

Sept. 22, 1942.

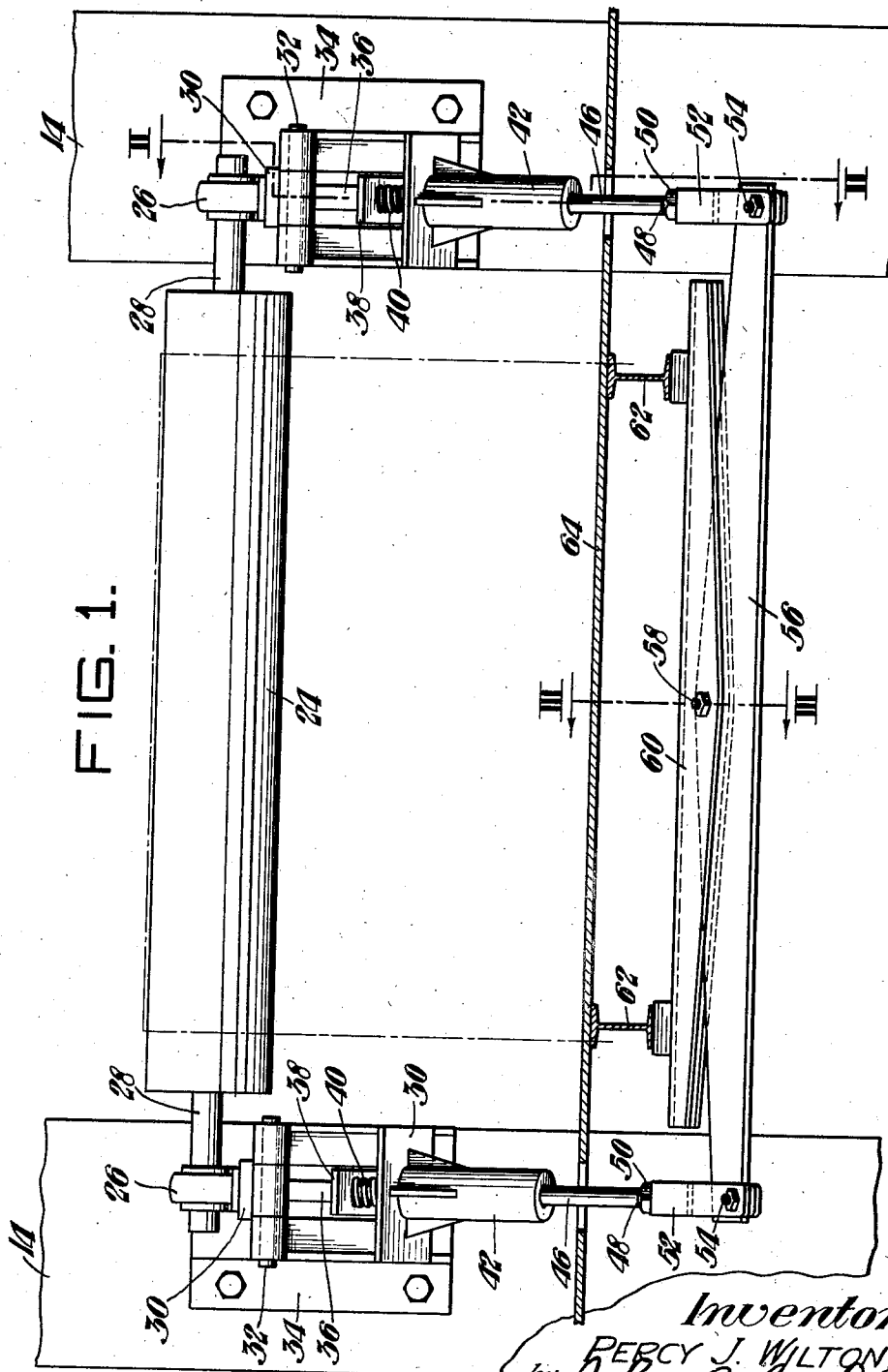
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2,296,753

EQUALIZING GUIDE ROLL

Filed Dec. 26, 1940

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

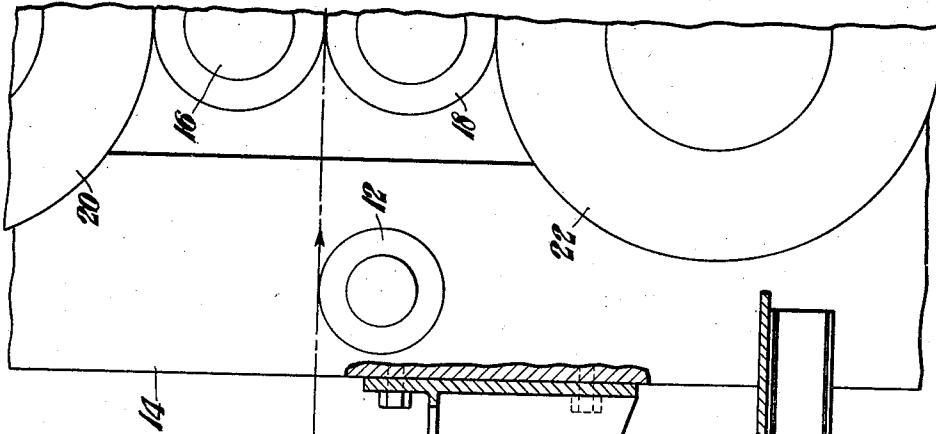


FIG. 2.

