

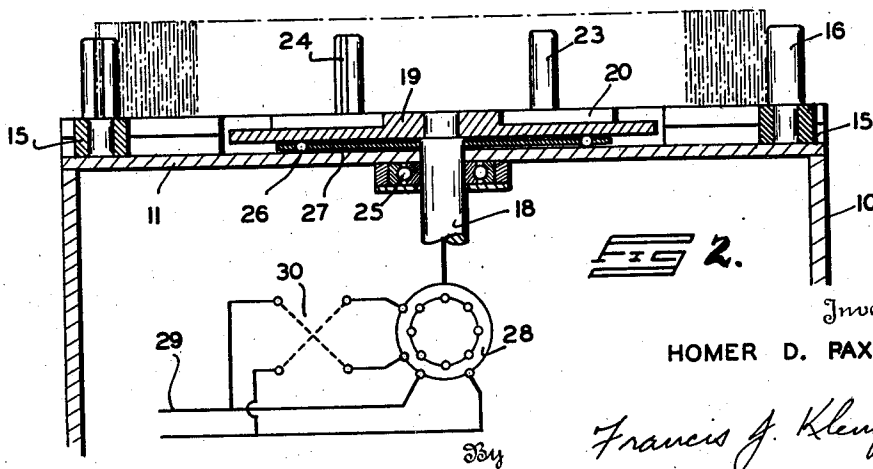
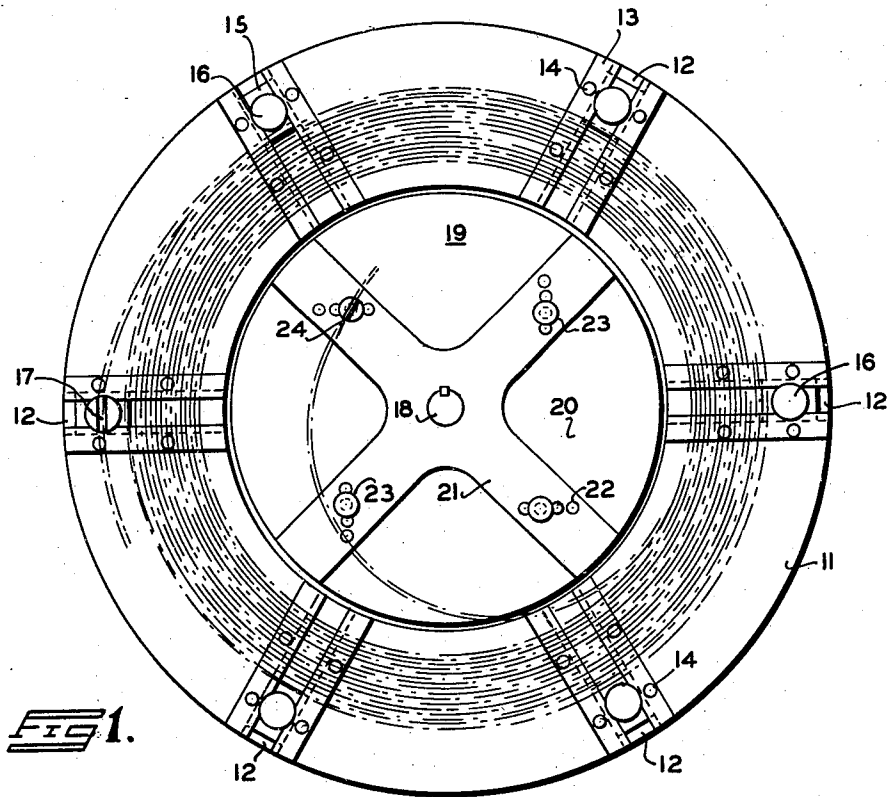
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COIL EXPANDER

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COIL EXPANDER

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This invention relates to a coil expander and more particularly to an apparatus which is operative to condition coils of strip steel or other metal. In the processing and handling of coiled strip stock it is often necessary or desirable to alter the physical character of the coils and such alteration may consist, for example, in the expansion and tightening of the coil or in the contraction and loosening of the coils. Both these operations may find utility in the pickling of coiled stock by the batch method in which the coils are immersed in the corrosive solution, washed, dried, oiled and prepared for shipment or use. To facilitate the operation of this process it is desirable that the adjacent convolutions of the coil be spaced to allow entrance and flow of the pickling and washing solutions between the convolutions and upon completion of the process it is desirable to retighten the coil to enable it to be bound for shipment or to allow its proper application to an uncoiling mechanism.

