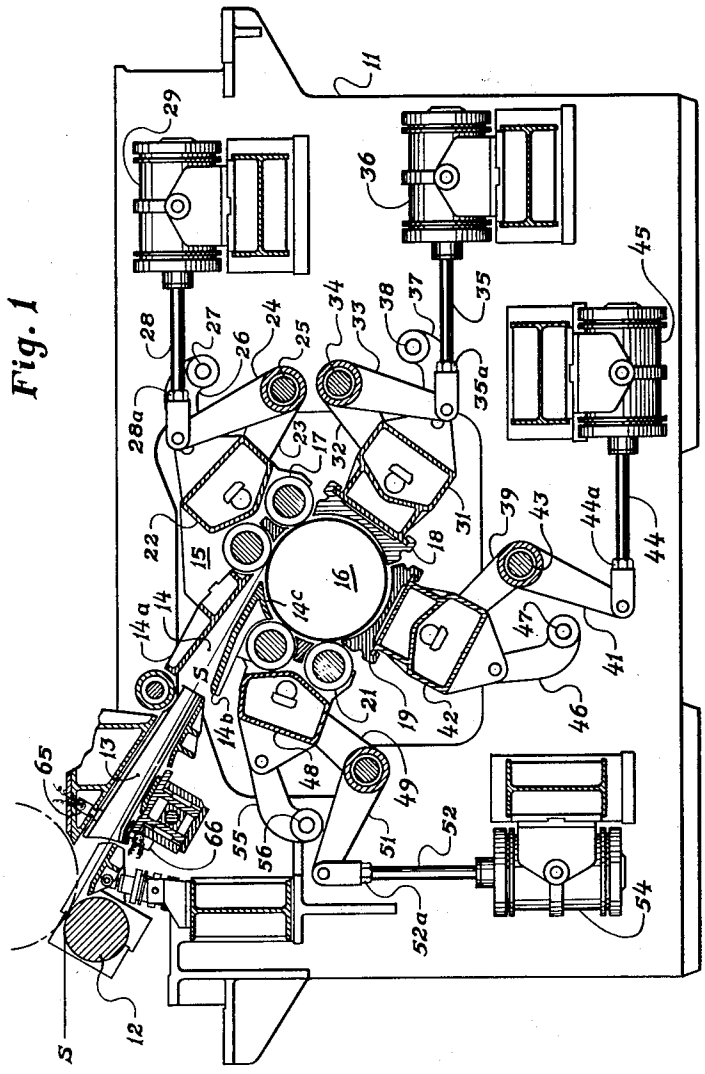
July 31, 1956 M. P. SIEGER 2,756,942

APPARATUS FOR COILING STRIP MATERIAL

Filed June 18, 1952 3 Sheets-Sheet 1

Fig. 1



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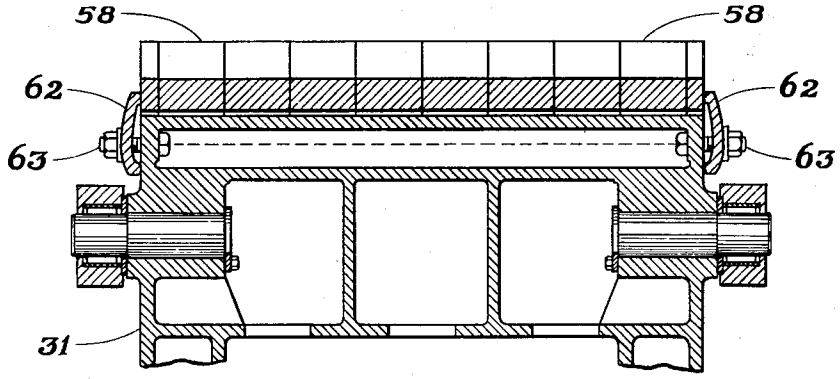


