

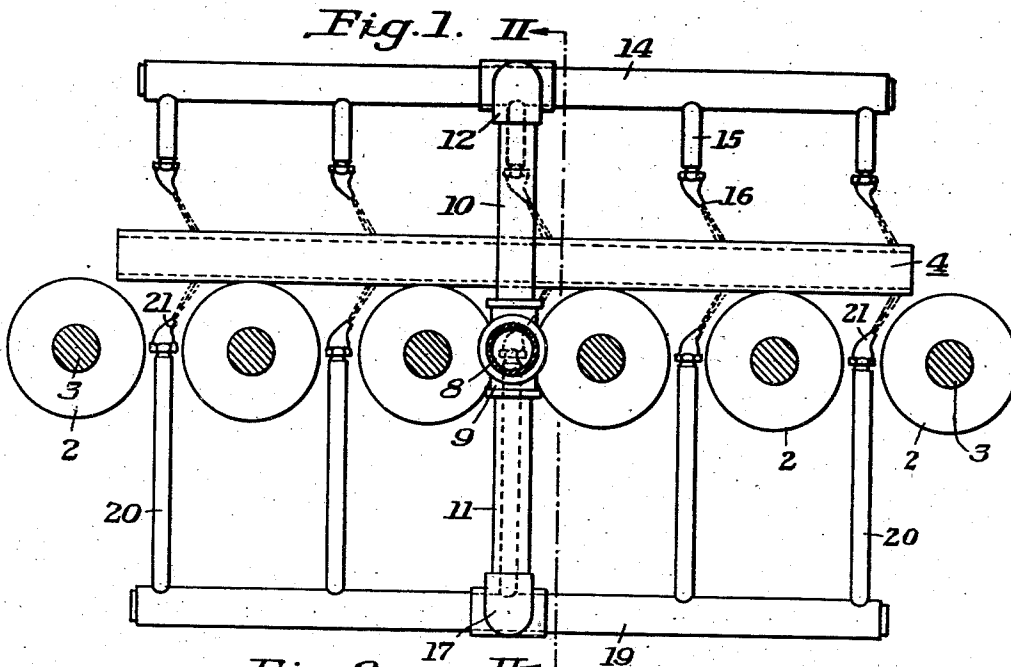
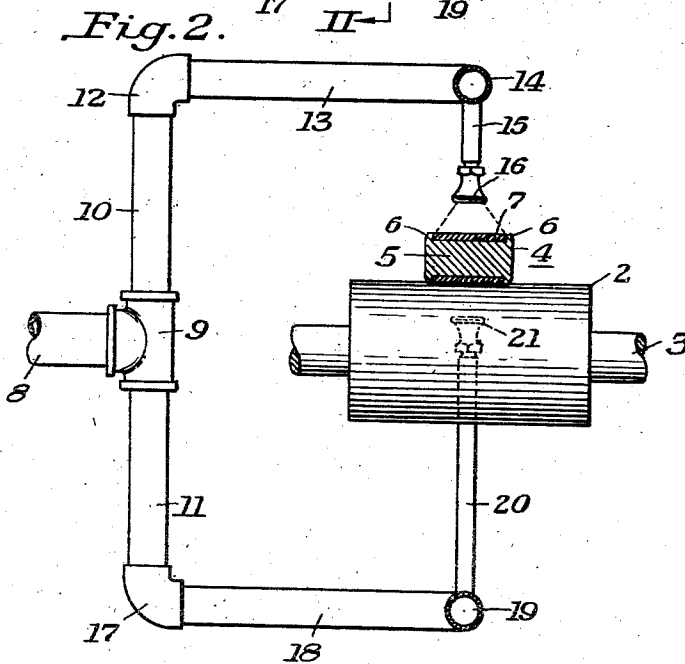
Oct. 15, 1946.

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2,409,422

TREATMENT OF BIMETALLIC BILLETS

Filed May 26, 1942



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UNITED STATES PATENT OFFICE

2,409,422

TREATMENT OF BIMETALLIC BILLETS

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Application May 26, 1942, Serial No. 444,609

3 Claims. (Cl. 80—60)

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This invention relates to the treatment of bimetallic billets. It relates to a method of and means for treating bimetallic billets so that any tendency which may exist for components of such billets to elongate differentially in hot rolling will be overcome or at least largely counteracted. The invention further relates to a method of and means for counteracting the tendency of a relatively more plastic billet component to elongate to a greater extent during hot rolling than a relatively less plastic component through control of the temperature of such components.

