May 10, 1932. W. BENDER 1,857,582

METHOD OF MAKING FORGED COMPROMISE BARS

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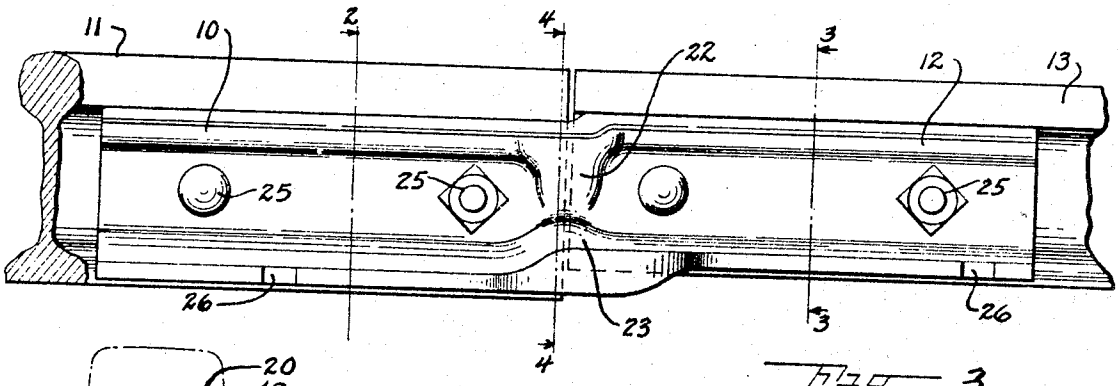
Fig 1



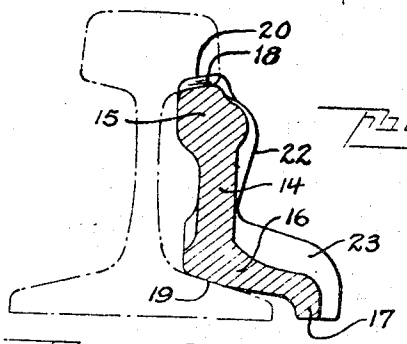


Fig 2

Fig 4

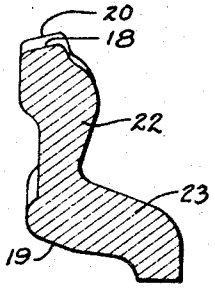
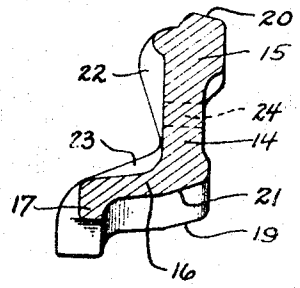


