April 30, 1940. G. M. MAGEE 2,198,675

RAIL JOINT BAR WITH DIFFERENTIAL HARDENED SURFACES

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Fig. 1

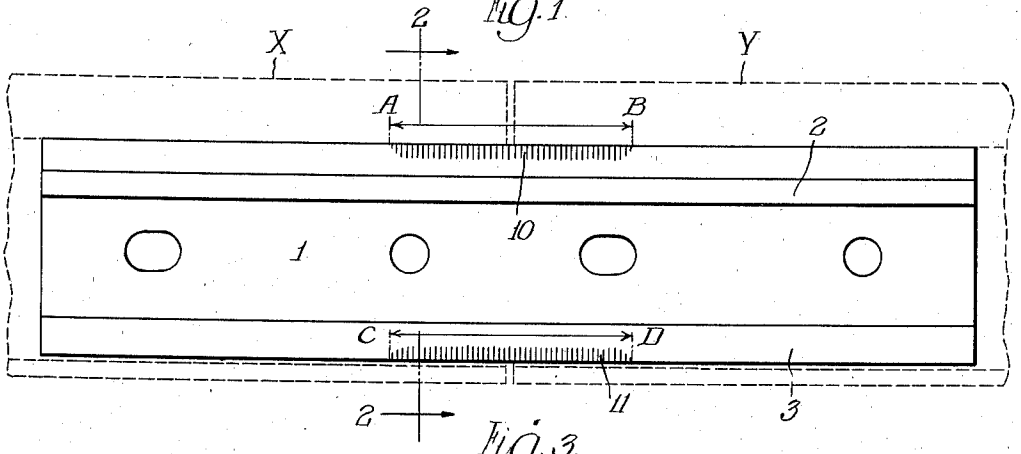


Fig. 3

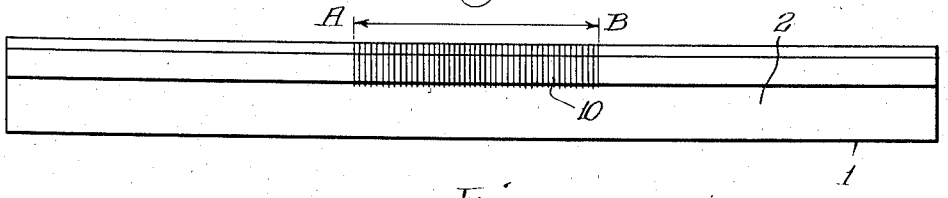
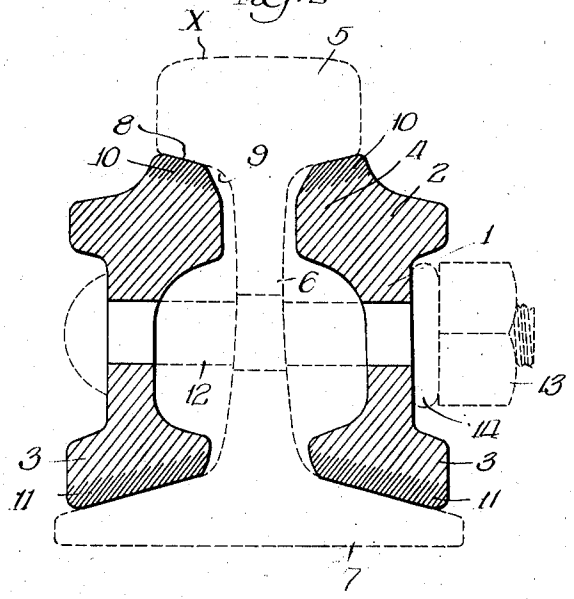


Fig. 2



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RAIL JOINT BAR WITH DIFFERENTIAL HARDENED SURFACES

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9 Claims. (Cl. 238—243)

This invention relates to new joint bars adapted for use in conjunction with railroad rails and particularly to means for improving that part of the surfaces of the bars which contacts the rails and which is particularly subjected to wear and localized stress adjacent the meeting ends of the rails.

In the mechanics of rail joint action, when the wheel load is over the rail joint, the rail ends bear downwardly on the top of the joint bar near the central portion thereof, creating a very high bearing pressure on the bar at that locality, thus resulting in wear upon the bar at that point. This, combined with the bending stresses which are also a maximum at that portion of the bar, develops in the course of time cracks or fatigue failures in the bar at a point where strength is particularly required.

Also undue wear and high bending stress likewise takes place upon the bottom of the joint bar near the central portion thereof due to the action of the rail ends upon that particular portion of the surface of the bar. When the joint bar is between two wheels the bar is flexed upwardly and the rail ends bear against the bottom surface of the joint bar near its center. More or less localized stresses result from this action.

