Jan. 9, 1973 J. J. STOBO 3,709,797

METHOD OF MAKING A FIBRE-REINFORCED PLAIN BEARING

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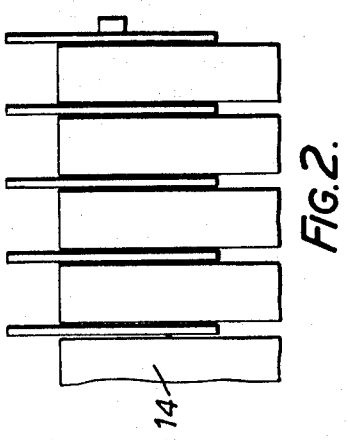


FIG. 2.

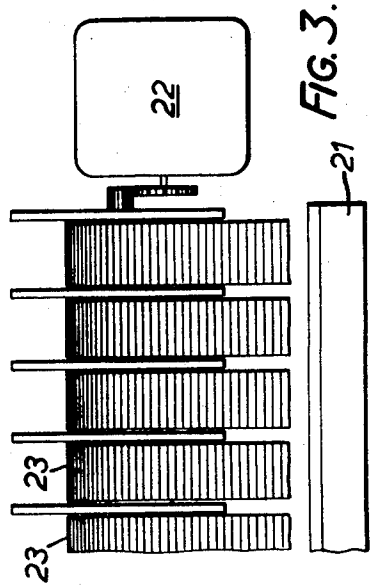


FIG. 3.

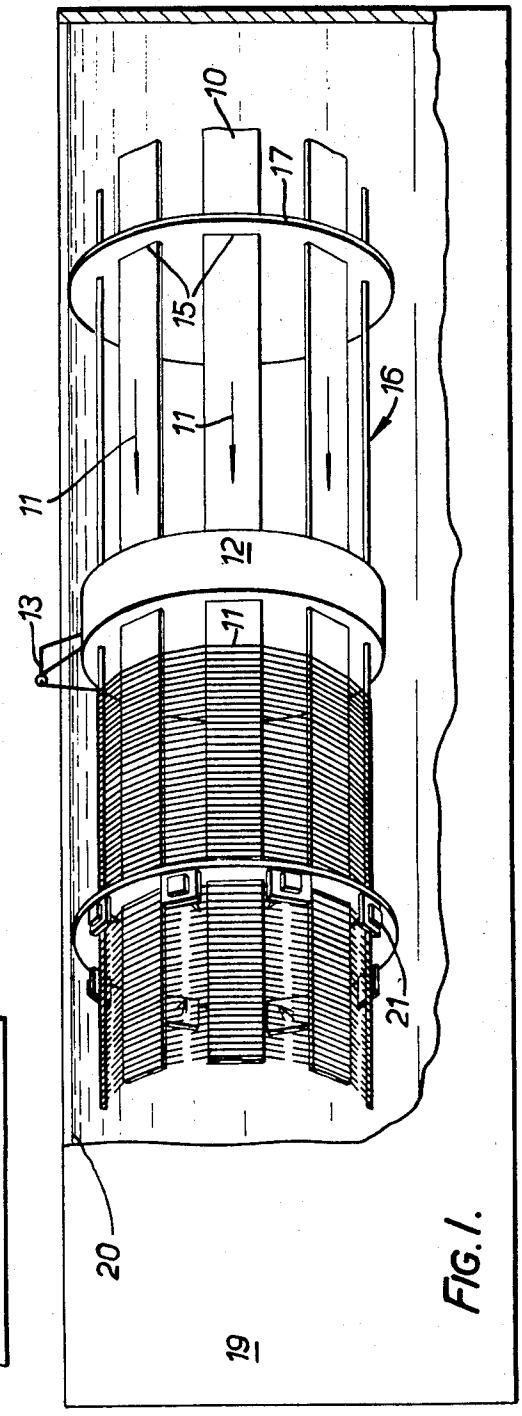


FIG. 1.

INVENTOR
JAMES J. STOBO

BY
Pierce, Schuffler & Parker
ATTORNEYS

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METHOD OF MAKING A FIBRE-REINFORCED PLAIN BEARING

James J. Stobo, Weybridge, England, assignor to The Glacier Metal Company Limited, Alperton, Wembley, England

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U.S. Cl. 204—16 4 Claims

ABSTRACT OF THE DISCLOSURE

The invention is a method of making bearing strips in which a steel or other backing has carbon or other fibres in successive pieces extending parallel with one another over one face, the fibres being embodied in a metal applied onto that face of the strip to form a reinforced bearing lining. In a method of making such a bearing a number of lengths of strip extending side by side are wound in an electroplating bath through which they progress.

This invention relates to lined backing members, for example metal strips having an appropriate lining suitable for use as bearing materials.

One object of the invention is to provide such a material with a strong lining and to provide a novel method of manufacturing such a member.

According to one aspect of the present invention a backing member has a lining or covering comprising electroplated metal embodying reinforcing fibres, for example carbon fibres. The backing member may be a strip suitable for use as the backing of a plain bearing and the electro-plated metal may be a metal suitable for use as a bearing lining whether for use with or without liquid lubrication.