Fig. 3

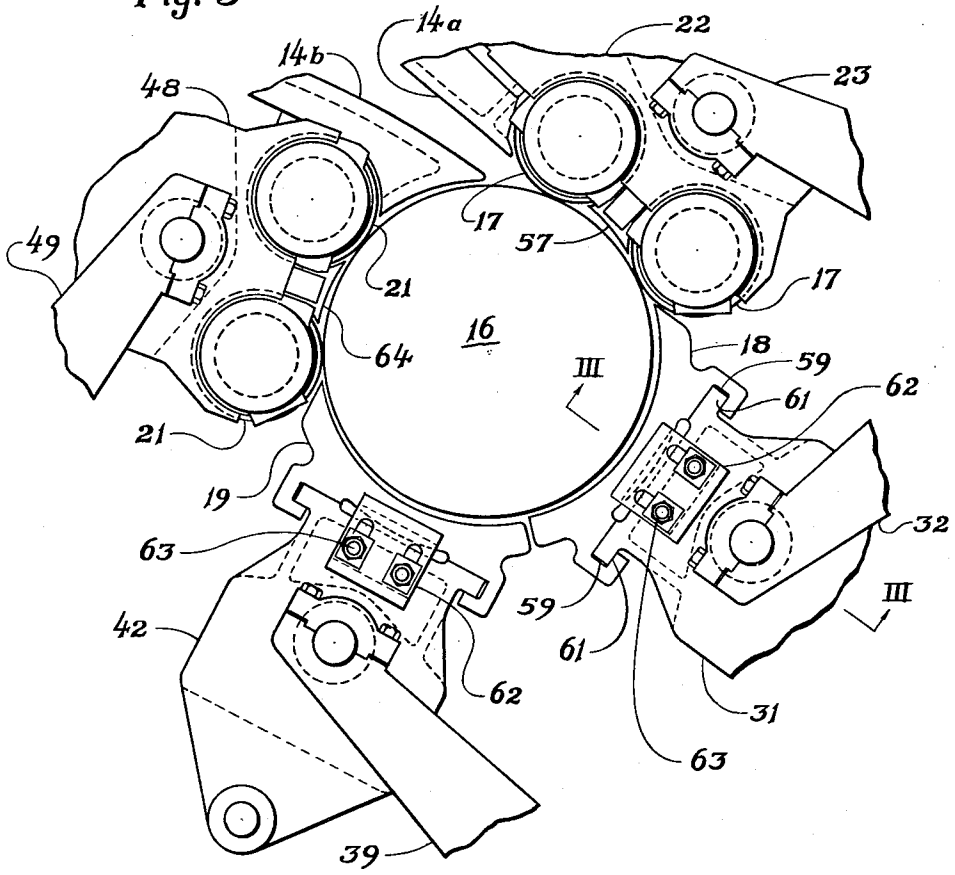


Fig. 2

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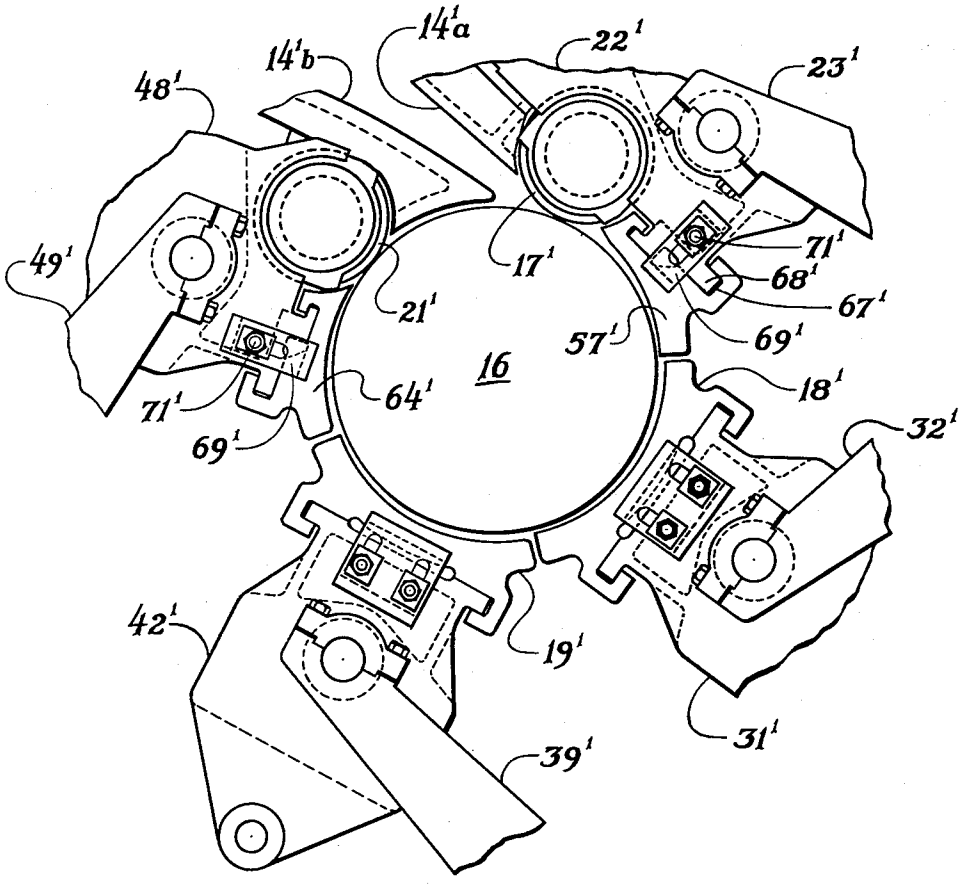