The invention, although broadly applicable to the treatment of bimetallic billets, will be described for purposes of explanation and illustration in connection with the treatment of a bimetallic billet comprising a steel backing or base member faced on two opposite faces with gilding metal, the facing members being positioned and held in place on the backing member by flanges of the backing member embracing the facing members. Bimetallic billets of this type are used to a great extent in the manufacture of bimetallic strip for making ammunition components, such, for example, as bullet jackets.

Different metals heated to a predetermined temperature and hot rolled at that temperature elongate to different extents during hot rolling. When a plurality of such metals are embodied in the same bimetallic billet as distinct billet components and the billet is heated and hot rolled the relatively more plastic metals will tend to elongate during hot rolling to an appreciably greater extent than the relatively less plastic metals. When a billet of the type above described comprising a steel backing member faced on opposite faces with gilding metal is heated to hot rolling temperature and hot rolled the gilding metal facing members will, in the absence of counteractive treatment, elongate to a greater extent during hot rolling than the steel backing member. This is because gilding metal is more plastic at hot rolling temperatures than steel.

Gilding metal is composed of about 89 to 91% copper and about 9 to 11% zinc. Copper especially is now very scarce and in great demand for war purposes. Thus it is extremely important to do away with any wastage of gilding metal due to relatively great elongation during hot rolling of the gilding metal facing members of a bimetallic billet such as above described. Moreover, the differential elongation of bimetallic billet components tends to interfere with proper bonding of the components during hot rolling.

I provide for doing away with all of the dis-

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advantages above pointed out which have heretofore been encountered in the rolling of bimetallic billets. I control the relative elongation during hot rolling of the billet components of a bimetallic billet and I preferably provide for equal elongation of such components so that a billet having equally long components of relatively more plastic and relatively less plastic metals can be rolled in a hot rolling mill to produce hot rolled strip having both components of substantially the same length. I control the extent to which the respective billet components elongate during the hot rolling by controlling their temperatures. By hot rolling the bimetallic billet with the relatively more plastic component at a lower temperature than the relatively less plastic component the tendency of the relatively more plastic component to elongate to a greater extent than the relatively less plastic component is counteracted. While the temperature control may be effected in various ways I prefer to first heat the bimetallic billet to hot rolling temperature and then cool the relatively more plastic component. I prefer to spray the relatively more plastic component with a cooling medium. I find that water is a satisfactory cooling medium for this purpose. The spraying of the relatively more plastic component or components of the billet lowers the temperature thereof relatively to the temperature of the relatively less plastic component or components so that the billet can be rolled into a strip having all components of the same length, thus eliminating wastage at the ends of the strip. Moreover, by starting with a billet having the respective components of substantially the same length and elongating the components together without substantial differential elongation any tendency of the components not to properly bond during hot rolling is minimized or entirely eliminated.

Other details, objects and advantages of the invention will become apparent as the following description of a present preferred embodiment thereof and a present preferred method of practicing the same proceeds.

In the accompanying drawing I have shown a present preferred embodiment of the invention and have illustrated a present preferred method of practicing the same, in which

Figure 1 is a side elevational view, partly in vertical longitudinal cross section, of apparatus for treating billets showing a billet being treated thereby; and

Figure 2 is a vertical transverse cross-sectional view taken on the line II—II of Figure 1.

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As well known in the art, billets are heated in a furnace provided for the purpose and are withdrawn from the furnace one by one and fed to the rolling mill where they are hot rolled. Billets may be conveyed from the heating furnace to the first stand of the hot mill by any suitable conveying apparatus, which apparatus conveniently comprises a roller table with the rolls either driven or not. The billet may be advanced either by driving the rolls or by propelling the billet along over the rolls and turning the rolls by the action of the billet thereagainst.

I preferably employ a roller table over which the heated billets pass in their successive movement from the heating furnace to the rolling mill and I provide means for acting on the billets while on the roller table. The billets may be acted on while moving on the roller table or they may be brought to a standstill while being acted on or they may be acted on partly while moving and partly while standing still. After they are acted on they are advanced to the rolling mill and rolled in the usual way.