Also in annealing operations the coils should be more or less loosely wound to prevent welding during the heating treatment. Elongation of the strip under heat tends to cause an additional tightening of the coils and it is highly desirable therefore that the coils be in a loose condition when placed in the annealing furnace.

Other practical applications of the concept and principles involved should be apparent. For example, a coil which is too loosely wound, commonly termed a "soft" coil, is difficult to handle, bind and ship and if allowed to stand on its edge for any appreciable length of time, the natural set attained in the convolutions thereof is out of round which is objectionable in the operation of uncoiling mechanisms. Consequently it is usually desirable to maintain a predetermined degree of tightness or "hardness" in coils of metal strip.

The primary object of the invention therefore, is the provision of a simple but efficient apparatus which is operative to tighten or loosen coils of metal strip to any desired degree. Another object of the invention is the provision of an apparatus having the above general characteristics which is operative to change the inner and outer diameters of any particular coil of metal strip within the limits of the capacity of the particular machine being employed.

The above and other objects and advantages of the invention will become apparent upon a consideration of the following detailed specification and the accompanying drawing wherein

there is specifically disclosed a preferred embodiment of the invention.

In the drawing:

Figure 1 is a plan view of an apparatus constructed according to the principles of the invention, the view including a coil, in dotted outline, in operative position on the apparatus; and Figure 2 is a transverse sectional view through a portion of the apparatus of Figure 1, the power supplying means being shown in schematic outline.

The apparatus of the invention, in its preferred and illustrated embodiment, comprises a circular base or support 10 to the top of which is fixed a plate 11. Circumferentially spaced about the outer portion of the plate 11 are a number of radially extending guideways 12 each consisting of a pair of bars 13 which are fastened to the plate 11 by the screws 14. Bars 13 are rabbeted to receive the blocks 15 and it should be apparent that upon loosening of the screws 14 the blocks may be adjusted radially inward or outward and relocked in position by tightening the screws. Each of the blocks 15 carries an upwardly extending post 16 one of which is provided with a diametrically extending slot 17 to provide a clamping device the function of which will be hereinafter fully explained.

Extending centrally through the plate 11 is the vertical shaft 18 to the upper end of which is keyed a rotary table 19. This table is provided, on its upper face with depressed quadrants 20 the function of which is to enable the downwardly and outwardly extending fingers of a coil lifting device to pass under the lower edge of the convolutions of the coil resting on the machine. In each of the spokes 21 intermediate the quadrants 20 of the table 19 is a plurality of radially spaced apertures 22. Apertures 22 are adapted to receive the reduced lower end portions of posts 23 one of which may be provided with a diametrically extending slot 24 to provide a clamping or anchor device the purpose of which will be explained below.

A radial bearing 25 journals the shaft 18 at the plate 11 to take any lateral strains or pressure and a thrust bearing consisting of circumferentially spaced balls 26 and a space plate 27 is positioned between the table 19 and the plate 11 to support the weight of the rotary assembly and of the coil positioned thereon. Shaft 18 is arranged to be rotated in alternate directions and at a variable rate of speed by a reversing motor operating through a suitable speed reduction unit as is well understood in the art. This power assembly is

indicated schematically at 28 as deriving electrical current from line 29 and employing a reversing switch 30.

In operation, a suitable centering device, not shown, may be employed to align the coil axially with the center of the table 19 as the coil is lowered onto the table. The outer end of the outer convolution of the coil is gripped in the clamping slot 17 and all the posts 16 having been previously adjusted to provide the desired final coil diameter, rotation of the table 19 in the proper direction will rotate the portion of the coil resting on the table thereby unwinding the coil and compacting the strip thereof against the posts 16. The tightness of the finished coil is determined by the speed of rotation of the table 19 and by the physical characteristics of the strip of the coil. In this manner a coil may be either expanded or tightened or receive both of these treatments simultaneously. If it is desired to loosen the coil the outer end thereof is anchored in clamp 17 while the inner end thereof is anchored in clamp 24 and the table 19 rotated in the opposite direction for the required angular distance and at the required speed. If it is desired to rewind the coil to a smaller diameter all of the four posts 23 are inserted in selected apertures 22 and table 19 rotated in the proper direction until all the strip is compacted against the posts 23. It will be understood, of course, that in expanding a coil a short end portion of the inner convolution will remain curved inwardly, as indicated in Figure 1 but this portion may be readily moved by hand into engagement with the adjacent convolution of the coil. Likewise, a short end portion of the outer convolution of the coil will remain outside of the general outline of the coil in contracting the coil but this portion may also be readily moved into the general peripheral contour of the treated coil. Frictional contact is relied on to prevent linear movement of the strip through the slots 17 and 24 but if it is found that this restraint is not sufficient a suitable wedging arrangement or other expedient may be resorted to.