Fig. 4

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2,756,942

APPARATUS FOR COILING STRIP MATERIAL

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Application June 18, 1952, Serial No. 294,146

3 Claims. (Cl. 242—78)

This invention relates to apparatus for the coiling of continuous strip material as it issues from a mill and, in particular, to coiling apparatus employing movable curved guide members encircling a reel about which continuous hot strip metal is directed for coiling thereon as it issues from a hot strip mill.

Present day hot strip coiling apparatus employs a reel about which there are circumferentially spaced a plurality of movable guide rolls and guide plates which may or may not include positive driving means. The strip end is received and guided around the reel by the rolls and guide plates and on completion of one or one and one-half wraps of metal therearound, the guide rolls and guide plates are withdrawn from their coiling positions and the strip coiled upon the reel. Unless all rolls are driven at a speed equal or greater than the speed of the strip entering the coiler, a slight hesitation of the strip end is experienced as it enters each set of wrapper rolls. This usually results in a buckle in the strip which is detrimental to further processing of the strip and also decreases the yield of prime product. As this type of equipment is subject to a considerable amount of water applied for cooling purposes, the very nature of the machine makes it extremely difficult, if not impossible, to design drives for the wrapper rolls which do not require excessive maintenance.

The apparatus embodying the features of the invention herein disclosed obviates the foregoing difficulties in the coiling of hot strip metal upon a mandrel or reel. Included in the apparatus there is a reel about which a plurality of curved guides are circumferentially arranged to present a substantially continuous channel through which the front end of the hot strip is lead around the reel for coiling thereon. The guides, being light in construction and consequently having less inertia than the customarily employed cumbersome rolls and drives, respond very quickly to the mechanism operably connected thereto for withdrawing them from their coiling positions, thereby avoiding the possibility of jamming of the metal between the guides and the reel. Adjacent to the entry end of the first guide there is a driven roll or a pair of succeeding driven rolls for receiving and positively urging the metal into and through the guide channel around the reel and at the delivery end of the last guide there is provided a second driven roll or a pair of succeeding driven rolls for receiving and positively urging the strip end completely around the reel and beneath the oncoming strip for seizing between the strip and the reel, thereby insuring positive coiling of the strip on the reel.

It is one of the objects of this invention to provide a light weight guide mechanism in combination with a hot strip reel for insuring positive coiling of the strip as it is delivered by a hot mill.

Another object of this invention is to provide a mechanism in combination with a hot strip reel which employes a plurality of curved guide members normally encircling a substantial portion of the reel adapted to direct the leading end of the strip around the reel and

then to withdraw themselves rapidly from the coiling position as soon as the reel has positively engaged the strip.

Still another object of this invention is to provide a guide mechanism and hot strip reel combination which is economical to construct as well as to maintain and to operate.

