April 28, 1953 N. C. RENDLEMAN 2,636,256

PLOWSHARE BLANK

Original Filed Oct. 17, 1945 2 SHEETS—SHEET 1

Fig. 1.

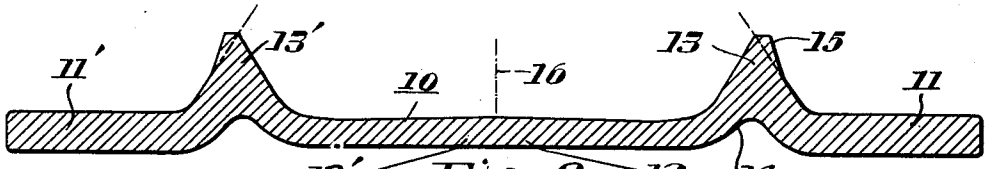


Fig. 2.

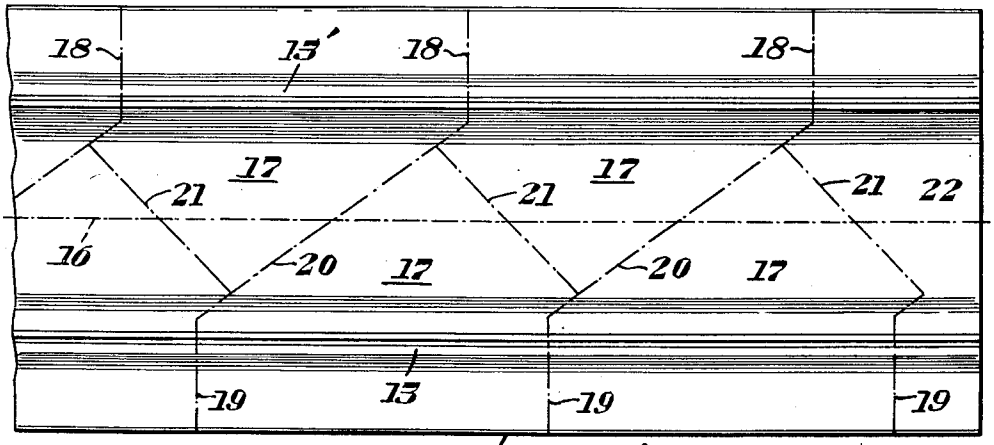


Fig. 7.

Fig. 9.

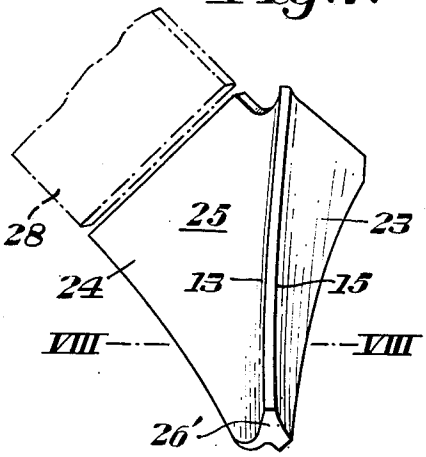
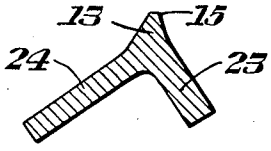


Fig. 8.



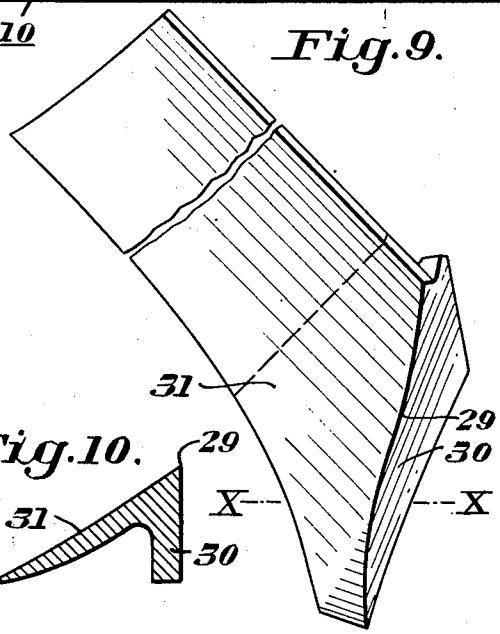


Fig. 10.

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Fig. 3.

