June 17, 1941. E. W. BACKES 2,245,955

SOUND CENTER RAIL JOINT BAR

Original Filed Aug. 23, 1939 2 Sheets-Sheet 1

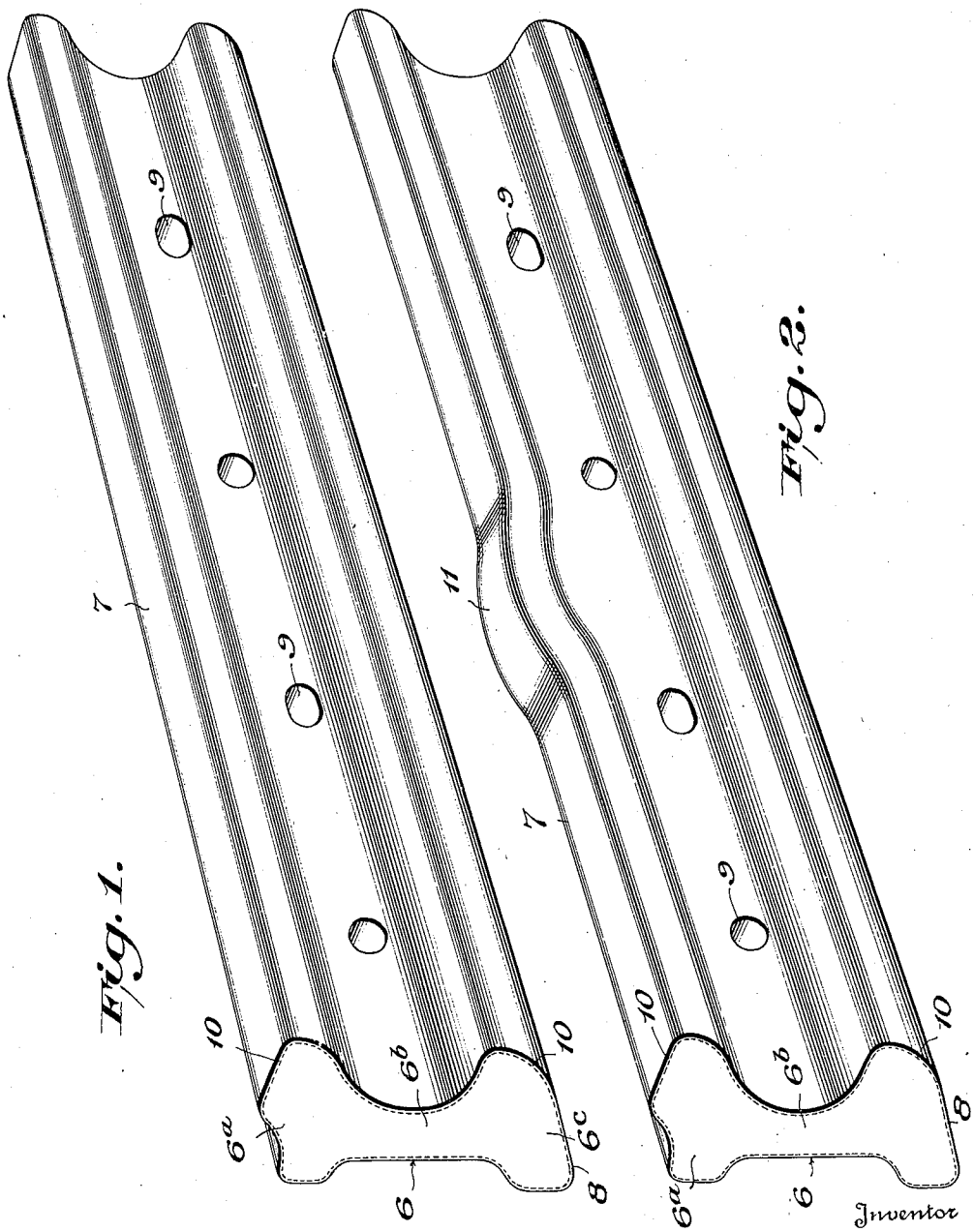


Fig. 1.

Fig. 2.