The roller table which I preferably employ comprises rollers 2 having necks or axles 3, the rollers being either driven rollers or idlers as desired. The billets passing from the heating furnace to the rolling mill are supported upon and move over the rollers 2. One such billet is shown in the drawing, being designated generally by reference numeral 4. It comprises a steel body or backing member 5 having flanges 6 and facing members of gilding metal designated by reference numeral 7 held to the backing member 5 by the flanges 6. This form of billet is now in regular use for making bimetallic strip. If the billet were rolled as delivered from the heating furnace the gliding metal facing members 7, being relatively more plastic than the steel backing 5, would elongate during rolling to a greater extent than the backing member with the result that there would be a waste of the relatively expensive copper alloy as well as a possible failure of the billet components to properly bond during hot rolling due to the creeping action of the facing members relatively to the backing member. I provide cooling means for cooling the facing members so that they will be at a substantially lower temperature than the backing member when the billet enters the rolls of the rolling mill.

I provide a water supply pipe 8 which receives water at normal temperature. The pipe 8 leads to a T 9 from which risers 10 and 11 extend upwardly and downwardly, respectively. The riser 10 communicates through an elbow 12 and a horizontal pipe 13 with a header 14 having a series of downwardly projecting pipes 15 each terminating in a nozzle 16. The riser 11 communicates through an elbow 17 and a horizontal pipe 18 with a header 19 having a series of upwardly projecting pipes 20 each terminating in a nozzle 21. The nozzles 21 are disposed between the rollers 2 as shown. All of the nozzles are preferably directed toward the billet and also somewhat longitudinally to assist in spreading of the water over the surfaces of the billet to be cooled. The billet preferably moves from the heating furnace to the rolling mill in the direction from right to left viewing Figure 1, and if the billet is sprayed while moving the directing of the jets in the direction opposite the direction of movement will assist in spreading the water over the surfaces to be cooled. However, the billet may be brought to a stationary position

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such as that in which it is shown in Figure 1 and there sprayed or it may be disposed in such position but moved back and forth slightly during spraying to insure cooling of the portions desired to be cooled.

As shown, the nozzles 16 and 21 preferably are elongated transversely of the roller table so that they emit a jet or spray which extends generally transversely of the work. The positions of the nozzles relatively to the bimetallic billets 4 are preferably adjusted so that the jet or spray from each nozzle will flare out transversely just sufficiently to spray the full width of one of the gilding metal facing members 7. Thus the facing members will be sprayed and thus cooled while the backing member will not be directly sprayed except possibly for a little spray impinging upon the flanges 6, which will not materially affect the temperature of the backing member. The facing members are materially cooled by the spray so that during rolling their plasticity, and hence their elongation, will be materially less than at the original higher temperature at which the entire billet was delivered from the heating furnace, resulting in controlled elongation of the respective billet components. The facing members are preferably sufficiently cooled that when the thus treated bimetallic billet is hot rolled the facing members and the backing member will elongate to the same extent.

While I have shown and described a present preferred embodiment of the invention and a present preferred method of practicing the same it is to be distinctly understood that the invention is not limited thereto but may be otherwise variously embodied and practiced within the scope of the following claims.

I claim:

1. A method of treating a bimetallic billet having a relatively less plastic component and a relatively more plastic component assembled together comprising heating the billet to bring it at least to the hot rolling temperature of the relatively less plastic component, thereafter cooling the relatively more plastic component so that the components are at such temperatures that in hot rolling they will both elongate to approximately the same length and hot rolling the thus prepared billet to elongate the same.

2. A method of treating a bimetallic billet having a relatively less plastic component and a relatively more plastic component assembled together comprising heating the billet to bring it at least to the hot rolling temperature of the relatively less plastic component, thereafter spraying the relatively more plastic component to cool it so that the components are at such temperatures that in hot rolling they will both elongate to approximately the same length and hot rolling the thus prepared billet to elongate the same.

3. A method of treating a bimetallic billet having a relatively less plastic component and opposed relatively more plastic components at opposite faces of the relatively less plastic component, the components being assembled together, comprising heating the billet to bring it at least to the hot rolling temperature of the relatively less plastic component, thereafter cooling the relatively more plastic components so that the components are at such temperatures that in hot rolling they will all elongate to approximately the same length and hot rolling the thus prepared billet to elongate the same.

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