L. F. STEPHAN

METHOD OF COILING STRIP

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FIG. 1

FIG. 2

Inventor
LOUIS F. STEPHAN

By Donald L. Dalton
Attorney
1. 3,328,989

METHOD OF COILING STRIP
Louis F. Stephan, Valparaiso, Ind., assignor to United States Steel Corporation, a corporation of Delaware
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The present invention relates generally to rolling mill equipment and, more particularly, to an improved method of coiling continuous strip.

In the manufacture of many types of continuous strip steel, the final processing steps before shipment consist of passing the strip through a continuous pickling line and then recoiling it on an upcoiler as it emerges from the pickle line. Conventional upcoilers are generally equipped with adjustable strip-bending rolls that shape the strip to form the initial coil wraps which comprise the inside coil diameter of a coil as it is subsequently formed on the cradle rolls. The initial wraps of the coil so formed determine the size and condition of the inside diameter of the finished coil.

Prior to my invention, upcoilers were not equipped with any means for controlling the inside coil diameter after the strip had passed through the bending rolls. Inasmuch as strip of different gauges and physical properties coiled differently, it was not possible to consistently produce coils having inside diameters of uniform dimension and condition on upcoilers prior to my invention. Further, as a coil was initially formed on an upcoiler prior to my invention, slippage frequently occurred between the coil and the cradle rolls until the coil grew to sufficient weight to overcome the slippage. This caused undesirable, loose inner wraps to develop in the coil.

Since most users of strip steel must be provided with coils having specified inside diameters so the coils can be accommodated on their equipment, it was necessary for strip steel suppliers to add another step to the processing of the steel strip after pickling. After a coil had been recoiled on an upcoiler, it was necessary to remove it from the upcoiler and carry it to another piece of equipment where it could be recoiled again, this time around a mandrel so that the coil would have an inside diameter of desired size and shape and be free of loose inner wraps. This additional operation obviously increased production costs.

It is accordingly, the primary object of my invention to provide a unique method of coiling continuous strip into coils of predetermined inside diameter size without the use of a mandrel or the like, which includes the steps of imparting a lengthwise curvature to the strip, then feeding the curved strip onto cradle rolls to coil it, and exerting a predetermined fixed pressure on the outer surface of the coil during the initial stages of its formation to thereby control the inside diameter of the coil and minimize slippage of the coil on the cradle rolls. This and other objects will become more apparent after referring to the following specification and attached drawings.

FIGURE 1 is a plan view; and FIGURE 2 is a side elevational view.

Referring more particularly to the drawing, reference numeral 2 designates generally an upcoiler having the apparatus of the invention incorporated therein. The upcoiler 2 includes a pair of feed rolls 4, a set of bending rolls 6 and a pair of cradle rolls 8, all mounted on a frame 10. The feed rolls, bending rolls and cradle rolls are conventional and function in a well-known conventional manner.

A double-acting, upstanding fluid pressure cylinder 12 is pivotally mounted by its lower end on the frame 10 adjacent to and above the feed rolls 4. A reciprocable piston rod 14 projects from the upper end of the cylinder 12 and is pivotally connected with one end of a lever 16, which in turn is rigidly connected at its other end with one of a rotatable shaft 18. The portion of shaft 18 adjacent lever 16 is rotatably supported in an upright bracket 19. The opposite end of the shaft 18 is rotatably supported on a post 20 and carries a beam 22 rigidly mounted thereon. The beam 22 is mounted intermediate its ends on the shaft 18 and extends transversely of the shaft, as best shown in FIGURE 1.

One end 24 of the beam 22 extends toward the cradle rolls 8 and is adapted to move in an arc in the vertical plane containing the cradle rolls when the shaft 18 is rotated by projection or retraction of the piston rod 14. A roller bracket 26 having a pair of rollers 28 journaled therein is pivotally mounted on the end 24 of the beam 22.

In operation, the leading end of a continuous strip S is threaded between the feed rolls 4, which then advance the leading end of the strip through the bending rolls 6 and onto the cradle rolls 8 to form an initial inner coil wrap A. After the initial inner coil wrap A is formed, fluid pressure cylinder 12 is actuated to project the piston rod 14 and rotate shaft 18 so that end 24 of beam 22 is lowered toward the cradle rolls 8 to place the roller bracket 26 in a predetermined position above the cradle rolls. In this position, the rollers 28 in the bracket 26 define with the cradle rolls 8 a confining guide for the curved strip as it is fed onto the cradle rolls. The distance between the cradle rolls and the roller bracket depends upon and is directly proportional to the inside coil diameter desired.

After the roller bracket has been lowered to the predetermined position, it is maintained therein by the fluid pressure cylinder 12; and the rollers 28 prevent slippage of the coiling strip on the cradle rolls and limit and control the maximum diameter of the initially-formed inner coil wraps. After a sufficient number of inner coil wraps have been formed to insure a fixed inside coil diameter, the pressure cylinder 12 is actuated to retract the piston rod 14. Retraction of the piston rod 14 causes counterclockwise rotation of shaft 18, pivoting of beam 22 and lifting of the roller bracket 26 clear of the coiling operation, as shown by broken lines in FIGURE 2.

If desired, tables (not shown) indicating the pressure load which must be maintained by the pressure cylinder to hold the roller bracket in proper inside-diameter-controlling position for strip material of various gauges and tempers can be formulated through trial-and-error procedure. These tables can then be used to guide future recoiling operations on the upcoiler.

While one embodiment of my invention has been shown and described, it will be apparent that other adaptations and modifications may be made without departing from the scope of the following claim.

I claim:

A method of coiling continuous strip without the use of a mandrel including the steps of first feeding said strip through bending rolls to impart a lengthwise curvature thereto, then continuously feeding said curved strip
onto cradle rolls to coil the same, exerting a predetermined fixed pressure on the outer surface of the coil of said strip as it begins to form on said cradle rolls, and then removing said fixed pressure after only a portion of the coil has been formed.

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CHIARLES W. LANHAM, Primary Examiner.
A. RUDERMAN, Assistant Examiner.