It is an object of my invention to additionally treat for hardening purposes a new joint bar at the specific points where hardness is essentially required, leaving the remainder of the bar in its original state which is initially of sufficient hardness to withstand the ordinary amount of wear. An increased hardness of the joint bar at these specific areas increases the resistance of the bar to wear at these locations and it increases the fatigue strength of the steel at the particular locations where it is subject to the greatest localized stress.

The differential hardening of the joint bar of my invention is an advantage over a bar which has its hardness additionally increased throughout its entire length. In treating the entire upper and bottom surfaces of the bar to give the bar additional hardness upon its wearing surfaces, it is true that a bar with surfaces thus additionally treated may give better service than a bar as ordinarily rolled. However, in treating the entire upper and bottom surfaces of the bar, that portion of the bar adjacent the meeting ends of the rails will nevertheless, in course of time, wear more rapidly than the remaining portions of the bar. The wear in this instance will be proportionately less rapid than the wear upon an untreated bar, but sooner or later there will be an extra amount of wear at the meeting ends of the rails, thus causing unevenness in the bar. In the use of the bar of my invention there is naturally a certain amount of wear upon the untreated portions of the bar. Also at the meeting ends of the rails there is a considerable tendency for the bar to wear at that point. However, due to the extra hardening of the bar at the meeting ends of the rails, the wear upon the bar at that portion is in proportion to the wear upon the untreated portions of the bar and thus minimum unevenness is created in the bar at any time during service. An uneven wear on the joint bar tends to pull the rails out of their true surface when they conform to the worn surface of the joint bars. This serious effect upon the rails is overcome by the use of the bar of my invention with its differential hardened surfaces. Therefore, the provision of additional hardening integral with the bar at areas most subject to wear will tend to give more uniform wear and hence more satisfactory performance of the joint bar in maintaining a true surface of the rail ends throughout their service life.

Also it has been proposed to build up the worn middle portion of used bars. This method would undoubtedly enable the bar to be put back in service but it is not a preventative measure to retain the rails in their true surface. This welding method is only carried out after the injurious effect upon the rail ends and surface has taken place. In the use of my invention the injury to the rail ends and surface is prevented.

Also, means have been attempted heretofore to prevent wear upon rail joint bars under the meeting ends of rails by the insertion of plates in cut-out portions of the top surfaces of the bar. One such means is disclosed in the Palmer Patent No. 1,192,103, July 25, 1916. In this patent a portion of the upper surface of the joint bar is cut out and fitted into the cut-out portion is a hardened plate which engages the under side of the heads of both rail ends at the joint. This means is objectionable for several reasons: First, it is difficult to secure a sufficiently tight fit for the hardened plates to insure that wear does not develop between the plate and the joint bar; secondly, in cutting out a portion of the upper surface of the joint bar its strength is reduced and in addition sharp corners are necessarily left which act as stress raisers at that portion of the bar subject to high bending stresses, which is undesirable from a standpoint of propagating fatigue failures; thirdly, the cost of machining out a portion of the upper surface of the rail joint

bar for receiving the hardened plate is prohibitive.

In carrying out my invention by differential treatment all objections inherent in the Palmer construction and other structures known to me are avoided and a safe, efficient and inexpensive means is provided for hardening the bar where hardness is essential and thus maintaining the rail surface.

The aforesaid and other features and advantages of my improved means will be more fully understood with reference to the following description and drawing wherein like reference characters are applied to corresponding parts in the several views. While I have shown in the drawing a specific type of joint bar, it is to be understood, of course, that any type of bar having upper and lower contact with a rail may be improved in accordance with my invention.

Figure 1 is a view in side elevation illustrating an embodiment of my invention wherein the joint bar is illustrated as applied to the meeting rail ends.

Fig. 2 is a vertical cross section taken on line 2—2 of Fig. 1, and

Fig. 3 is a plan view of Fig. 1.

The present invention is applied to any type of rail joint bar but for illustrative purposes there is shown in the drawings a bar of the type having a web 1, head 2 and base 3, and the usual inwardly projecting portion 4. The bar is used in the customary manner in conjunction with the meeting ends of rails, each rail having the standard head 5, web 6 and base flange 7. It will be seen that the top surface 8 of the head 2 of the joint bar contacts the under side 9 of the rails in the usual manner. It is understood, of course, that the contacting surface between the head of the bar and the under side of the head of the rail varies according to the type of bar used. Between the portion A—B, the upper surface of the head of the joint bar is hardened as at 10, the remaining upper surface of the joint bar remaining untreated. It will be noted that the hardened portion 10 of the joint bar contacts the under side 9 of the rails X, Y, at the meeting ends of the rails. While I have shown the treated portion 10 of the joint bar located between the space as indicated between A and B, it is to be understood that this portion may cover slightly more or less surface than indicated. Also, the depth to which the treatment may be given the bar may vary slightly.

