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BIMETALLIC WIRE

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13 Claims. (Cl. 29—182)

This invention relates to the manufacture of wire, particularly steel wire of high tensile strength. The invention is especially adapted for the manufacture of high tensile wire having a protective coating as, for example, of copper, although the invention is not thus limited. This application is a continuation-in-part of my application Ser. No. 475,398, filed August 14, 1930.

Steel wire of high tensile strength has many fields of usefulness, and when adequately protected from the elements, as may be done with a suitable copper coating, numerous applications of such wire, notably in suspension bridge cables, are materially simplified.

The most approved method of manufacturing a copper covered wire is to pour molten copper around a heated steel core or billet, thus effecting a permanent union between the copper and the steel, rolling the bimetallic billet thus formed into a wire rod, and finally drawing it into wire. Copper has a melting point of about 1980° F., and it is therefore impossible in rolling the bimetallic billet to use temperatures of 2100 to 2200° F. which are ordinarily employed in rolling steel billets, since such temperatures would melt the copper. It has been found that a safe rolling temperature for copper coated steel billets is about 1700° F., which is more than 400° lower than the ordinary steel rolling temperature. Copper coated steel billets in which the steel is of relatively low tensile strength can be successfully rolled at or below a temperature of about 1700° F., but great difficulty has been encountered in the past where it has been attempted to roll copper covered steel billets in which the steel core has a high tensile strength. High tensile strength steels previously used have contained relatively high percentages of carbon. Great difficulty is encountered when it is attempted to roll a copper coated steel billet of relatively high carbon content. In starting such a copper coated steel bar into the rolls, it has been found necessary to apply great force to the bar, such as may be accomplished by four or five men grasping the bar with tongs and then running forward to force it into the rolls. If this was not done, the rolls would not grip the bar, but due to the fact that the steel was so hard, would grind off the copper from the end of the bar as they rotated. In the rolling operation itself, it was extremely difficult, if not impossible, to hold the roll passes to the degree of accuracy which should be maintained. It is very important that a uniform distribution of copper be obtained on the wire rod obtained by rolling the bar in order to provide uniform protection for the steel core. The steel core assumed various irregular shapes which seriously affected the distribution of the copper around it and resulted in a product having non-uniform protection against corrosion of the steel core.

I have discovered that a proportion in the neighborhood of 2% of manganese in the steel core enables me to keep the carbon content of the steel core low enough so as to readily hot roll the bimetallic billet or the like and obtain a product which has nevertheless remarkably high tensile strength. This discovery is of particular importance when working with a steel core surrounded by a sheath or coating of copper. Such copper covered steel can be satisfactorily rolled at a temperature of about 1700° F., which is considerably below the melting point of copper and is therefore a safe temperature to employ. Such a bimetallic billet can be fed into the rolls without difficulty and the rolling mill passes can be maintained with the desired accuracy. The steel core is not unduly distorted in the rolling process, but is maintained substantially round, and therefore a much improved distribution of copper is obtained. The carbon in the steel core may vary between .05% and .30%. It is preferably over .10%, but less than .20%, a preferred specific range being .13% to .17%. The manganese may vary between 5.0% and 1%, preferably between 1.75% and 2.25%. A specific example of a steel which has proved very satisfactory in practice contains about .15% carbon and about 1.95% manganese.

Although the present invention applies particularly to bimetallic wire, the uncoated steel wire having relatively high manganese and relatively low carbon, as compared with the usual high tensile strength steel, has advantageous properties itself. It can be cold worked to a much greater degree than the previously known higher carbon material.

It is impossible to draw the higher carbon copper covered steel wire from a ⅜ inch rod to sizes finer than about .162 inch without encountering considerable brittle wire, whereas under similar conditions the lower carbon, higher manganese steel of the present invention can be drawn without difficulty from ⅜ inch rod to .102 inch and it still possesses sufficient ductility and toughness to make a satisfactory wire.

I have described the present preferred embodiment of my invention. It is to be understood, however, that the invention may be otherwise embodied within the scope of the following claims.

I claim:

1. A hot worked bimetallic body comprising a steel base of high tensile strength containing carbon from .05% to .30% and manganese from 5.0% to 1.0%, and a non-ferrous metal coating on said base.

2. A hot worked bimetallic wire comprising a steel base wire of high tensile strength containing carbon from .05% to .30% and manganese from 5.0% to 1.0%, and a non-ferrous metal coating on said base wire.

3. A hot worked bimetallic body of high tensile strength comprising a steel base containing carbon from .05% to .30% and manganese from 5.0% to 1.0%, and a copper coating on said base.

4. A hot worked bimetallic wire comprising a steel base wire of high tensile strength containing carbon from .05% to .30% and manganese from 5.0% to 1.0%, and a copper coating on said base wire.

5. A hot worked bimetallic wire comprising a steel base wire of high tensile strength containing carbon from .05% to .30% and manganese from 1.75% to 2.25%, and a copper coating on said base wire.

6. A hot worked bimetallic wire comprising a steel base wire of high tensile strength containing carbon from .13% to .17% and manganese from 1.75% to 2.25%, and a copper coating on said base wire.

7. A hot worked bimetallic wire comprising a high tensile strength steel base wire containing about .15% carbon, about 1.95% manganese, and a copper coating on said base wire.

8. A hot worked bimetallic wire comprising a steel base wire of high tensile strength containing carbon over .10% but under .20% and manganese over 1.75% but not over 2.25%, and a copper coating on said base wire.

9. A high tensile strength bimetallic wire cold drawn to a size substantially smaller than about 0.162 inch from a hot worked bimetallic rod comprising a steel core containing carbon from about .05% to about .30% and manganese from about 5.0% to about 1.0%, and a copper sheath on said core.

10. A hot worked bimetallic wire of high tensile strength comprising a steel base wire containing carbon over .05% but under .20% and manganese from 1.75% to 2.25%, and a copper coating on said base wire.

11. A hot worked bimetallic wire comprising a steel base wire of high tensile strength containing carbon from about .1% to about .2% and manganese from 5% to 1%, and a copper coating on said base wire.

12. A hot worked bimetallic wire comprising a high tensile strength steel base wire containing carbon over .05% but under .20% and manganese from 5.0% to 1.0%, and a copper coating on said base wire.

13. A hot worked bimetallic wire comprising a steel base wire of high tensile strength containing carbon from .13% to .17% and manganese from about 5% to about 1%, and a copper coating on said base wire.

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