

J. M. HANSEN.
METHOD OF REWORKING WORN CAR AXLES.
APPLICATION FILED JUNE 13, 1908.

940,805.

Patented Nov. 23, 1909.

FIG. 1

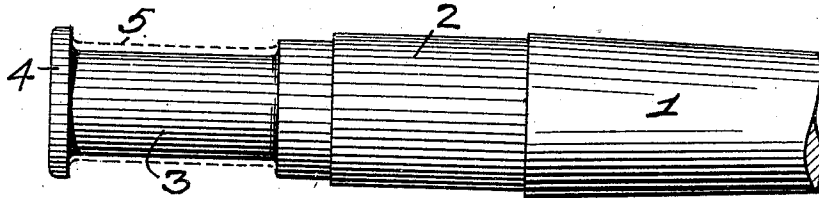


FIG. 2

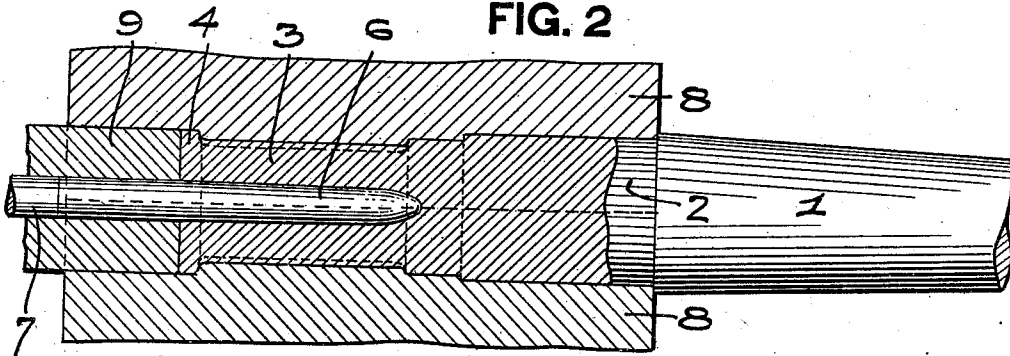


FIG. 3

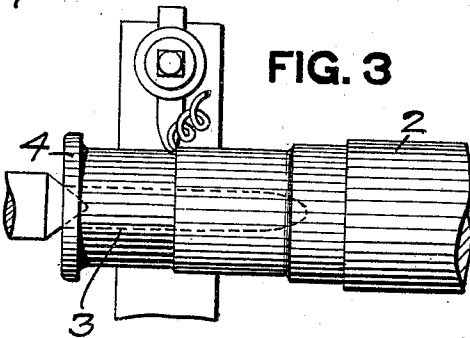


FIG. 4

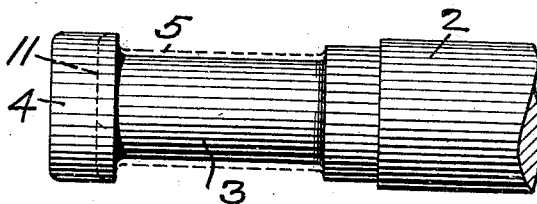
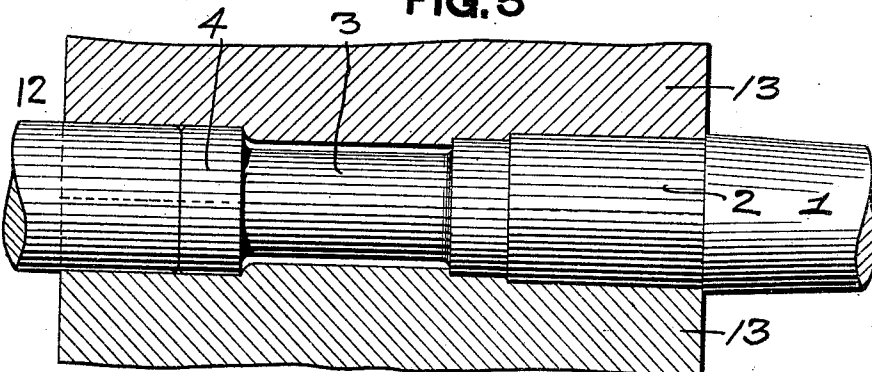


FIG. 5



WITNESSES.

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METHOD OF REWORKING WORN CAR-AXLES.

940,805.

Specification of Letters Patent.

Patented Nov. 23, 1909.

Application filed June 13, 1908. Serial No. 438,419.

To all whom it may concern:

Be it known that I, JOHN M. HANSEN, a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Methods of Reworking Worn Car-Axles; and I do hereby declare the following to be a full, clear, and exact description thereof.

This invention relates to a method of reworking or utilizing worn-out car axles.

Railroad car axles are subjected to severe wear on the journal portions. The practice is to discard such axles when the journal portions have worn down about $\frac{1}{8}$ of an inch, it being then considered that the axle is no longer safe, and also that its reduced diameter entails excessive wear on the journal bearings and is also objectionable on account of the loose fit with the bearing. The life of axles is therefore rather short and as their first cost is large this is quite a heavy item in maintenance of rolling stock.

The object of my invention is to utilize such worn car axles in order to at least double the life thereof, thus effecting an important saving in the maintenance of the rolling stock.

My invention consists, generally stated, in forming and re-working the car axle by forming the axle with finished journal and collar portions, and after wear heating and re-forging the journal portion so that after re-forging it will be at least as large as the original journal portion.

It also consists in heating such worn axles, or at least the journal portions thereof, and confining the end collar and the wheel bearing back of the journal to maintain the original diameter thereof, and subjecting the same to pressure to enlarge the worn journal portion between the said end collar and wheel bearing, and so bring the same to such size that it can be re-turned to the diameter of the original axle.