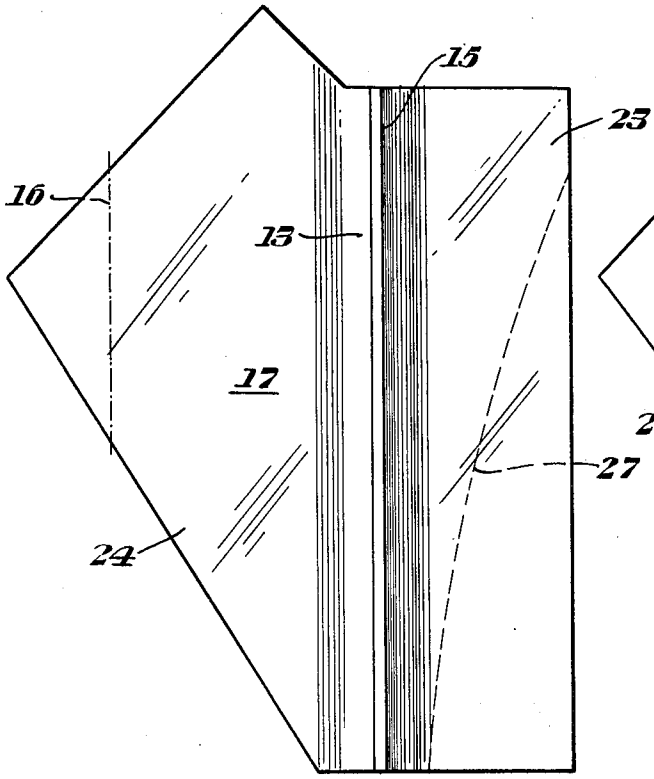


Fig. 5.

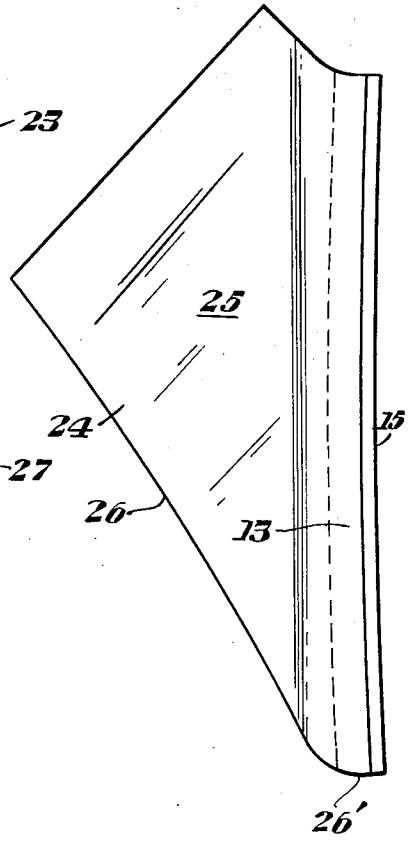


Fig. 6.

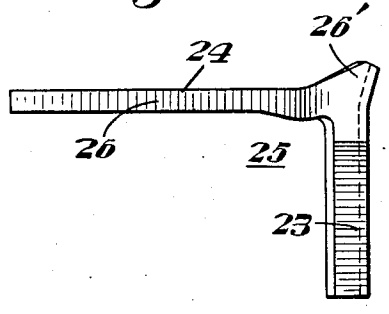
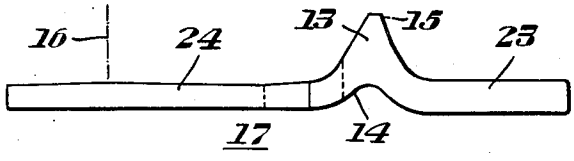


Fig. 4.



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UNITED STATES PATENT OFFICE

2,636,256

PLOWSHARE BLANK

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Original application October 17, 1945, Serial No. 622,777. Divided and this application April 18, 1950, Serial No. 156,622

5 Claims. (Cl. 29—193)

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This invention relates to a blank adapted to be forged into a plowshare and this application is a division of my copending and subsequently abandoned application Serial No. 622,777, filed October 17, 1945.