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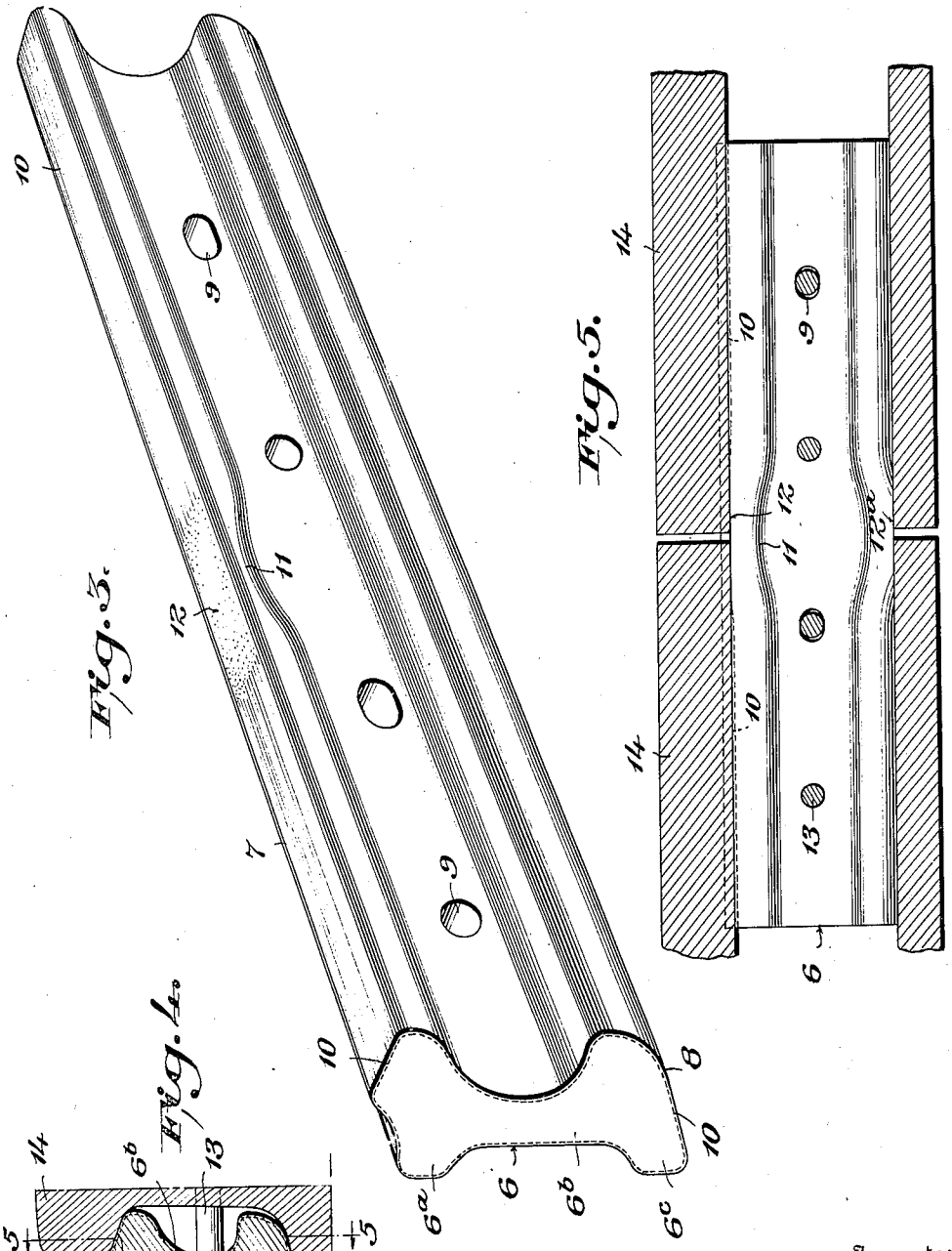


Fig. 5.

Fig. 5.

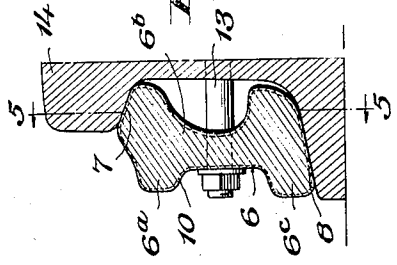


Fig. 4.

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SOUND CENTER RAIL JOINT BAR

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Original application August 23, 1939, Serial No. 291,611. Divided and this application June 5, 1940, Serial No. 338,989

1 Claim. (Cl. 238—243)

This invention relates to rail joint bars used in connecting the ends of railroad track rails and the like, and the present application is a division of my application for Letters Patent Serial No. 291,611, filed August 23, 1939.

