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APPARATUS FOR PREPARING COLD-ROLLED STRIP METAL

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2 Sheets-Sheet 1

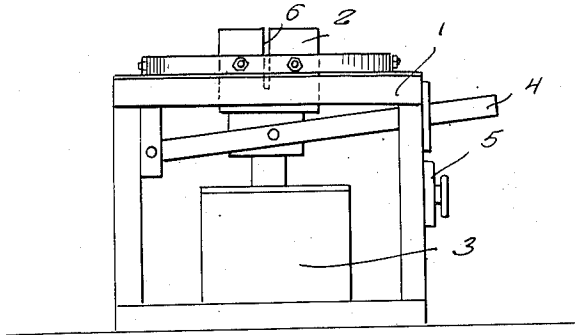


Fig. 1.

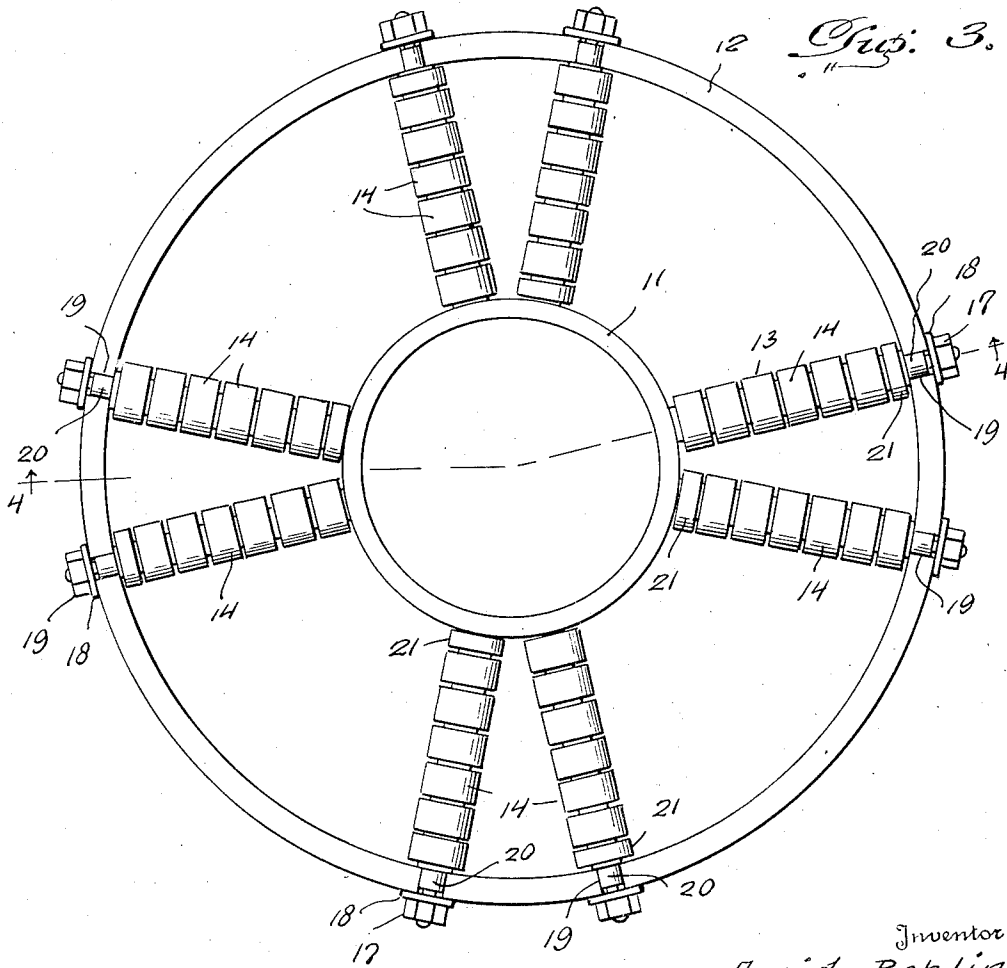


Fig. 3.