Fig 3



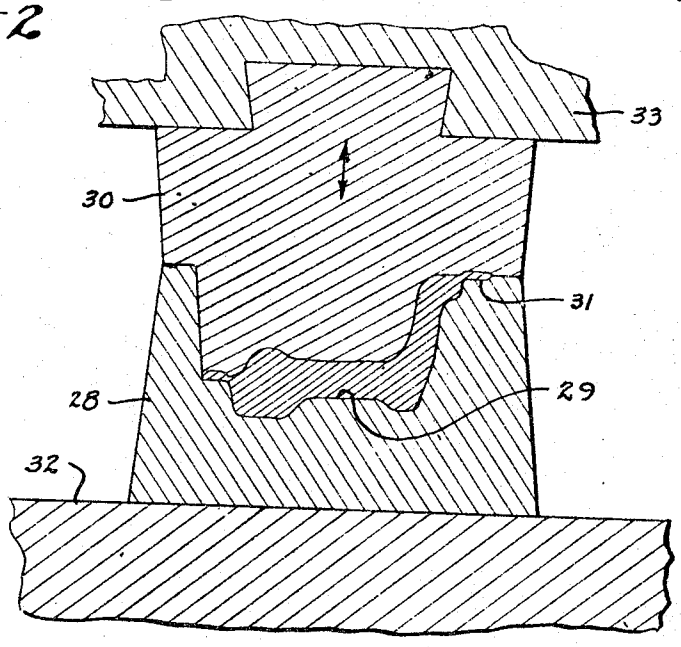


Fig 6

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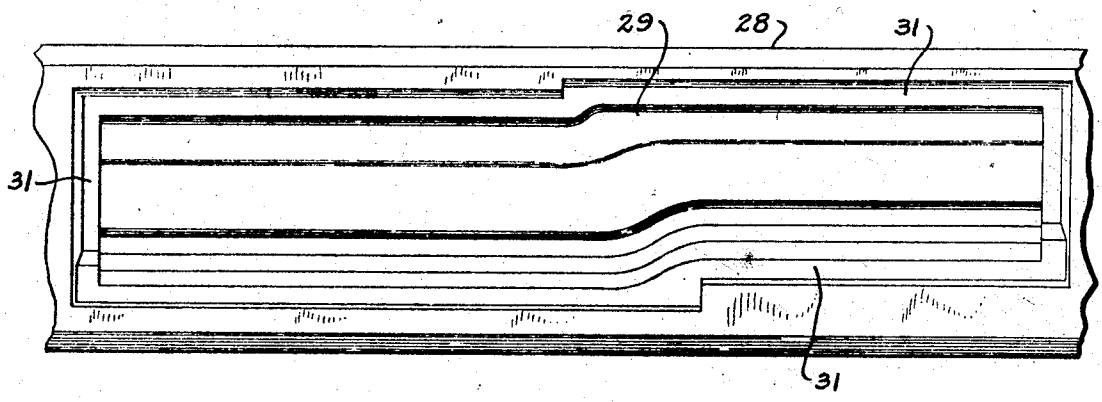
Fig 7.



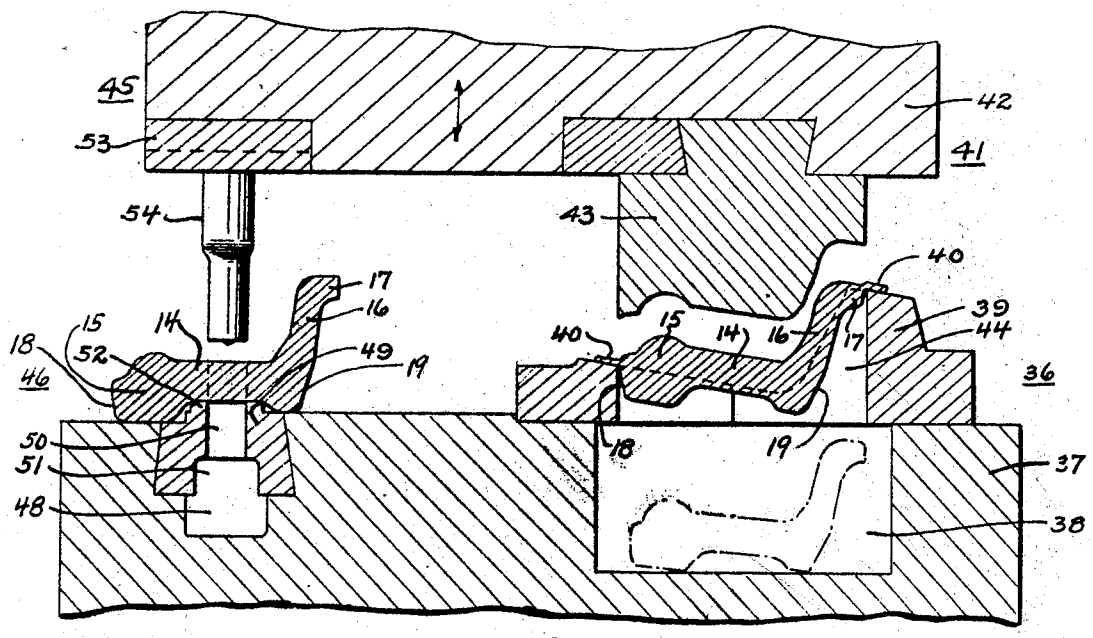


Fig 8

Fig 5

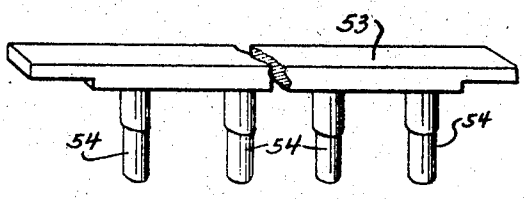
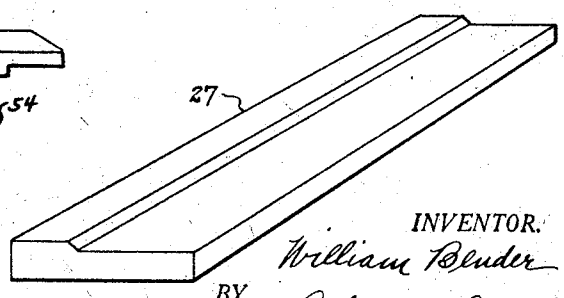


Fig 9



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UNITED STATES PATENT OFFICE

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METHOD OF MAKING FORGED COMPROMISE BARS

Application filed May 5, 1927. Serial No. 188,379.

The invention relates to a method of making forged compromise connector bars for connecting rails having different sections.