In the accompanying drawings Figure 1 is a side view showing one end of a worn railroad axle prior to being subjected to my method; Fig. 2 is a sectional diagrammatic view illustrating one manner of enlarging the diameter of the worn journal portion; Fig. 3 is also a diagrammatic view illustrating the re-turning of such journal portion; Fig. 4 is a view similar to Fig. 1 showing an axle capable of a modified operation to restore the same to its original size;

and Fig. 5 illustrates the upsetting of such journal portion.

Fig. 1 shows a portion of a worn car axle having the main body portion 1, the wheel bearing or portion 2 upon which the wheel is secured, the journal 3 and the end collar 4. The dotted lines 5 show the original size of the journal portion, so indicating the manner in which the same has been worn down. I heat the journal portion of such worn axle and while confining the end collar and the wheel bearing subject the journal portion to a suitable forging operation to again enlarge its diameter to or beyond its original diameter so that it can again be re-turned and used the same as a new axle.

Fig. 2 illustrates one manner of effecting this result. The end of the axle is heated and is subjected to a piercing operation, such as by means of a punch 6 carried by a plunger 7 operated by a hydraulic cylinder, or any suitable means. The punch pierces the end of the axle centrally and penetrates substantially to the inner end of the journal portion, thereby forcing the metal to flow radially and expanding the journal portion and bringing it up to or somewhat in excess of its original finished diameter.

In order to maintain the shape of the journal portion and also to hold the axle against the thrust of the piercing plunger the end of the axle is inclosed in suitable dies, such as shown at 8, which may be closed around the end of the axle by any suitable mechanism, not shown. The dies correspond in shape to the end collar 4 and the wheel bearing 2 and the portion of the axle between such wheel bearing and the worn journal portion 3, and confine these parts so as to maintain them at their original shape during the forging operation, so that the only portion enlarged is the worn journal portion of the axle which is expanded by the forging operation to bring it to its original shape which, as shown, is of less diameter than the portions of the axle at each end thereof, the dies also holding the portions of the axle so confined in their proper relative positions lengthwise of the axle that such relative positions are not disturbed in the forging operation. Preferably the plunger 7 carrying the punch 6 will also be formed to maintain the shape of the end collar, such as by the use of an annular die 9 around the punch which may be forced

against the end of the axle and act with the punch in maintaining the shape of or re-forming the end portion thereof. The effect of these dies and punch is to enlarge the diameter of the journal portion while maintaining substantially the proper external contour thereof. The dies 8, before the punching operation, of course do not grasp the journal portion of the axle so that the metal displaced by the punch 6 flows out radially into the vacant space. After being enlarged in diameter the journal portion will be re-turned, as indicated in Fig. 3, in the same manner as in the manufacture of new axles. The resulting axle has the journal portion of the same diameter as a new axle and has practically the same strength since the deficit of metal produced by the wearing down of the journal portion now exists at the neutral axis instead of at the periphery. According to this method the axle will be capable of being re-forged a plurality of times, as when worn a second time it can be subjected to a similar operation with a slightly larger punch to enlarge the central hole and again bring the journal portion out to its original diameter.

Figs. 4 and 5 illustrate a modification of the method. According to this modification the end collar 4 is provided with an excess of metal, such as making the axle somewhat longer than ordinarily. This excess of metal is indicated beyond the line 11, being provided in the manufacture of the new axle. When worn, the end of the axle is heated and the journal portion subjected to an upsetting operation, such as shown in Fig. 5, by subjecting the journal portion to an end pressure by means of a suitable plunger 12 while holding the axle in dies 13. In this operation the end collar and the wheel bearing and the portion of the axle between the wheel bearing and the worn journal portion is confined in the dies, as above described in connection with Fig. 2. These dies will not grip the journal portion but fit loosely around the same, leaving a space in which the metal will flow radially. The upsetting pressure, of course, shortens the journal portion and as the metal cannot flow inwardly beyond the end of the journal portion on account of being gripped by the dies 13 it is compelled to flow radially. In this manner the worn journal portion is brought

back to its original diameter, or preferably slightly in excess thereof so that it can be re-turned in the same manner as described in connection with the modifications illustrated in Figs. 1 to 3.

The modification illustrated in Figs. 4 and 5 is not specifically claimed herein, but is covered by the generic claims and it is specifically claimed in the companion application, Serial No. 438,420.

According to my method it will be readily seen that the life of the axle can be doubled and even trebled by rather simple operations and at a comparatively small cost, much less than the cost of a new axle. This will materially reduce the cost of maintenance of the rolling stock.

What I claim is:

1. The method of forming and re-working car axles, consisting in forming the axle with finished journal and collar portions, and after wear heating and re-forging the journal portion so that after re-forging it will be at least as large as the original journal portion.

2. The method of utilizing worn car axles, consisting in heating the journal portion and confining the end collar and wheel bearing of the axle to maintain their original diameter, and subjecting the worn journal portion to pressure in a manner to enlarge said journal portion.

3. The method of utilizing worn car axles, consisting in heating the journal portion and confining the end collar and wheel bearing to hold them to their original diameter, and subjecting the worn journal portion to pressure exerted axially and thereby causing the metal to flow radially and enlarge said journal portion.

4. The method of utilizing worn car axles, consisting in heating the journal portion and confining the end collar and wheel bearing to hold them to their original diameter, and piercing the axle centrally, thereby causing the metal at the worn journal portion to flow radially and enlarge said worn journal portion.

In testimony whereof, I the said JOHN M. HANSEN have hereunto set my hand.

JOHN M. HANSEN.

Witnesses:

ROBERT C. TOTTEN,
J. R. KELLER.