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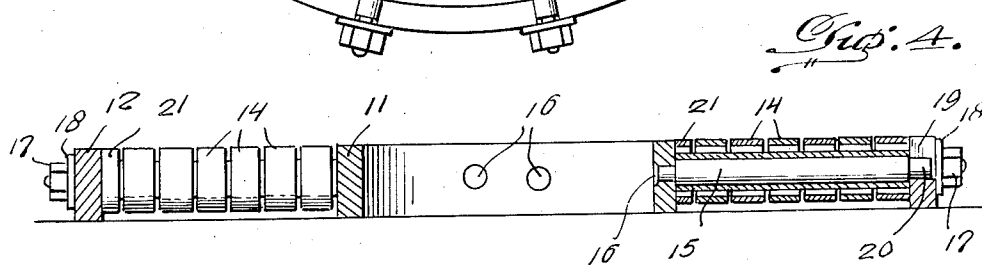
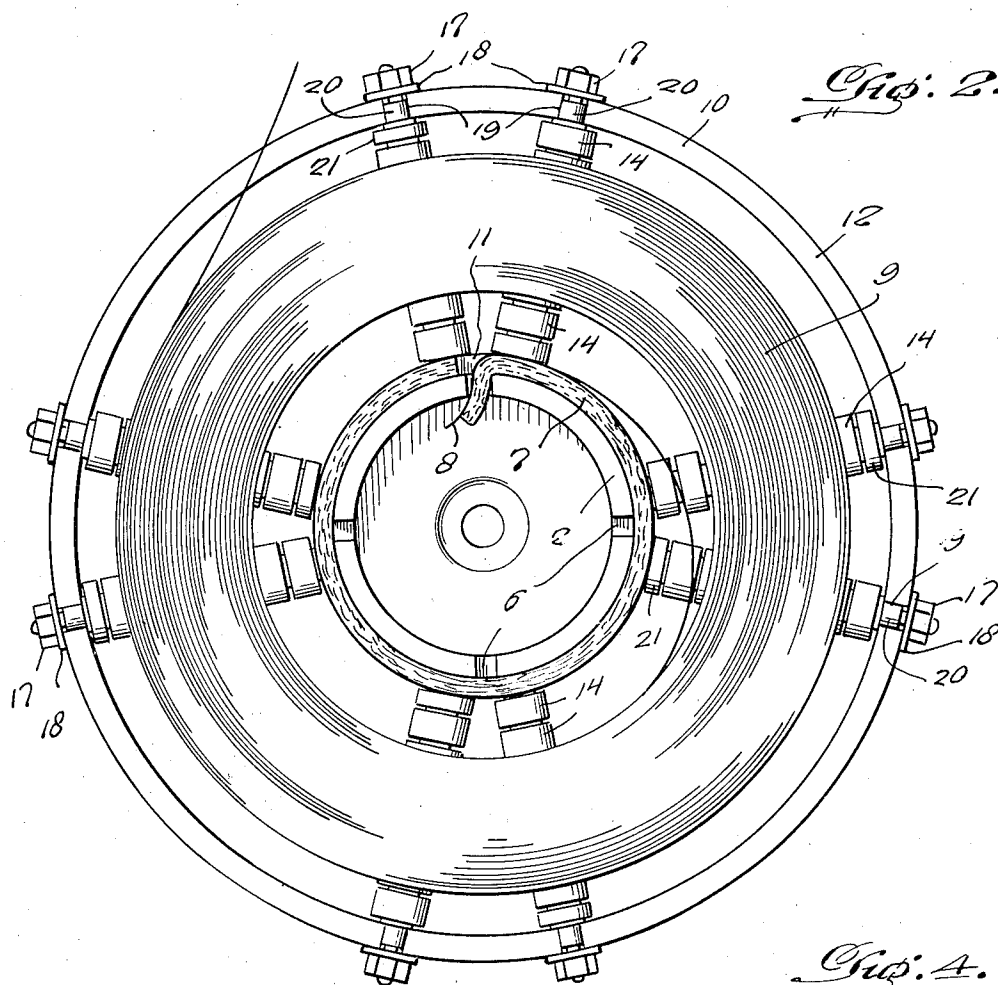
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APPARATUS FOR PREPARING COLD-ROLLED STRIP METAL

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7 Claims. (Cl. 242-78)

1

My invention relates to an apparatus for preparing cold rolled strip metal for annealing in coil form, or for bright annealing.