A primary object of the invention is to provide a joint bar so constructed as to eliminate surface defects in the fishing surface thereof, particularly at the middle of the rail joint usually due to the presence of the decarburized surface film which is present in the conventional rail joint bar, and which inevitably results from the common procedure observed in the manufacture of such bars It has been found, in some instances, that this decarburized surface or skin on the fishing surface of a rail joint bar encourages formation of incipient cracks at the middle of the joint where the rail ends bear on the top of the bar, and it is therefore the general purpose of the present invention to provide a joint bar which is sound in the critical pressure area or areas and possesses therein the physical properties necessary to a satisfactory and durable rail joint.

It is well known that even though the loading conditions of a rail joint are such as to put the highest bending stresses in the bottom of the joint bars, nevertheless, when failure occurs it usually is at the top center of the bar. Thus, a surface defect or condition, rather than an internal weakness of the bar is indicated to be the cause, and this surface defect or condition has been traceable to the decarburized film or skin at the surface of the bar. Defining this decarburized surface film or skin it is well understood that during the heat rolling and cooling of a rail joint bar much of the carbon which gives the steel its inherent strength escapes, with the result of leaving a relatively soft and weaker surface integument on the bars, and that is the so-called decarburized film or skin referred to. The depth of this decarburized film or skin runs quite uniform at the various mills, amounting in most cases to something between 0.010 and 0.015 of an inch. It is an established fact that economic considerations preclude the production of steel shapes without the escape of carbon at the surface and for a slight depth depending on length of heating and furnace atmosphere, and when carbon escapes from steel, only the softer and more ductile iron remains. Accordingly, the present invention contemplates an improvement in the metallurgy and physical properties at the contacting surface of the rail joint bar, preferably at a point locally where surface conditions often cause rupture and defeat all of the structural or functional purposes of the bar. Mere conventional heating and cooling of the surface of the metal will not accomplish the result sought for by the present invention because such conventional hardening treatment would not escape the formation of a decarburized surface.

Therefore, the present invention is based upon the fact that presentation of sound mother-metal below the rail ends in the center area of the bars will strengthen the bar medially and greatly reduce the tendency to the formation of incipient cracks and will provide a joint bar more durable than ordinarily.

The invention will be understood best from further description with reference to an illustrative embodiment, such as shown in the attached drawings forming a part of this specification.

In said drawings:

Figure 1 is a perspective view of a rail joint bar as initially formed or produced.

Figure 2 is a like view of the same bar having a slight deformation purposely given thereto.

Figure 3 is a similar view of the bar after treatment upon the deformed portion thereof.

Figure 4 is a cross-sectional representation of a rail with the joint bar applied thereto at a juncture point; and

Figure 5 is a view taken on the line 5—5 of Fig. 4, showing the joint plate in inner side elevation with parts of the rail appearing in vertical section.

In the illustrative embodiment, a typical form of rail joint bar is represented by the bar 6, having a conventional head portion 6^a, web portion 6^b and foot portion 6^c. The surface 7 of said head portion constitutes the top fishing surface or angle fitting against the bearing surface at the underside of the rail head, and the surface 8 of said foot portion constitutes the bottom fishing surface or angle fitting against the upperside of the rail flange (see Fig. 4). Holes 9 through the web provide for bolt fastening to the rails on opposite sides of the joint therebetween.

As initially rolled, said bar has the regular configuration and straight edging of normal production as illustrated in Fig. 1; that is, it is produced in the usual way, in desired form or shaping, just as heretofore and just as it has heretofore been used. The outer decarburized integument or "skin" surface, present over its entire area, which is present in the production of all such plates as before stated, is shown somewhat exaggeratively by the dotted line 10 underlying the full surface or configurational lines, said surface or skin comprising roughly

that portion of the metal which exists between said dotted line and the full outer-surface line, and is ordinarily actually only a few hundredths of an inch in depth.