By embodying the reinforcing fibres in the electroplated lining or covering, a particularly strong lining can be adequately secured to be suitable for many applications of plain bearings.

According to another aspect of the invention in a method of making a lined backing member a length of reinforcing fibre is wound in successive turns, each having a portion extending across the surface of the backing member, plating is applied to the exposed parts of the surface and the fibre, and then the fibre portions extending across the surface of the backing member are severed from the remaining portions of the successive turns.

The backing member can be moved continuously in relation to a bobbin feed or the like which is also movable generally transversely to the direction of movement of the backing member so that successive turns can be as closely spaced and angularly related as desired.

The winding and movement can take place in an electroplating bath, for example with the backing and fibres constituting one electrode and a second electrode being constituted by material to be plated on the backing member and fibres.

The backing member may be in the form of one or a number of elongated strips which could progress through the bath so that a continuous production process is achieved, the strips being capable of being wound onto reels as they come from the bath after severing of the fibres, to be then suitable for being cut into individual lengths for forming bearings.

A number of strips may extend side-by-side in the direction of movement, possibly arranged around a many-sided polygon so that the fibre can be wound around the outer surfaces of all the strips in successive turns and

then severing of the fibres needs to take place only between adjacent strips after plating has been completed.

The invention may be carried into practice in various ways and one embodiment will be described by way of example with reference to the accompanying drawing of which:

FIG. 1 is a diagram showing strips being made in accordance with the invention, and

FIGS. 2 and 3 are diagrams of spool arrangements for supplying and taking up the strips.

A number of bearing backing strips which may for example be of steel **10** are fed in the direction of the arrows **11** through an electro-plating bath **19** containing a plating solution **20**. The strips **10** extend side-by-side around the surface of a polygon passing though slots **15** in a guide plate **17** for maintaining their spaced relationship. The plate **17** also acts as an electrode for all the strips. As they are fed slowly through the bath, they are electro-plated with the metal of an anode of an appropriate bearing material for example lead/tin, lead/indium, nickel, copper, chromium, iron, gold, silver, platinum or an alloy of any of these metals. After a certain plating thickness has been achieved the strips **10** encounter a rotary bobbin feed device **13** carried on a ring **12** surrounding the strips so that as the bobbin feed **13** rotates around the ring **12** a continuous carbon fibre **11** is wound around the multi-sided polygon, and portions of each turn lie transversely over the width of each strip. The spacing between turns is determined by the relative speeds of strip feed through the bath and rotary feed of the bobbin **13**.

The fibre **11** is plated as the strips and fibre continue to move through the bath and if desired after a certain plating thickness has been achieved, a similar bobbin device **13** can apply a further reinforcing layer to the strips and indeed as many successive layers with intervening plating can be applied as is needed in a particular application.

Finally the plated strips encounter a cutting device **21** which severs the threads between successive strips **10** leaving a number of side-by-side extending, parallel, reinforced, plated, strips for winding onto individual spools driven by a motor **22** as indicated generally at **23**. A similar spool arrangement **14** can be used at the inlet end for supplying the uncoated strip **10** to the bath.

The strips may be flexible enough to be turned onto parallel spools as shown, or may be wound onto reels arranged in a ring if they are not so flexible.

In one application a winding pitch of 200 fibres per inch has been achieved giving a strong plated backing strip.

A preferred plating material for varying strips is a soft lead/tin or lead/indium which is a good bearing material that can be successfully electro deposited, but it is also possible to deposit electrically a bearing material on top of the first plated metal. Also, one can deposit refractory materials from molten salt baths.

For a good bond it is preferred that the thermal coefficients of expansion of the fibre and the backing and possibly also the plating material should not be too different from each other.

I claim:

1. The method of making a fibre-reinforced plain bearing which comprises the steps of advancing a plurality of continuous backing strips longitudinally through a bath for electro-plating a layer of bearing material on a facial surface thereof, said backing strips being arranged in parallel spaced relation and having a spacial configuration corresponding generally to a polygon the individual sides of which correspond respectively to the backing strips, winding a continuous length of fibre in successive spaced turns across and in contact with the facial surfaces of said backing strips while in the electro-plating bath so that said

fibres become embedded in the layer of bearing material, and severing the wound-on fibres intermediate the sides of adjacent backing strips subsequent to formation of the fibre-reinforced layers of bearing material thereon thereby to separate the backing strips each from the other.

2. The method as defined in claim 1 of making fibre-reinforced plain bearing strips wherein the fibre wound across and in contact with the facial surfaces of said continuous backing strips is carbon.

3. The method as defined in claim 1 of making continuous plain bearing strips wherein the fibre is wound across and in contact with the facial surfaces of said continuous backing strips by advancing said backing strips longitudinally of themselves in a continuous manner while winding on the fibre at an angle to the direction in which said backing strips are advanced.

4. The method as defined in claim 1 of making fibre-reinforced plain bearing strips wherein said continuous backing strips are fed from supply spools to the location where said fibre is applied and wherein the finished fibre-reinforced bearing strips are rewound on storage spools.

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THOMAS TUFARIELLO, Assistant Examiner

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156—150; 308—237