For a period of many decades up until quite recently, the accepted method of making plowshares, despite several serious objections thereto, has been to weld a forging forming the landside to a piece of plate forming the blade. The objections to this method are the difficulty and the cost of the welding operation, and the tendency of a share so made to fail at the weld. More recently, it has been proposed to make plowshares by providing an integral forging including the landside and a portion of the blade adjacent thereto, and the butt welding to the blade portion of the forging a piece of substantially flat plate adapted to constitute the remainder of the blade. This method has proved quite desirable except for the difficulty in providing the forging including as an integral piece the landside and portion of the blade. Attempts have been made to produce this part by rolling a bar of special shape, cutting portions therefrom and working them into a finished shape, specifically by forging the cut portion of the bar. The difficulty experienced in this operation has been that the forming of the blank leaves concavities in the blade portion resulting from the displacement of the metal by internal stresses set up in the bending operation. This is highly objectionable.

I have invented a novel plowshare blank and method of making it, whereby the aforementioned objections to the previous practice are overcome and further advantages obtained. In a preferred practice of my invention, I provide a rolled bar having a flanged web providing integral landside and blade portions, respectively, with a longitudinal rib at the junction therebetween. The web or blade portion of the bar is thicker in the region remote from the rib than in the immediate neighborhood of the rib. I cut from the bar pieces of proper shape to form forging blanks and roll the web portions individually to bring the landside into proper relation with the blade portion and to reduce the blade portion in the region where its thickness is greater, to substantially the thickness of the remainder of the blade portion thereby causing a progressing radial elongation in said region. The rolling and elongation of the web portion occur progressively as the piece is being bent to angular shape, thus providing the additional length necessary for the web portion in its new position.

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The internal stresses hitherto encountered in forming a rolled piece into a plowshare are thus prevented and the movement of metal in the dies is the minimum. The rolling operation produces a blank having integral landside and blade portions meeting in an edge of triangular section. The originally thicker part of the blade portion is reduced by the rolling to substantially the same thickness as the remainder of the blade portion and is somewhat lengthened thereby. The triangular edge and landside portion are bowed inwardly toward the blade portion as a result of this lengthening. I also preferably shape the rib to provide a lip of excess material on the landside which, when removed by grinding, leaves the finished share with a sharp edge. A blank made according to my invention may easily be forged into finished shape after a piece of plate adapted to form the remainder of the blade has been butt welded to the blade portion of the blank. The blank conforms to the dies and the share is formed without internal stresses or undue movement of metal.

For a complete understanding of the invention, reference is made to the accompanying drawings illustrating a preferred practice and the blank produced thereby. In the drawings:

Figure 1 is a cross section through a rolled bar adapted to be cut into pieces for the production of plowshare blanks;

Figure 2 is a plan view of the bar showing the manner of cutting it to form a number of starting pieces;

Figure 3 is a plan view of one of the pieces as cut from the rolled bar;

Figure 4 is an end view thereof;

Figure 5 is a plan view of the blank after it has been rolled;

Figure 6 is an end view thereof;

Figure 7 is a perspective view of the rolled blank;

Figure 8 is a cross section therethrough substantially along the plane of line VIII—VIII of Figure 7;

Figure 9 is a perspective view of the finished plowshare; and

Figure 10 is a cross section therethrough taken substantially along the plane of line X—X of Figure 9.

Referring now in detail to the drawings, I provide a rolled bar 10 including a flange or landside portion 11 and a web or blade portion 12, preferably disposed as substantially coplanar strips. An upstanding longitudinal rib 13 is integral with the landside and blade portions and

projects equidistantly above the upper surfaces thereof. A round-bottomed groove or channel 14 is formed in the surface of the bar opposite the rib 13. The landside and blade portions 11 and 12 are each bowed with undiminished thickness where they merge into the rib 13, and their undersurfaces form smooth reverse curves with the groove 14. The rib 13 is of substantially triangular section but has a lip 15 along the vertex on the side adjacent the landside portion 11, for a purpose which will subsequently appear. For economy of manufacture, the bar 10 is symmetrical about a central longitudinal plane 16, having a duplicate landside portion 11', blade portion 12' and rib 13' on the opposite side of the central plane.

The blade portions 12 and 12' of the bar 10 (see Figure 1) are not uniform in thickness but are thicker at the central longitudinal plane 16 than in the neighborhood of the ribs 13 and 13'. The difference in thickness amounts to about 5%. In a particular case, the thickness at the central plane is .336'' while the thickness adjacent the ribs 13 .320''. The bar 10 may easily be rolled from a suitable billet by following well known rolling practices as to the shape and number of roll passes required. The billet, of course, should be of a composition suited for the manufacture of plowshares. For example, it may be of low-carbon steel if the finished shares are to be treated as by carburizing or the like. On the other hand, high-carbon steel may be used without any subsequent recarburizing.