The main object of the invention is to provide a means of equalizing tensile stress in a coil of strip metal when it is being re-coiled preparatory to annealing.

A further object of the invention is to provide an improved supporting structure for strip metal during the coiling process whereby friction between the rotating coil and the stationary support thereof is minimized, resulting in the substantial elimination of excessive tensile stresses in the final coil.

Further objects of this invention will appear from the following description and claims, and from the accompanying drawings, wherein:

Figure 1 is a view in elevation showing diagrammatically a strip coiling apparatus.

Figure 2 is a plan view of a preferred embodiment of the improved coil supporting member of this invention, showing a coil of strip metal operatively supported thereon and connected to the coiling drum preparatory to re-coiling.

Figure 3 is a plan view of the coil supporting member of Figure 2 showing the structural details thereof.

Figure 4 is a cross-sectional view taken on line 4-4 of Figure 3.

In the manufacture of cold rolled strip metal, such as strip steel, considerable trouble has been encountered in annealing to soft tempers, particularly on the finer sizes such as .025 inch and less in thickness, due to excessive tensile stress remaining in the coils after they have been re-coiled preparatory to annealing. If this excessive tensile stress in the coils is not relieved properly, they will, under the effects of heat expansion, fuse together, turn to turn, due to the pressures developed during this operation.

If the coil of strip metal rests on the ordinary flat surface of the usual coiling bench, the coil cannot be sufficiently loosened and relieved, particularly the finer sizes of .025 inch and under in thickness, due to the frictional drag developed when revolving on the flat bench surface, resulting in a condition where coils are too tight for proper annealing and producing a final coil which will not unwind freely but show breaks and stickiness in the material.

Referring to Figure 1, a coiling apparatus comprising a table 1, a coiling drum 2, a driving motor 3 and a positioning lever 4 for vertically adjusting the drum 2, are shown. A rheostat 5 is employed for regulating the speed of rotation

2

of the driving motor 3 and drum 2. Drum 2 is provided with slots 6 for engagement with the inner end of the strip.

As shown in Figure 2, a section of leather belting 7 is employed as a liner around the coiling drum and the end 8 of the strip is inserted, together with an end of the leather liner into one of the slots 6 to provide a cushioned securement of the end of the strip with respect to the drum. The drum is rotated in a counter-clockwise direction in the embodiment of Figure 2 and the strip is fed to the drum from the original coil 9, resulting in the formation of a new coil.

In order to equalize the tensile stress in the strip during the re-coiling operation and to minimize frictional contact between the coil and the table 1, a supporting device 10, shown in Figures 3 and 4 and comprising an inner rim 11 and an outer rim 12 connected by radial spoke elements 13 carrying anti-friction roller elements 14 is employed between the coil and the table. The spoke elements 13 are arranged in pairs, one element of the pair carrying a shortened anti-friction roller element 21 adjacent the outer rim 12 and the other element of the pair carrying a shortened anti-friction roller element 21 adjacent the inner rim 11. This staggers the anti-friction roller elements so that with a given pair of spokes a supporting roller surface will always be presented to any turn of the coil.

The roller elements are mounted on radial rods 15. The inside ends 16 of the rods 15 are riveted or braced to the inner rim 11 and the outer ends 20 are drilled and tapped to receive a cap screw 17 and lock washer 18. The outer rim 12 is provided with slots 19 aligned with rods 15 to receive the ends 20 thereof and to permit their securement by cap screws 17.

As shown in Figure 4, the height of the inner and outer rims and the location of the spoke elements with respect to the bottom edges of the rims is such that there is free running clearance between the roller elements and the surface of the table.

Any desirable number of pairs of spoke elements 13 may be used as long as sufficient support for the coil is provided. The roller elements may be free running roller bearings of the usual type or may be merely free running sleeves. The width of the shortened roller elements 21 may be any desired fraction of the width of the main roller elements. In a practical embodiment of this invention a width of $\frac{3}{4}$ inch for the main roller elements and $\frac{3}{8}$ inch for the short-

ened roller elements has been used, with a thickness of $\frac{1}{2}$ inch for the outside rim and $\frac{1}{4}$ inch for the inside rim.

