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WORKING OF METAL STRIP

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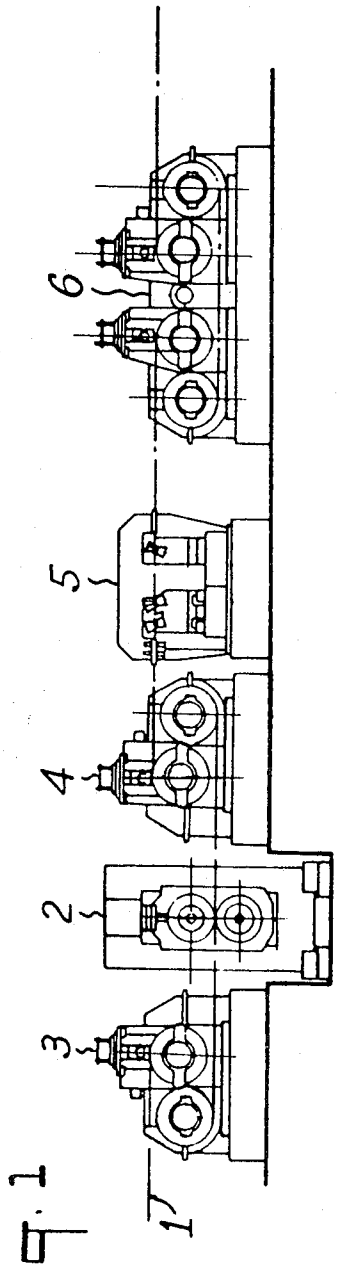


FIG. 1

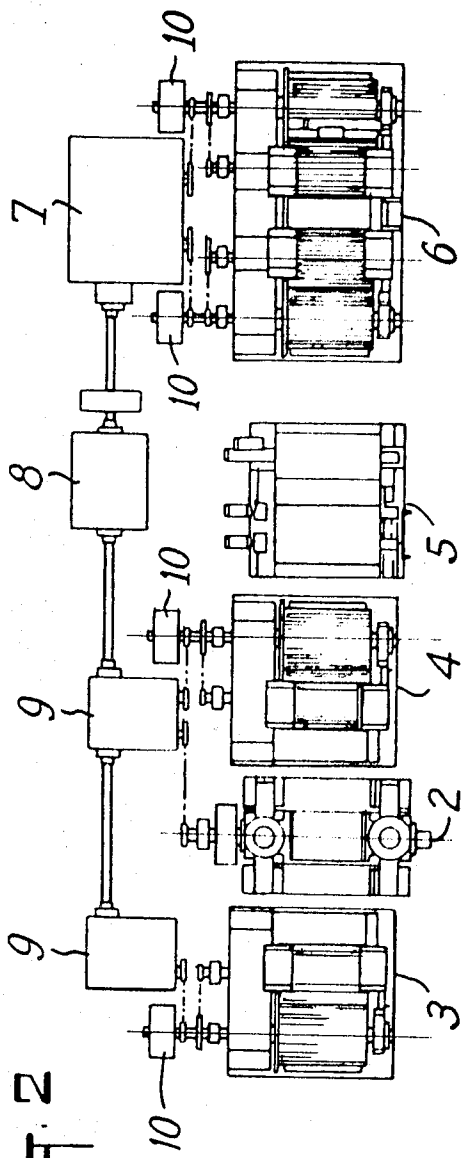


FIG. 2

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WORKING OF METAL STRIP

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ABSTRACT OF THE DISCLOSURE

The invention concerns the working of metal strip and is original in the fact that it comprises a temper mill located between an entry drag bridle and a pulling bridle followed by a roller leveler and a second exit pulling bridle, and more particularly the driving of the rolls of the bridles and temper mill in synchronism by a common source.

BACKGROUND AND SUMMARY

Our invention has particular application to the tension leveling of cold rolled strip. Heretofore, it has been proposed to use two machines, one consisting of a temper mill located between two bridles, followed in the line of the strip by a second machine consisting of a leveler located between two bridles. Although the strip was adequately worked in such proposal, the equipment was heavy and expensive, and the control between the two machines was sometimes difficult to maintain since each had its own bridle system and tension or elongation control. In order to reduce the cost of the equipment, it was proposed to use a temper mill and a leveler located between two common bridles. In this case, the equipment is simplified and less expensive, but the distribution of stresses was uncontrolled and the strip was not therefore correctly worked.