Figure 2 illustrates the manner of cutting the bar 10 to form starting pieces 17 for making forging blanks. As clearly shown in the drawings, the bar is cut along transverse parallel lines 18 and 19 extending through the ribs 13. The lines 18 and 19 are staggered and are connected by diagonal cuts on lines 20. Additional cuts on diagonal lines 21 extend between the lines 20. The pieces 17 may conveniently be cut from the bar 10 in pairs by shearing along the lines 18, 19 and 20 and then severed along the line 21. It will be apparent that this manner of cutting provides the maximum number of pieces 17 per unit length of bar, the only scrap loss involved being the piece 22 at each end of the bar.

Figures 3 and 4 show one of the pieces 17 as cut from the bar 10. It will be noted that the piece includes a landside portion 23 of rectangular shape and a blade portion 24 of roughly triangular shape between which the rib 13 extends. The blade portion 24, as previously stated, increases in thickness toward the central longitudinal plane 16.

The starting piece 17, after being cut from the bar 10, is subjected to hot-working to elongate the blade portion 24 adjacent the plane 16 and reduce its thickness substantially to the thickness of the blade portion adjacent the rib. At the same time, the landside portion 23 is bent down to a position generally at right angles to the blade portion. This is done by feeding the piece longitudinally, i. e., in a path parallel to the rib 13, between plain grooved rolls defining a pass of the proper shape. This pass may easily be laid out in accordance with known principles.

Figures 5 and 6 illustrate the blank, indicated at 25, which results from rolling the starting piece as just described. It will be apparent that the thickness of the blade portion 24 has been made uniform throughout. This involves a slight displacement of the metal in the area of greatest thickness, and a consequent elongation of that part of the blade portion. As previously explained, this introduces a slight curvature into the longer diagonal edge 26 of the blade portion. The bending down of the landside portion 23 leaves it connected to the blade portion 24 by an edge 26' of generally triangular section (i. e., the rib 13) and the edge and the landside portion 23 are bowed inwardly intermediate their ends. As indicated by comparison of Figure 4 with Figures 6 and 7, the landside and blade portions 23 and 24 are each bent away from the top of the rib 13 in an arc of not more than about 45° to bring them into right-angle relation, the bend being along the initially bowed juncture of the respective portions 23 and 24 with the rib 13. The blank 25 is now in condition for final forging after the landside portion 23 is cut along the line 27 (Figure 3) to give it the desired taper in the forward direction, and any other incidental trimming which may be necessary to smooth the edges.

Figures 7 and 8 illustrate the blank 25 when finally ready for forging. Before starting the forging operation, a piece of plate 28 of suitable size and shape is butt welded to the blade portion 24. When the weld has been completed and dressed, the blank is forged between suitable dies to bring it to the desired final shape. As previously indicated, the blank readily conforms to the dies and the share is formed without internal stresses or undue movement of metal. Care is taken during the forging operation to leave the lip 15 undisturbed. When the forging is finished, this lip furnishes a slight excess of metal which, when ground off, leaves a sharp cutting edge 29 at the intersection of the finished landside 30 and blade 31. The leading lower edge of the blade is also ground to the desired contour as shown in Figure 10.

It will be apparent from the foregoing description that the invention provides a plowshare forging blank and method of making it having numerous advantages. In the first place, the bar 10 from which the starting pieces are cut may easily be rolled by standard practice. In the second place, the increased length of the blade portion of the blank resulting from the reduction of the originally thicker part thereof prevents the development of internal stresses. The lip 15 of excess metal permits the share to be finished with a very sharp edge by a minimum amount of grinding. Since the only welding operation necessary to complete the share is a simple butt weld, the forging blank may be made of high-carbon steel as well as low-carbon steel, and the necessity for subsequent recarburizing thus avoided. The invention permits a substantial reduction in the cost of the forging blank as compared to blanks having integral landside and blade portions as made heretofore. An even greater advantage in cost, number of operations and quality of product is achieved in contrast to the time-honored method of welding a landside forging to a complete blade.