Although shown herein as a portable member, the support device 10 may be built into the table 1 as a permanent coil supporting surface thereon.

As above described, in the re-coiling operation the coil to be re-coiled to a smaller inside diameter preparatory to annealing is placed on the support 10 and its inside end is fastened to the re-coiling drum 2, the outside end thereof being anchored to an appropriate securing means to maintain the original coil stationary during the recoiling operation. As the diameter of the new coil increases there is a tendency to develop differential speeds in different parts of the coil. These speed differentials are automatically relieved by the sectional roller elements which revolve along with the segments of the coil which they support. By adjusting the speed-controlling rheostat 5, any desired tension can be had to suit the individual size of material and weight of coil to be prepared for the annealing operation.

Although a specific embodiment of this invention has been disclosed herein, it is to be understood that the present description and drawings are merely illustrative, and that various modifications may be made within the spirit of the invention. Therefore it is intended that no limitation be placed upon the invention other than as defined by the scope of the appended claims.

What is claimed is:

1. An anti-friction device for supporting a coil of strip metal during a coiling process comprising a pair of concentrically disposed ring elements; said ring elements being connected by a plurality of pairs of radial arms, said arms being provided with roller elements, the roller elements of each pair of arms being disposed in staggered relationship along the lengths of the respective arms whereby a roller surface is presented to the coil for a given pair of arms at any distance along the arms, the height of the ring elements being sufficient to provide free clearance between the roller elements and the bottom plane of the ring elements.

2. An anti-friction device for supporting a coil of strip metal during a coiling process comprising a pair of concentrically-disposed ring elements; said ring elements being connected by a plurality of pairs of radial arms, said arms being provided with roller elements, the roller elements of each pair of arms being disposed in staggered relationship along the lengths of the respective arms whereby a roller surface is presented to the coil for a given pair of arms at any distance along the arms, the height of the ring elements being sufficient to provide free clearance between the roller elements and the bottom plane of the ring elements, and wherein the roller elements consist of sleeves mounted for free rotation about said arms.

3. An anti-friction device for supporting a coil of strip metal during a coiling process comprising a pair of concentrically-disposed ring elements, said ring elements being connected by a plurality of pairs of radial arms, said arms being provided with roller elements, the roller elements of each pair of arms being disposed in

staggered relationship along the lengths of the respective arms whereby a roller surface is presented to the coil for a given pair of arms at any distance along the arms, the height of the ring elements being sufficient to provide free clearance between the roller elements and the bottom plane of the ring elements, and wherein the roller elements consist of roller bearings mounted for free rotation about said arms.

4. An anti-friction device for supporting a coil of strip material during a coiling process, comprising a support, a plurality of spaced radial arms mounted on said support, a plurality of roller elements rotatably mounted on each of said arms, the roller elements of adjacent arms being so disposed in radially-staggered relationship that the presentation of a roller surface to the coil on at least alternate arms at any point along the arms is insured.

5. An anti-friction device for supporting a coil of strip material during a coiling process, comprising a support, a plurality of spaced radial arms mounted on said support, a plurality of roller elements rotatably mounted on each of said arms, the roller elements of adjacent arms being so disposed in radially-staggered relationship that the presentation of a roller surface to the coil on at least alternate arms at any point along the arm is insured, and said roller elements comprising sleeves mounted for free rotation about said arms.

6. An anti-friction device for supporting a coil of strip material during a coiling process, comprising a support, a plurality of spaced radial arms mounted on said support, a plurality of roller elements rotatably mounted on each of said arms, the roller elements of adjacent arms being so disposed in radially-staggered relationship that the presentation of a roller surface to the coil on at least alternate arms at any point along the arms is insured, and said roller elements comprising roller bearings mounted for free rotation about said arms.

7. An anti-friction device for supporting a coil of strip material during a coiling process, comprising a support, means mounting a plurality of sets of anti-friction elements on said support, said sets each comprising at least two anti-friction elements in end-to-end relation, said sets being radially disposed around said support, and the elements of each set being so staggered radially relative to the elements of immediately adjacent sets that the presentation of an anti-friction surface to the coil at any point along the length of at least alternate sets of said elements is insured.

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