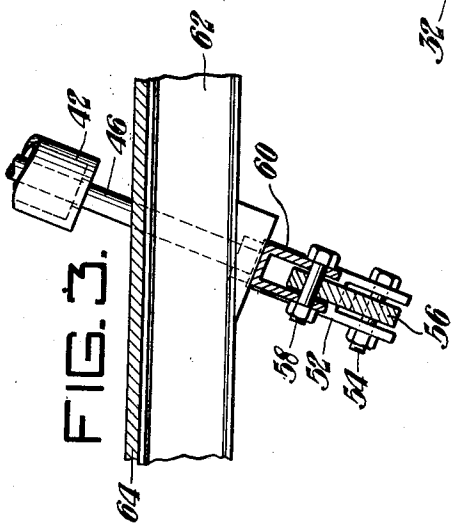


FIG. 3.

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UNITED STATES PATENT OFFICE

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EQUALIZING GUIDE ROLL

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3 Claims. (Cl. 80—51)

This invention relates to improvements in guiding means for strip material and aims particularly to provide a self-adjusting guide roller which will automatically move to a multiplicity of different axial positions to compensate for inequalities in the condition of strip material at different portions thereof.

Heretofore in guiding strip material from the drag reel to the working rolls of a rolling mill, difficulty has been encountered due to the fact that in the preliminary processing of such strip material it is frequently distorted to such a degree that one edge is wavy and the other edge comparatively straight. When such uneven material is fed over a fixed guide roll, difficulty has been encountered due to the fact that the working rolls of the mill and also the conventional guide billy roll rotate on parallel horizontal axes, as does also the drag reel which carries a supply of material fed to the mill. With such parallel fixed axes of all rolls, when a wavy strip is encountered a greater tension is exerted on the straight portion of the strip than on the other wavy portion. This causes difficulties, sometimes even severing or tearing a portion of the sheet.

The present invention provides a guide roll having an improved yieldable mounting so constructed and arranged that the axis of the guide roll can shift out of parallelism with the axes of the working rolls and fixed billy guide roll of the mill and consequently out of parallelism with the axis of the drag reel. Thus the improved mounting for the guide roll provides means for equalizing the tension exerted throughout the width of the sheet. Thus the combined action of the guide roll with its novel mounting, the drag roll and the working rolls provides an arrangement for so equalizing and distributing the tension as to improve the resulting product.

The above and other features of the invention will be fully understood from consideration of the following detailed disclosure when read in connection with the accompanying drawings, in which:

Figure 1 is an end elevation of the guide roll and the improved supporting means therefor;

Figure 2 is a section on the line II—II of Figure 1; and

Figure 3 is an enlarged detail section on the line III—III of Figure 1.

Referring in detail to the drawings, the numeral 10 represents a conventional form of drag reel into which coils of previously processed material are inserted. The drag reel is provided

with any suitable conventional means for exerting a back tension on the coiled metal strip carried on the reel. An idler billy roll 12 is mounted in suitable bearings in the rolling mill housing 14 to facilitate the feed of the strip to the working rolls 16 and 18 of the mill which react in the conventional manner against the relatively larger backing rolls 20 and 22. The axes of the working rolls, the backing rolls, billy roll and the drag reel are all parallel and are substantially horizontally disposed.

In accordance with the teachings of the present invention, I provide a guide roll 24 which is mounted by the improved means so constructed and arranged as to permit the axis of rotation of the guide roll to shift out of parallelism with the axes of the working rolls, billy roll and the drag reels above referred to so as to thus compensate for inequalities such as wavy edges in different parts of the metal strip fed from the drag reel 10. The novel mounting for the guide roll 24 includes self-aligned bearings 26 forming somewhat flexible or self-aligning journals for the shaft 28 on which the guide roll is carried. Each self-aligned bearing 26 is carried by a respective base member 30 which is pivoted on a respective pivot 32 provided in the outer end of a bracket 34 secured to the mill housing. Each base member carries an inwardly extending arm 36 carrying a plate 38 for coaction with a compression spring 40 housed in a cylindrical casing 42 secured to the bracket 34. Each spring 40 reacts against a collar 44 secured to the upper end of a rod 46 whose lower extremity is threaded, as indicated at 48, to receive a nut 50 which abuts a clevis 52. Each clevis 52 is pivotally connected by a bolt 54 with the respective end of an equalizer bar 56 which in turn is pivotally mounted on a stud 58 secured to the central portion of a hanger 60 which is fixedly suspended from beam members 62 which also serve as supports for the floor plates 64 adjacent the mill housing.