Although I have illustrated and described but a preferred embodiment of my improved blank, it will be understood that changes in the details of the blank may be made without departing from the spirit of the invention or the scope of the appended claims.

I claim:

1. A plowshare forging blank adapted to be cut from a rolled bar comprising an elongated rib of generally triangular cross section integrally connecting a relatively thick flange for a plow

landside and a relatively thin flange for at least a portion of a plow blade, said flanges having their respective major portions extending generally in a common plane and each having a bowed portion extending along and merging into the rib, the rib having one of its triangular corners projecting above the flanges and its other two triangular corners where the respective bowed portions of the flanges merge into the rib, whereby the flanges are adapted to be brought into right-angle relationship with minimum strain and weakening of the blank and with substantially no weakening of the outer plow edge by bending the flanges along their bowed portions each through an angle of about 45 degrees away from the projecting triangular corner of the rib.

2. A plowshare forging blank adapted to be cut from a rolled bar comprising an elongated rib of generally triangular cross section integrally connecting a relatively thick flange for a plow landside and a relatively thin flange for at least a portion of a plow blade, said flanges having their respective major portions extending generally in a common plane and each having a bowed portion extending along and merging into the rib, the rib having one of its triangular corners projecting above the flanges and its other two triangular corners where the respective bowed portions of the flanges merge into the rib, with a curved groove along the bottom of the rib forming a smooth reverse curve with each of the lower surfaces of the bowed portions of the flanges, whereby the flanges are adapted to be brought into right-angle relationship with minimum strain and weakening of the blank and with substantially no weakening of the outer plow edge by bending the flanges along their bowed portions each through an angle of about 45 degrees away from the projecting triangular corner of the rib.

3. A plowshare forging blank adapted to be cut from a rolled bar comprising an elongated rib of generally triangular cross section integrally connecting a relatively thick flange for a plow landside and a relatively thin flange for at least a portion of a plow blade, said flanges having their respective major portions extending generally in a common plane and each having a bowed portion of undiminished thickness extending along and merging into the rib, the rib having one of its triangular corners projecting equidistant above the top surfaces of the respective major portions of the flanges and having its other two triangular corners where the respective bowed portions of the flanges merge into the rib, whereby the flanges are adapted to be brought into right-angle relationship with minimum strain and weakening of the blank and with substantially no weakening of the outer plow edge by bending the flanges along their bowed portions each through an angle of about 45 degrees away from the projecting triangular corner of the rib.

4. A plowshare forging blank comprising an elongated rib of generally triangular cross section, a relatively thick flange for the plow landside extending from one side of the rib and being bounded by the rib, by a pair of edges extending from the ends of the rib normal to the length of the rib, and by an edge spaced from the rib and connecting the said pair of edges, and a relatively thin flange for the base of the plow blade extending from the other side of the rib and being bounded by the rib, by a pair of relatively short edges extending from the ends of the rib normal to the length of the rib, by a pair of parallel edges of unequal length extending at an acute angle to the length of the rib from the outer ends of the last-mentioned pair of normally extending edges, and by an edge extending substantially normal to the unequal edges and connecting their outer ends, an identical series of said blanks being arrangeable in an unbroken pattern of two staggered rows of the blanks with their thin flanges interlocking between the rows, whereby a plurality of the blanks can be cut from a rolled bar with minimum cutting and loss of material.

5. A plowshare blank comprising an elongated rib of generally triangular cross section with a channel of semi-circular cross section along the underside of the rib, a relatively thick flange for the plow landside extending from one side of the rib and being bounded by the rib, by a pair of edges extending from the ends of the rib normal to the length of the rib, and by an edge spaced from the rib and connecting the said pair of edges, and a relatively thin flange for the base of the plow blade extending from the other side of the rib and being bounded by the rib, by a pair of relatively short edges extending from the ends of the rib normal to the length of the rib, by a pair of parallel edges of unequal length extending at an acute angle to the length of the rib from the outer ends of the last-mentioned pair of normally extending edges, and by an edge extending substantially normal to the unequal edges and connecting their outer ends, said flanges being bowed adjacent the rib to merge smoothly with the rib and channel, an identical series of said blanks being arrangeable in an unbroken pattern of two staggered rows of the blanks with their thin flanges interlocking between the rows, whereby a plurality of the blanks can be cut from a rolled bar with minimum cutting and loss of material.

NORMAN C. RENDLEMAN.

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