Our invention combines good features of both of these prior proposals in an efficient and economical manner.

DESCRIPTION OF THE DRAWING

In the drawing accompanying this description and forming a part of this specification, there is shown, for purposes of illustration, an embodiment which our invention may assume, and in this drawing:

FIG. 1 is a front elevation of a machine disclosing an embodiment of our invention, and

FIG. 2 is a plan view of the same.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In the embodiment herein disclosed, the strip **1** passes from a source, such as an uncoiler reel (not shown) to an entry drag bridle **3** which may be of conventional design. From the bridle **3**, the strip passes through a temper or skin pass mill **2** and to a pulling bridle **4**, the latter creating a tension in the strip, and the rolls of the mill **2** acting on the strip portion so tensioned.

At the exit of the bridle **4**, the strip **1** enters a roller leveling device **5**, and thereafter enters an exit bridle **6** for which the bridle **4** now becomes a drag bridle.

The bridles **3**, **4** and **6** are driven by single motor **7** through a speed variator **8** and separate differential couplings or gearing **9** and **10**. The rolls of the temper or skin pass mill **2** are also driven by the motor **7**, and a differential coupling may be interposed in the device, as shown. The strip **1** in the illustrated embodiment is pulled through the leveler **5** by means of the bridle **6** and therefore there is no drive to the rolls of this leveler.

Since the rolls of the temper or skin pass mill **2** are

driven in synchronism with the rolls of the bridles **3** and **4** by the single motor **7** and differential couplings **9** and **10**, and the drive may be varied to desired synchronism, the cold working of the strip **1** is achieved under enlongation, and consequently under tension, and such tension may be readily and closely controlled between the bridles **3** and **4** so that the best conditions may be achieved to prevent the strip from showing Lüders' lines, or other objectional markings.

Further, since the strip **1** is worked under elongation in the leveler **5**, the tension thereon may be closely and readily controlled by the drag bridles **4** and **6**, by means of the differential couplings **9** and **10**, so that the strip may be leveled under the best of conditions. The leveler **5** may be of conventional design and consist of several rolls of equal or unequal diameters. The drag and pulling bridles may have any number of rolls, the choice depending upon the tension required.

It will be appreciated that by use of a single drive motor **7**, the speed variator **8** and the differential couplings **9** and **10**, the driving relationship between the rolls of the bridles **3**, **4** and **6**, and the temper or skin pass mill **2**, may be closely controlled to provide the optimum in cold working conditions.

We claim:

1. Apparatus for cold working metal strip, comprising an entry drag bridle, a pulling bridle acting in cooperation with said entry drag bridle to establish a tension in the strip portion between said bridles, a temper mill between said bridles and having rolls working on the strip portion tensioned therebetween, an exit bridle acting in cooperation with said pulling bridle to establish tension in the strip therebetween, and a roller leveler between said pulling bridle and said exit bridle for working the strip tensioned therebetween.

2. The apparatus according to claim **1** wherein the respective rolls of said entry, pulling and exit bridles and of said temper mill are driven in synchronism by a common drive.

3. The apparatus according to claim **1** and further including a drive for the apparatus, including means for varying the speed of the respective drives to said entry, pulling and exit bridles and to said temper mill.

4. The apparatus according to claim **1** and further including a single motor for driving said apparatus, and including separate differential couplings for each of said entry, pulling and exit bridles and said temper mill, each of said differential couplings receiving power from said single drive motor.

5. The method of cold working metal strip, comprising working a portion of the strip tensioned between entry and pulling bridles by means of the rolls of a temper mill, and subsequently tensioning said strip portion between said pulling bridle and an exit bridle and working the strip portion so tensioned by means of the rolls of a leveler, and driving the rolls of all bridles and said temper mill in synchronism by a common drive.

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