According to the invention, a compromise connector bar for connecting two rails of different sections may be forged to a shape which roughly approximates the finished shape. The rough forging may then be further forged in a forming die to the finished shape. The forming die may form the necessary offsets and also necessary re-enforcements. The forming die may be such that both upper and lower fishing surfaces of the connector bar may be formed in one section, preferably the lower section. After the forging operation, the fins caused thereby may be sheared off in a suitable shearing machine, and the bolt holes may be punched in a suitable punching machine. The bar may then be allowed to cool slowly, after which it may be heat treated to give the bar proper temper to withstand the working stresses to which it may be subjected in use.

Some of the advantages in making a bar in this way are the formation of a bar having sharp and abrupt offsets, which supports the rails substantially at the ends thereof, so as to minimize the up and down movement of the rail ends which causes the ends of the rails to be pounded by the wheels rolling thereon. According to the invention, this is accomplished without unduly weakening the bar, either by decreasing the cross section thereof or by setting up strains which affect the strength of the bar. Furthermore, the provision of a die in which both upper and lower fishing surfaces are formed by the same section thereof insures accuracy in the formation of the fishing surfaces.

Various other features and advantages of the invention will be apparent from the following particular description and from an inspection of the accompanying drawings.

Although the novel features which are believed to be characteristic of this invention will be pointed out with particularity in the claims appended hereto, the invention itself, as to its objects and advantages, the mode of its operation and the manner of its organization may be better understood by referring to the following description taken in connection with the accompanying drawings forming a part thereof, in which

Fig. 1 is a side elevation showing a compromise angle bar according to the invention, applied to the inner or gage side of a pair of rails of different sections.

Fig. 2 is a section on the line 2—2 of Fig. 1, taken through the larger end of the angle bar.

Fig. 3 is a section similar to Fig. 2, taken on the line 3—3 of Fig. 1, through the angle bar at the smaller end.

Fig. 4 is a section on the line 4—4 of Fig. 1, at substantially the middle of the angle bar showing the reenforcements therein.

Fig. 5 represents the appearance of the billet after it has been rough forged in the roughing die.

Fig. 6 is a section through the forming die showing an angle bar formed into shape.

Fig. 7 is a plan view of the lower section of the forming die.

Fig. 8 is a section through a combined shearing and punching machine.

Fig. 9 is a detail showing the male die members used for punching the bolt holes.

In the following description and in the claims parts will be identified by specific names for convenience, but they are intended to be as generic in their application to similar parts as the art will permit.

Referring now to the drawings and more particularly to Figs. 1 to 4, a single compromise angle bar made according to the invention is shown connecting two rails of different section. Although only the inner or gage side angle bar is shown for the purpose of illustrating the invention, it will be understood that the outer angle bar connecting the rails on their outer sides may also be made according to the teachings of the invention. Each rail may be of a standard shape comprising a head, web and flange. The rails may differ in one or more dimensions, such as height and width.

The angle bar comprises a large end 10 adapted to fit the fishing section of the large rail 11, and a small end 12 adapted to fit the fishing section of the small rail 13. The large end, as shown in Fig. 2, is made up of a web

14, head 15 and flange 16, the flange having a depending rib 17 which is provided for strengthening purposes. The upper surface 18 of the head is a fishing surface, and the lower surface 19 of the flange is also a fishing surface, these surfaces fitting the head and flange of the rail, respectively.

The small end 12 is shaped similarly to the large end, and has an upper fishing surface 20 and a lower fishing surface 21 adapted to fit the head and flange respectively of the small rail 13 as shown clearly in Fig. 3.

To take care of the difference in sections between the rails, the bar is provided with offset portions adjacent the point where the rails meet. The angle bar is offset upwardly from the large to the small end to take care of the disalignment of the fishing surfaces of the rails. In the angle bar shown the horizontal offset between the large and small ends is practically nil, but it will be appreciated that, if necessary, the bar may be given an appreciable horizontal offset in addition to a vertical offset. The head 15 and web 14 is provided with a strengthening projection 22 at the point where the rails meet, and the flange 16 is also provided with a projection 23 at this point, as shown clearly in Figs. 2, 3 and 4.

The bar is provided with bolt holes 24 through the web thereof, along the center lines at the large and small ends and is bolted to the rails by bolts 25 as is well understood in the art. Spike matches 26 may also be provided in the flange if desired.

The shape of the angle bar is such that the rails receive support therefrom at substantially the extreme ends thereof. The forging process makes this possible. The offsets may be made quite sharp and abrupt without setting up undesirable strains in the metal and the bar at the offset may be strengthened if desired by means of the projections shown.

To make an angle bar of the character above described a billet of the proper kind of steel may be first rough forged in a roughing die to a shape 27 somewhat as shown in Fig. 5, this shape being substantially rectangular, and having a thick side and a thin side. The modified billet 27 may then be placed in a forming die such as shown in Figs. 6 and 7.