With the described arrangement it will be apparent that since the bearings 26—26 at opposite ends of the guide roll 24 are self-adjusting, and since each bearing is mounted on an independently pivoted base member 30, and since each base member reacts through the yielding spring 40 against the pivotally mounted equalizer link 56, in the event a wavy portion of the strip comes into contact with the guide roll, one or the other of the base members will be rocked on its respective pivot 32 against the yielding action of the corresponding spring 40 and thus the axis of the guide roll will be shifted sufficiently out

of parallelism with the axes of the working rolls 16 and the reel 10 so as to automatically compensate for the inequalities of the strip. The result of this action will be to redistribute the tension transversely of the strip or, in other words, to equalize it so as to smooth out such inequalities. This materially contributes to the production of a more uniformly rolled product and provides extremely sensitive means whereby various inequalities in the coil imparted by a previous rolling operation are entirely eliminated. Thus unequal lengths in the opposite edges of the strip due to wavy contour are absorbed by the floating action of the guide roll 24 which instantly compensates for such conditions by tilting upwardly on the side of the strip which is longer than the straight side because of such waviness of the sheet.

Heretofore considerable difficulty has been experienced with coils which were out of round or which had varying degrees of tightness in the coil. These difficulties are also overcome by the floating action of the guide roll 24, since in case of loose tension on the strip the guide roll will be automatically forced upwardly by the action of the springs 40, thus taking up the slack. On the other hand, in the case of an abnormally excessive tension on the drag reel, the reverse action will permit compression of the springs 40, thus depressing the guide roll from its normal position. The described arrangement thus provides an extremely sensitive balance of the spring tension through the medium of the equalizer bar 56 and the rods 46 acting in concert with the springs 40. It is apparent that with the described arrangement the yielding pressure exerted by each individual spring 40 can be adjusted with precision by manipulating the adjusting nuts 50 which react against the clevises 48.

Practice has demonstrated that the invention provides the following improvements over conventional prior practice. Shocks of drag reel tension changes, and mill speed changes are dampened sufficiently to prevent breaks in strip such as frequently occurred in using prior known apparatus. Coils with one wavy edge and one straight edge would heretofore cause the flat edge to take all the tension between the drag reel and the mill, but with the device of the present invention since the equalizing roll is free to move, it follows instantly the contour of the strip and will tighten a wavy edge and reversely decrease the tension on a straight edge. Coils slightly out of round due to warpage or faulty recoiling invariably "side break" when the larger diameter is on the outside, or away from the

mill. With my improved equalizing roll and self-adjusting mounting for the guide roll taking care of variations in tension caused by such conditions, breaks in the strip are prevented. Coils with varying tightness due to annealing temperatures have a natural tendency to cause changes in tension resulting in sticker breaks in the strip. The novel equalizing and self-adjusting supporting means for the guide roll absorbs or compensates for these changes in tension, thus eliminating strip breakage.

While I have described quite precisely a specific design and arrangement of parts, it is not to be construed that I am limited thereto since various modifications and substitutions of equivalents may be made by those skilled in the art without departure from the invention as defined in the appended claims.

I claim:

1. In an apparatus of the character described, a reel carrying a supply of coiled material, means for drawing the material therefrom, a guide roll between the latter and said reel, self-aligning bearings supporting the opposite ends of said roll, a pivotally mounted base member for individually supporting each of said self-aligning bearings with freedom for movement in directions substantially normal to the roll axis, an equalizer bar coacting with both said supporting means, and respective cushioning means interposed between said equalizer and each of said supporting means.

2. In an apparatus of the character described, a reel carrying a supply of coiled material, means for drawing the material therefrom, a guide roll between the latter and said reel, respective self-aligning bearings at opposite ends of said roll, respective pivoted base members for said bearings, an equalizer pivotally supported intermediate said base members, and respective means each including a cushion element for operatively connecting said base members with said equalizer.

3. Apparatus for guiding strip material including a guide roll, pivotally mounted spaced supports adjacent the ends thereof, self-aligning bearings secured thereto in which the opposite ends of the guide roll are journaled, an equalizer bar movable about a fixed axis located intermediate said bearings and extending in a plane perpendicular to said roll, and respective connections between the ends of the equalizer bar and said pivoted supports, each connection having cushioning means interposed between the equalizer and the support with which it coacts.

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