These objects as well as the various other novel features and advantages of this invention will be apparent from the description and accompanying drawings of which:

Figure 1 is a side elevation view of a coiling mechanism embodying the features of the invention herein disclosed;

Figure 2 is an enlarged partial side elevation view of the guide elements embodying the features of the invention;

Figure 3 is a section taken at III—III of Figure 2, and

Figure 4 is an enlarged partial side elevation sectional view of a coiling mechanism embodying the invention in modified form.

With reference to the drawing Figure 1, the coiling mechanism shown therein is confined between two frames **11**, the frame closest to the viewer being eliminated from the drawing in order to expose the coiler elements so that the relationship between and the operation of the parts may be clearly understood. The strip material S which issues from a hot mill or the like is received between a pair of driven pinch rolls **12** from which it passes through a chute **13** and a throat guide **14**, consisting of an upper portion **14***a* and a lower portion **14***b*, into a coiling mechanism **15** encircling a driven reel **16** upon which the material is wound.

The hot strip coiling mechanism **15** comprises a roll or a pair of rolls **17** driven by a suitable motor not shown, two curved or spiral guides **18** and **19** each partially encircling the reel **16** so as to provide a passage or channel for and to lead the front end of the strip around the reel and a second roll or a pair of rolls **21** driven by a suitable motor not shown. The rolls **17** are carried by a frame **22** retractable by means of a lever mechanism made up of links **23** and **24** keyed to a shaft **25** supported in the frame, a link **26** connected at one end to a shaft **27** supported by the frame and connected at its other end to the roll supporting frame **22**. The outer end of link **24** is pivotally attached to the end of a piston rod **28** which is actuated by a reversible piston-cylinder assembly **29** mounted between the frames **11**. The rod is provided with an adjusting nut **28***a* for changing the effective length thereof whereby the rolls **17** are adjusted to vary the spacing between the rolls and the reel. The curved guide **18** is supported by a frame **31** which is adapted to be placed into or withdrawn from its coiling position by means of links **32** and **33** keyed to a shaft **34**, the opposite end of link **32** being pivotally connected to the frame **31** by a shaft and the outer end of link **33** being attached to the end of a piston rod **35** of a double-acting piston-cylinder assembly **36** mounted between the frames **11**. The rod **35** is also provided with an adjusting nut **35***a* for changing the effective length thereof whereby the guide **18** is adjusted to vary the spacing between the guide and the reel. A second link **37** is pivotally attached to frame **31** and to a shaft **38** which acts as a guide link for insuring that the guide **18** will always be returned to its proper coiling position with respect to the reel. The second guide **19** is actuated similarly by links **39** and **41**, the link **39** being pivotally connected to a frame **42** and keyed to a shaft **43**, and the link **41** keyed to the shaft **43** and pivotally attached to a piston rod **44**, having an adjusting nut **44***a*, extending from a piston-cylinder assembly **45** mounted between the two frames **11**. A guiding link **46** is provided for the guide **19** and is piv-

otally attached to the frame 42 and to a shaft 47 mounted between the two frames 11. The second pair of rolls 21 is carried by a frame 48 which is placed into and withdrawn from the coiling position by means of links 49 and 51 attached respectively to the frame 48 and to the end of a piston rod 52, having an adjusting nut 52*a*, extending from a double-acting piston-cylinder assembly 54 mounted between the two frames 11. A guiding link 55 is provided being pivotally attached to the frame 48 and to a shaft 56 supported between the frames 11. The throat guide 14, as mentioned heretofore, is made up of an upper portion 14*a* and a lower portion 14*b* which are carried respectively by the frames 22 and 48.

As shown in Figure 2, there is provided a short curved or spiral deflector 57 which provides a narrowing passage for the strip from the first to the second roll in order to insure that the leading end of the strip will pass between the rolls and the reel. The guide 18 is so constructed that the elements thereof which make contact with the strip may be readily removed for reconditioning or replacement and consist of a plurality of segments 58 curved on the sides which embrace the strip passing around the reel and having recesses 59 at their opposite sides which slidably engage with the projections 61 on the frame 31. The segments are secured to the frame by means of keeper plates 62 attached to the frame by bolts 63. While the shape of the guide surface adjacent the reel is not to be limited thereto, the illustrative guide elements of Figure 2 are curved on a spiral so as to provide an opening or channel at the strip receiving end which is wider than the opening at the delivery end thereof. The guide 19 is made up of similar segments which are secured in a similar fashion to the frame 42 by means of keeper plates 62 and bolts 63.