The forming die shown comprises a lower section 28 made of suitable material having a recess 29 shaped to form the rail side of the head, web, and flange of the angle bar, and to put the necessary offsets therein. The upper section 30 of the die is made to fit the lower section, and is shaped to form the other side of the web, head and flange of the angle bar, as shown clearly in Fig. 6. The upper section cooperates to place the necessary offsets in the angle bar, and also to form the necessary strengthening projections. Throughout the entire periphery of the die recess 29, a clearance space 31 is left which may be formed part in the upper section and part in the lower section, to allow space for the excess metal to be squeezed out. Slightly more metal is placed in the billet than is necessary to make a finished bar to insure the die mold to be completely filled. The clearance space 31 accommodates the excess metal which is squeezed out during forging.

It will be understood that the die sections are placed in suitable holders, the lower section 28 being placed upon the base or table 32 of a suitable hammer or press, and the upper section 30 being placed in the movable part 33 of the hammer or press in proper alignment with the lower section.

When the billet is formed to a rough shape in the roughing die a proper temperature should be used. A temperature several hundred degrees below the melting point is generally sufficient. When the billet is to be placed in the forming die, it may be reheated to a temperature sufficiently high to cause the metal to flow easily when subjected to pressure in the die.

The angle bar is further operated upon before cooling by the apparatus shown in Figs. 8 and 9. The device shown in Figs. 8 and 9 is a combined shearing machine and punching machine. The shearing machine will first be described. It comprises a lower section 36 made up of a base 37 having a chamber 38 in which the finished bar may drop. Positioned over the chamber is a lower shearing member 39, having an opening 44 of such shape so that its edge supports the bar by the fin 40 thereof, around the entire periphery of the bar.

The upper section 41 of the shearing machine is made up of a suitable holder 42, and an upper shearing member 43 shaped to fit the surface of the bar, and having shearing edges which co-operate with the shearing edges of the lower shearing member. It will be understood that the upper and lower sections are properly aligned, and that the upper shearing member is moved downwardly toward and into the lower shearing member to shear off the fins, the bar then dropping in its receiving chamber.

The punching machine comprises an upper section 45 and a lower section 46. The lower section 46 comprises the base 37 having suitable recesses 48 and a plurality of shearing nipples 49, one nipple for each bolt hole. These nipples fit in the recesses in the base and have openings 50 therein and clearance spaces 51 underneath. The nipples also have projecting collars 52 of proper height to contact and support the bar on the web thereof.

The upper section 45 comprises the holder 42 having a plunger member suitably secured thereto. The plunger member is made up of an attaching bar 53 having a plurality

of plungers 54 suitably secured thereto, these plungers piercing the web and passing into the holes 50 in the nipples, when the upper section moves downwardly.

The bar is then allowed to cool slowly, and if desired, after cooling, the spike notches 26, are punched in the flange. After the bar cools sufficiently, it may be subjected to suitable heat treatment to strengthen the bar, and put it in the best condition for withstanding the stresses which it must withstand in use.

Thus, it will be seen that the improved process produces an angle bar which has offset portions which are quite sharp and abrupt, giving support to the rails substantially at the ends thereof. The drop forging operation places these offsets in the bar and also suitable strengthening projections, without weakening the bar in any way. The provision of a die for forming both upper and lower fishing surfaces in the same section allows the bar to be made quickly, and very accurately at the necessary places. The final heat treatment puts the steel in best condition for withstanding the operating stresses. A bar made according to this invention will stand up in use without wear or without breaking and effectively supports the rails substantially at the extreme ends thereof in such manner to prevent relative vertical movement of the rails.

While certain novel features of the invention are shown and described and are pointed out in the annexed claims, it will be understood that various omissions, substitutions and changes in the process and apparatus above disclosed may be made by those skilled in the art without departing from the spirit of the invention.

What is claimed is:

1. The method of making a compromise angle bar having a head, web and flange, offset and strengthening projections, which comprises, forging a billet of steel to a rough shape in a roughing die, forging the rough shape in a forming die to a finished shape having a projecting fin, thereby forming the fishing surfaces on the head and flange in one section of the forming die, shearing off the fin before cooling in a shearing die, punching bolt holes in the web before cooling, cooling the bar slowly, punching spike notches in the flange, and then heat-treating said bar.

2. The method of making a compromise angle bar having a web, flange and offset which comprises, forging a suitable billet in a forming die to a finished shape having a projecting fin, removing the fin before cooling, punching bolt holes in the web before cooling, cooling the bar slowly, and then heat-treating said bar.

3. The method of making a compromise angle bar having a web, flange and offset which comprises, forming a billet of steel to a rough shape, forging the rough shape in a forming die to a finished shape having a projecting fin, thereby forming the fishing surfaces on the web and flange in one section of the forming die, removing the fin, punching bolt holes in the web, cooling the bar slowly, and then heat-treating said bar.

In testimony whereof, I have hereunto set my hand and seal.

WILLIAM BENDER.