The preferable process employed for producing the bar of Figure 3 is exemplified in Figures 1 and 2 of the drawings. As here shown the joint bar as initially formed, while still hot from the formative rolling operation, is slightly deformed by a suitable die, or otherwise, thereby to press the top fishing surface 7 upwardly into a raised portion 11 sufficient to bring the line 10, or the decarburized skin layer therein, above the normal plane of said surface at the center or central area of the bar, as exemplified in Fig. 2. In other words, that part at least of said fishing surface which will lie directly under the rail ends is raised by a deformation, from below, of the head portion 6a itself, transmitted through the wall thickness thereof. This raising is to a height, exaggerated in the illustration, which causes the decarburized skin portion of the metal to be brought above the normal level of the fishing surface, so that only sound "mother" metal lies thereunder within the regular plane of said surface. Of course, a larger area or the entire extent of said fishing surface may be raised in this manner if desired, but it is not necessary and would afford no particular advantage besides being uneconomical from a manufacturing standpoint. The said deformation or raising may be done advantageously by or in conjunction with the regular hot straightening dies.

After the described deformation, the still hot bar is quenched and cooled in the regular way. The raised portion is then removed or reduced by grinding or the like down to the regular level of the fishing surface, so as to expose a medial area 12 of the sound mother metal substantially flush or in plane with the remaining portions of said surface, as shown in Fig. 3. Thus, that portion or area of the bar, or the top fishing surface thereof, which is subjected to the greatest abrasion, impact and bending stresses below the rail ends and heretofore constituted the weakest point of the same, is provided with an exposed surface of the sound inner metal that will more effectively resist wear and breaking and cracking tendencies and add greatly to the enduring qualities of the bar. In other words, the physical properties of the bar will be as great in this crucial area as in the remaining internal structure of the bar rather than considerably weaker due to decarburization as at present. The same bar as heretofore is accordingly made much stronger and resistant to break-down effects.

In addition to providing a strong break-resistant surface under the rail joint, the invention also provides a more regular and accurate bearing face or fishing angle to fit the underside of the rail head, that is, a smoother and more uniform bearing surface at the point of maximum loading located in the top center of the bar. Joint bars as ordinarily produced vary slightly in their fishing surfaces from a true plane. A universal requirement is that any deviation from a true plane shall be such as to leave the top center of the bar slightly higher than the ends and a bar whose center is low will not be accepted. The invention automatically and expediently brings this about by specifically raising its level and thereafter grinding it down to a high-point plane, at the same time rendering it perfectly flat and smooth as compared with the remaining portions of the surface.

The described bar is applied to the rail joint in exactly the same way as formerly, i. e. as by bolts 13, as illustrated in Figs. 4 and 5. Referring to Fig. 5, wherein the bar is shown in elevation and the rail ends 14 are shown in section, it will be observed that the exposed sound mother metal surface 12 is disposed at the level of the outer face of the decarburized skin 10 and engages the under faces of the rail heads adjacent to the ends thereof; i. e., at the middle of the joint.

The advantages derived from the invention are manifold and will doubtless be readily appreciated. In addition to the longer life and increased resistance to wear, as well as the smoother more accurate surfacing already mentioned, it provides a bearing surface of maximum strength at the point where rail ends, especially when swelled, cause load concentration and high bearing pressures or stresses; it eliminates the necessity of cold straightening for the manufacturer who must straighten or re-run all low surface bars, since a bar which would normally be low would in practice of the invention be simply ground down to a lesser extent leaving the top surface high in the center; it affords a better or fuller-contact and tighter top surface fitting to the rail; it adds a minimum, almost negligible, of cost to the ordinary production; it permits a lower quantity production for replacement purposes, due to the reduction in service failures; and it eliminates other more expensive methods of correcting for the loss of carbon at the center of the bar—recarburizing, control of heating furnaces and quenching and drawing being all more costly and expensive in comparison.

Obviously the lower, medial portion of the bar may be treated in the same manner as the upper, medial portion of the bar; that is to say, by first pressing the lower, medial portion of the bar downwardly and by then grinding off or otherwise removing the resulting protuberance of metal to expose the sound mother metal, as indicated at 12a in Fig. 5 of the drawings.

Without further description it is thought that the features and advantages of the invention will be readily apparent to those skilled in the art, and it will of course be understood that changes in the form, proportion and minor details of construction may be resorted to, without departing from the spirit of the invention and scope of the appended claim.

I claim:

A new rail joint bar which prior to its initial application to rails in a rail joint has a finished bearing surface the end portions of which are decarburized and of normal hardness resulting from the rolling, cooling and quenching operations during forming of the bar and the center portion of which is of greater hardness than said end portions and is constituted by exposed sound mother metal of the bar lying in substantially the same plane as said end portions.

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