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METHOD OF MAKING COMPOSITE ALUMINUM-LINED STEEL-BACKED BEARING MATERIAL

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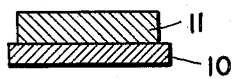

Fig. 1

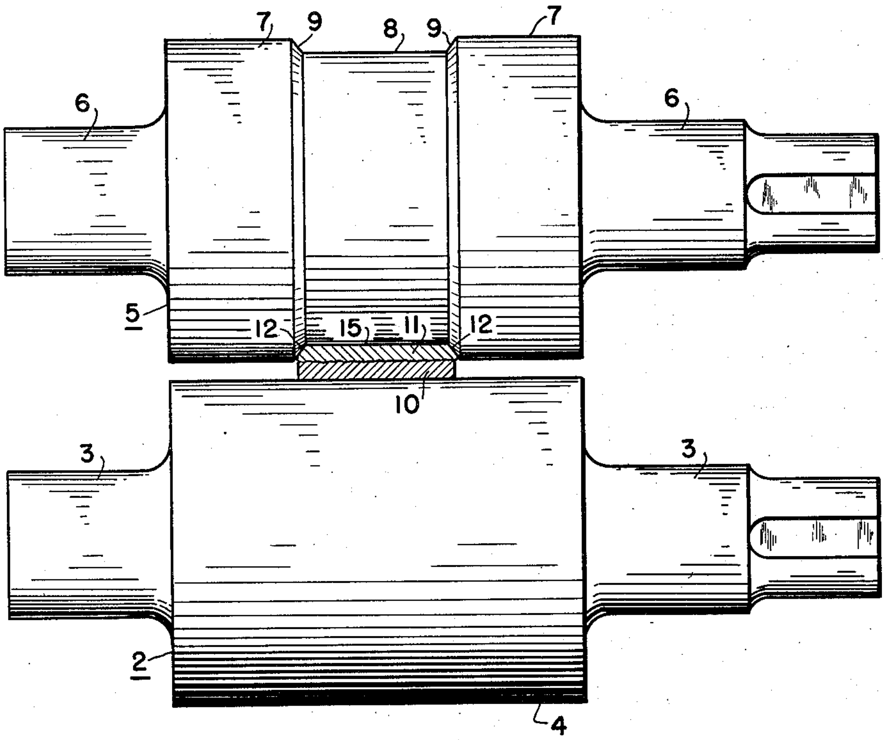

Fig. 2

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METHOD OF MAKING COMPOSITE ALUMINUM-LINED STEEL-BACKED BEARING MATERIAL

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3 Claims. (Cl. 78—93)

This invention relates to a method of making composite aluminum-lined steel-backed bearing material which may be formed into bearings having a steel backing and an aluminum lining. Such composite bearing material is now made commercially by hot rolling an aluminum strip on a silver-plated steel strip. Instead of plating the steel with silver, it may be plated with copper or nickel or alloys thereof. The aluminum bearing alloy strip may be rolled onto these plating metals directly or an intermediate bonding layer may be employed between the plated steel and the aluminum bearing layer, which intermediate bonding layer may be either commercially pure aluminum or aluminum alloy, and the intermediate bonding layer may be either a separate strip or may be clad to the aluminum bearing alloy. The rolls which have been used prior to my invention have been cylindrical.

One difficulty that has been encountered in carrying out the prior known method is poor bonding at the edges of the composite strip material. In general, the portion at the edges which does not bond properly is from ⅛ to ½" in width, depending on the particular rolling conditions. This is costly since these edges have to be cropped off in order to eliminate the area of poor bond.

I have discovered that this poor bonding of the aluminum to the steel at the edges of the composite strip is due to loss in rolling pressure near the edges caused by sliding of the aluminum relative to the steel in a direction perpendicular to the direction of rolling. I have discovered further that this poor honding at the edges can be overcome or at least minimized by employing a roll of such shape that the aluminum strip is confined at its edges so that rolling pressure is maintained but movement of the aluminum strip relative to the steel strip in a direction perpendicular to the direction of rolling is prevented or minimized. By employing such a confining roll, a good bond may be obtained for the full width of the strip and it is only necessary to trim enough from the edges to bring the strip to a finished size.

In the accompanying drawings which illustrate the invention in a somewhat diagrammatic manner:

Figure 1 illustrates an assembly of an aluminum strip on a steel strip before rolling; and

Figure 2 is a vertical section through the strips during rolling, the rolls being shown in elevation.

Referring more particularly to the accompanying drawings, the lower roll **2** is the usual roll having necks **3** and a cylindrical body portion **4** of uniform diameter throughout its length. The upper roll **5** is a stepped roll having necks **6**, two cylindrical body portions **7**, a cylindrical body portion **8** having a diameter less than the diameters of the body portions **7**, and two stepped portions **9** connecting the body portions **7** and **8**.

In Figure 1, there is shown an assembly comprising a steel strip **10** on which is placed a strip **11** of aluminum bearing alloy.

In carrying out the method, the aluminum bearing alloy strip **11** is placed on the steel strip **10**, the width of the aluminum strip **11** being slightly less than the width of the steel strip **10**, and being approximately the same width as the width of the body portion **8** of the roll **5**. The two strips are heated to a temperature suitable for rolling, for example 800° F., and are then passed between the two rolls **2** and **5** so as to reduce the thickness of the aluminum strip and bond it to the steel strip. Preferably the aluminum strip is reduced in thickness by the rolling to an extent of about 65%. During the rolling, the stepped portions **9** confine the edges **12** of the aluminum strip, thereby preventing it from sliding relative to the steel strip **10** in a direction perpendicular to the direction of rolling. During rolling, the portion **8** of the roll **5** exerts pressure on the exposed face **15** of the aluminum strip **11**, while the stepped portions **9** of the roll **5** simultaneously exert pressure on the edges **12** of the aluminum strip in a direction perpendicular to the direction of rolling. By employing such method, it has been found that good bonding may be obtained for the full width of the steel strip and it is only necessary to trim enough from the edges to bring the strip to a finished size.

While the method has been described as applied to bonding the aluminum strip **11** directly to the steel strip **10**, it is to be understood that the steel strip may be plated with silver, copper, or nickel or alloy thereof, that an aluminum bonding alloy may be interposed between the plated steel and the aluminum strip **11**, and that the interposed aluminum bonding layer may be either a separate layer or clad to the aluminum strip **11**.

The invention is not limited to the preferred embodiment but may be otherwise embodied or practiced within the scope of the following claims.

I claim:

1. The method of making composite aluminum-lined steel-backed bearing material, which comprises placing a strip of aluminum on a steel strip to form an assembly, the adjacent faces of said strips being smooth, heating the assembly and hot rolling it to reduce the thickness of the aluminum strip and bond it to the steel strip, and during such hot rolling, confining the edges of the portion of the aluminum strip being hot rolled against movement in a direction perpendicular to the direction of rolling while leaving the edges of the steel strip unconfined.

2. The method of making composite aluminum-lined steel-backed bearing material, which comprises placing a flat strip of aluminum on a flat steel strip to form an assembly, the adjacent faces of said strips being smooth, heating the assembly and hot rolling it to reduce the thickness of the aluminum strip and bond it to the steel strip, and during such hot rolling, confining the edges of the portion of the aluminum strip being hot rolled against movement in a direction perpendicular to the direction of rolling while leaving the edges of the steel strip unconfined.

3. The method according to claim 1, wherein the hot rolling reduces the thickness of the aluminum strip about 65%.

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