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METHOD OF PRODUCING METALLIC STRIP

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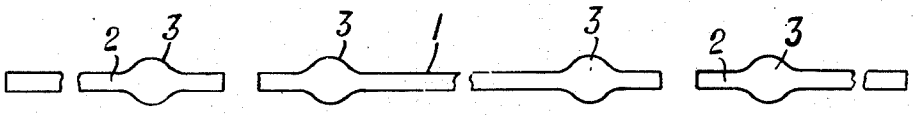


FIG. 1.

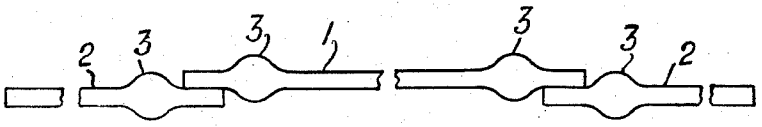


FIG. 2.

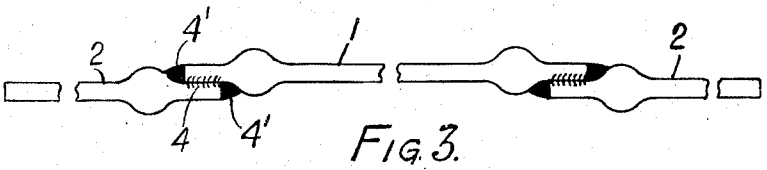


FIG. 3.

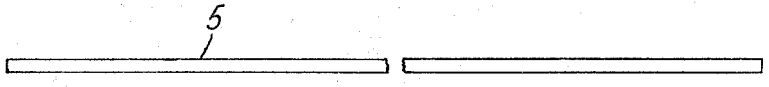


FIG. 4.

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METHOD OF PRODUCING METALLIC STRIP

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3 Claims. (Cl. 29—475)

This invention relates to the production of metallic strip or bar from a plurality of shorter lengths of strip or bar material which are welded together at their end portions, and particularly to such a method which will ensure that the formed strip will be free from defects or flaws at the welded portions, and which will produce a strip or bar having substantially the same grain structure and physical characteristics at the welded portion as in the portions between the welds.

According to the invention, metallic strip or bar, hereinafter collectively referred to as "strip," is produced from short lengths of strip having cross-sectional dimensions slightly in excess of the desired finished dimensions, by upsetting each strip which will become an intermediate portion of the finish strip a short distance from each end to present a local enlargement spaced from the adjacent end by an end lap portion, the two strips which will become end portions of the final strip being each upset at one end only, overlapping the end lap portions of adjacent strips disposed in end to end series, and welding said end lap portions to one another by full-penetration welding, the enlarged joints so formed including the local enlargements produced by upsetting, hot forging said enlarged joints substantially to the cross-sectional dimensions of the original strip, annealing said joints, and then reducing the thickness of the formed strip to the desired gauge, preferably by cold drawing the strip through finishing dies.

The practical steps in performing the method are illustrated diagrammatically in the accompanying drawings in which Fig. 1 illustrates an intermediate strip and two end strips before joining, Fig. 2 illustrates the strips put together for joining, Fig. 3 illustrates the strips welded to one another, and Fig. 4 illustrates the formed long strip with the enlarged joints forged down to the size of the original strip and ready for annealing the joints and reduction to the desired gauge.

In the drawings, **1** denotes an intermediate strip, **2** denotes end strips, and **3** denotes the upset local enlargements of the strips **1** and **2**. The enlargements preferably are formed with a thickness equal to approximately twice the gauge of the strips **1** and **2**. **4** denotes full-penetration welds joining together the adjacent end lap portions of strips **1** and **2**. These welds preferably are such as not only to effectively unite the contacting faces of the respective end lap portions of the strips, but also to leave a deposit of metal **4'** which substantially fills the space between the end of one strip portion and the opposite enlargement near the end of the adjacent strip.

After the adjacent ends of the strips are welded together in the manner described above, the composite

strip is hot forged to reduce the thickness thereof adjacent the welded portions to substantially the original thickness of the individual strips which were welded together. The composite strip is then reduced to the desired gauge, preferably only slightly less than the gauge of the original strips, in any desired manner, such as by cold drawing through finishing dies. The joints in the formed composite strip preferably are annealed before the strip is reduced to desired gauge. **5** denotes the long strip formed from the strips **1** and **2** after the joints have been hot forged down to the cross-sectional dimensions of the original strip, and the entire strip brought to the finished dimensions.

The filling of the space between the ends of the end lap portions of the several strips and the adjacent enlargement of the joined strip assures that the final strip, after the hot forging and finishing operations, will not have sections at those places which are of less thickness than other portions of the strip.

If the composite strip resulting from the present invention were not hot forged and subsequently cold-worked in the manner above described, the main portions of the strip would have the grain structure and physical characteristics of wrought metal, while the portions adjacent the welds would have the grain structure and physical characteristics of cast metal. However, by hot forging the strip after welding the several strips together at the welded areas the metal at those portions of the strip is converted from a cast structure to a wrought structure, and the strip after the finishing operations to reduce it the desired gauge will have throughout the same grain structure and physical characteristics as the original strips and, in practice, it is almost or completely impossible to detect the presence of joints.

What is claimed is:

1. The method of producing metallic strips from at least two strips of shorter length which comprises upsetting at least one end portion of one strip to produce a local enlargement spaced from but adjacent the end of said end portion, overlapping the strips so that the portion of said one strip between the enlargement and the adjacent end overlaps a corresponding portion of another strip, uniting the overlapping end portions by full penetration welding, hot forging the composite strip so formed adjacent said welded portion to substantially reduce the thickness thereof at said portion, and thereafter subjecting the composite strip to cold-working operations to reduce it throughout to the desired gauge.

2. The method of producing metallic strips as set forth in claim 1 in which at least one end portion of both strips is upset to produce a local enlargement spaced from but adjacent one end, and the ends of the strips beyond the enlarged portions are overlapped.

3. The method of producing metallic strips as set forth in claim 2 in which the composite welded strip is hot forged at said welded portions to a thickness substantially equal to the thickness of the original strips, the welded joints are annealed and the composite strip is cold drawn to the desired gauge.

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