Also I find it serviceable to treat a portion of the lower surface of the base 3 of the joint bar as indicated by 11, this treated portion to be localized to extend between the space as indicated between C and D, Figure 1. It will be seen that the treated portion 11 of the base of the joint bar contacts the upper surface of the base flanges of rails X and Y, also at the meeting ends of the rails. In other words, the treated portion 10 of the upper surface of the head of the bar and the treated portion 11 of the under side of the base of the bar are parallel with each other and cover the same distance.

While I have simply referred to one rail joint bar it is to be understood, of course, that in practical use two joint bars are employed at the meeting ends of rails in the customary manner, held in position by bolts 12 or other fastening means cooperating with nut 13 and usual lock washer 14.

From the foregoing it will be seen that I have provided a new joint bar with surfaces extra hardened in the localities where hardness is particularly required, leaving the remaining wearing surfaces of the bar untreated. In the use of my invention the joint bar is protected against wear at the meeting ends of the rails and thus the bar is retained in safe and serviceable condition at all times.

It is to be understood, of course, that while I have shown the portions of the bar to be treated as extending between A and B and C and D, these treated portions may vary somewhat in length and depth. It is preferred, however, that the length of the treated portion extend about 6 inches and to a depth of approximately ¼ inch.

To harden the localized portions of the joint bar the portion to be treated may first be heated to a temperature of approximately 1650° Fahr. by means of two oxy-acetylene torches mechanically held and automatically moved along the joint bar surface. The torches travel parallel to the axis of the joint bar, the first torch providing the initial heat, the second torch following at a distance of approximately 2 inches and bringing the metal up to the desired temperature. Following this a water jet may be employed at a distance of approximately 2 inches and this quenches the metal to attain the desired hardness. Also, desired results may be obtained by quenching the particular area of the bars to be hardened as they come red hot from the forming presses at the mill, using either water or compressed air or steam spray just prior to quenching the bars in the oil bath.

What I claim as my invention and desire to secure by Letters Patent is:

1. A new rail joint bar of the same metal throughout having a top bearing surface with end portions of one degree of hardness and of increased hardness intermediate the ends of the bar, said differential hardness created by heat treatment.

2. A new rail joint bar of the same metal throughout having a top bearing surface with end portions of one degree of hardness and of increased hardness intermediate the ends of the bar and centrally thereof, said differential hardness created by heat treatment.

3. A new rail joint bar associated with the meeting ends of rails, said bar being of the same metal throughout and having a top bearing surface having end portions of one degree of hardness and of increased hardness intermediate the ends of the bar at the portions contacting the ends of the rails, said differential hardness created by heat treatment.

4. A new rail joint bar of the same metal throughout having a head, web and base portion, the bottom bearing portion of said base having end portions of one degree of hardness and being of increased hardness intermediate the ends of the bar, said differential hardness created by heat treatment.

5. A new rail joint bar of the same metal throughout having a head, web and base portion, the bottom bearing portion of said base having end portions of one degree of hardness and being of increased hardness intermediate the ends of the bar and centrally thereof, said differential hardness created by heat treatment.

6. A new rail joint bar of the same metal throughout associated with the meeting ends of rails, said bar and rails each having a head, web and base portion, said bar overlying and contacting said rail base and the bottom surface of said bar-base having end portions of one degree of

hardness being of increased hardness at the portions where it contacts said ends of rails, said differential hardness created by heat treatment.

7. A new rail joint bar of the same metal throughout associated with the meeting ends of rails, said bar and rails each having a head, web and base portion, said bar-base overlying and contacting said rail bases at the ends of the rails, the bottom surface of said bar-base having end portions of one degree of hardness and being of increased hardness at the portions where it contacts said rail bases, said differential hardness created by heat treatment.

8. A new rail joint bar of the same metal throughout associated with the meeting ends of rails, said bar and rails each having a head, web and base portion, said bar-head underlying and contacting said rail head and said bar-base overlying said rail bases, the top bearing surface of the bar-head having end portions of one degree of hardness and being of increased hardness at the portions where the meeting ends of the rails contact the bar-head and the under side of the bar-base having end portions of one degree of hardness and being of increased hardness where it contacts the meeting ends of the rails, said differential hardness created by heat treatment.

9. A new rail joint bar of the same metal throughout associated with the meeting ends of rails, said bar and rails each having a head, web and base portion, said bar-head underlying and contacting said rail heads at the ends of the rails, the top surface of the bar-head having end portions of one degree of hardness and being of increased hardness at the portions where it contacts said rail heads, said differential hardness created by heat treatment.

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