTER G. HILDORF.