It should now be apparent that I have provided an improved apparatus which accomplishes the objects initially set out. The machine is instantly available to expand or compact and/or tighten or loosen coils of strip and by controlling the speed and extent of rotation of the table 19 any desired final coil characteristic may be attained. In addition to the above the construction of the machine is such that it may be readily adjusted to operate on coils of different weights and sizes.

The above specifically described embodiment of the invention should be considered as illustrative only as obviously many changes may be made therein without departing from the spirit or scope of the invention. Reference should be had therefore to the appended claims in determining the scope of the invention.

What I claim is:

1. Apparatus of the character described comprising in combination a base, a plurality of circumferentially spaced but radially extending guideways on said base, an upwardly extending retaining post adjustably mounted in each of said guideways, at least one of said posts being provided with means to engage and secure an end of a length of coiled strip, a rotary table positioned centrally of said guideways and posts and having a plurality of circumferentially spaced upwardly extending retaining posts at least one of which is provided with means to engage and secure an end of a length of coiled strip, means

adjustably mounting said second mentioned posts on said table whereby the radial distance between the axis of rotation of said table and said second mentioned posts may be varied, and means to rotate said table in alternate directions.

2. Apparatus according to claim 1 further characterized in that the upper surface of said table is depressed circumferentially intermediate the portions thereof supporting said second mentioned posts.

3. Apparatus of the character described comprising in combination a horizontally disposed support, a vertical shaft extending through said support, a rotary table of substantial area keyed to the upper end of said shaft with its upper surface flush with the end of the shaft and overlying the center portion of said support, a thrust bearing between said support and table, an annular series of circumferentially spaced upwardly extending retaining posts on said support outwardly of said table, and means to rotate said shaft, said support having circumferentially disposed supporting surfaces outwardly of said table and aligned substantially horizontally with the top surface of the table.

4. Apparatus according to claim 3 further including an upwardly extending means on said table to engage and secure an end of a coiled length of metal strip.

5. Apparatus for conditioning coils of metal strip comprising a fixed support, a rotary table positioned centrally of said support, a plurality of circumferentially spaced but radially extending guideways on said support outwardly of said table, each of said guideways comprising at least one radially extending bar, a block adapted to be clamped in adjusted position under and by said bar, each of said blocks being provided with an upwardly projecting post, and means to rotate said table.

6. Apparatus according to claim 5 further characterized in that the upper surface of said table is provided with radially extending ribs the upper surfaces of which lie in the same plane as the upper surfaces of said bars.

7. Apparatus of the character described comprising in combination a horizontally disposed support, a vertical shaft extending through the center of said support, a rotary table keyed to the upper end of said shaft and overlying the center portion of said support, a thrust bearing between said support and table, a plurality of circumferentially spaced upwardly extending retaining posts on said support outwardly of said table, and means to rotate said shaft, one of said posts being provided with means to engage and secure an end of a coiled length of strip.

8. Apparatus according to claim 7 further including an upwardly extending means on said table to engage and secure the inner end of a coiled length of strip.

9. Apparatus of the character described comprising in combination a table having a horizontally disposed supporting surface adapted to support at least a portion of a side edge of a coil of metal strip and the like, means mounting said table for rotation about a vertical axis, a normally fixed supporting member having a supporting surface disposed circumferentially outside of said table and aligned substantially horizontally with said supporting surface of said table, means to rotate said table, and an annular series of posts fixed with respect to said supporting member to engage the outer convolution of said coil.

10. Apparatus for expanding and/or tightening coils of metal strip comprising in combination, means to engage and retain the outer periphery of the coil, a rotary table positioned centrally of said retaining means and adapted to support and rotate the coil, means to rotate said table, a plurality of upwardly extending posts carried by

5 said table, at least one of said posts provided with means to engage and secure the inner end of a coiled length of metal strip and means to change the distance between the axis of rotation of said table and said posts.

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