Between the two delivery rolls 21 there is a curved or spiral guide 64 mounted on the frame 48 which provides a narrowing channel for leading the strip around the reel between the two rolls. The throat guide portion 14*b* is curved or spiralled at 14*c* providing a narrowing channel for directing the leading end of the strip therethrough and beneath the oncoming strip being coiled in order to make certain that the end of the strip is gripped between the strip and the reel for tight and positive coiling when the guides and the rolls are withdrawn from their coiling positions.

While many forms of mechanisms may be employed for actuating the various piston-cylinder assemblies in order to withdraw the guides and rollers quickly and substantially simultaneously from their strip and reel engaging positions, a photoelectric cell 65 and a light source 66 are positioned in the chute 13 so that by the proper setting of the relays actuated thereby, when the strip leading end interrupts the light beam the guides and the rolls are withdrawn at the instant desired so as not to interfere with the coiling of the strip. The photoelectric cell 65 is connected into a circuit comprising the usual relays connected to a source of power for energizing a solenoid valve connected in the hydraulic system and to all of the piston-cylinder assemblies so that simultaneously fluid under pressure is admitted to the side of all of the double-acting pistons adjacent to the roll and guide frames so as to retract the frames quickly and substantially simultaneously from the coiling position. Inasmuch as photoelectric cell control arrangements such as are employed in this instance are commercially available and are well known in the art, the details thereof have not been specifically set out.

The coiling mechanism embodying the invention in a modified form, as shown in Figure 4, comprises elements which are numbered similarly to those shown in Figures 1 through 3 but which are primed throughout. In the modified form one of the rolls 17 and one of the rolls 21 are eliminated entirely and each replaced by a suitable guide. The roll 17 is replaced by a curved or spiral guide 57′ which is adapted to direct the leading end of the strip from the roll 17′ beneath the guide element 18′. The guide 57′ is made up of a plurality of curved or spiral segments having recesses 67′ which slidably engage projections 68′ on the frame 22′, being secured in place by means of keeper plates 69′ and bolts 71′. The roll 21 is replaced by a curved or spiral guide 64′ adapted to direct the leading end of the strip from the guide 19′ beneath the roll 21′. Similarly to the guide 57′, the guide 64′ is made up of a plurality of segments secured to the frame 48′ by keeper plates 69′ and bolts 71′.

In accordance with the provisions of the patent statutes, I have explained the principle and operation of my invention and have illustrated and described what I consider to represent the best embodiment thereof. However, I desire to have it understood that within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

I claim:

1. Apparatus for use in combination with a driven hot strip reel comprising, a pair of guides forming a throat through which hot strip metal is directed to the reel for coiling thereon, a plurality of segmental strip guide members adapted to be positioned adjacent to said reel but spaced therefrom to provide a continuous restricted channel at each guide for strip to pass through for coiling upon the surface of said reel, separate means connected to and for positioning each of said guide members adjacent to said reel, and separate adjustable means connected to each of said members for defining the width of that portion of the channel between the surface of said reel and the surface of each of said guides.

2. Apparatus for use in combination with a driven hot strip reel according to claim 1 in which each of said guide members comprises a frame, a pair of oppositely disposed projections extending outwardly therefrom, a plurality of segments curved on one side to form a continuous surface and to conform substantially to the curvature of the strip coiling surface of the reel and recessed on the reverse side thereof for slidably engaging the projections of said frame, and locking means for preventing relative displacement between said members and said frame.

3. Apparatus for use in combination with a driven hot strip reel according to claim 1 in which each of said guide members comprises a frame, a plurality of interchangeable and replaceable segments, said segments being shaped to form a continuous surface and to conform substantially to the curvature of the strip coiling surface of the reel, and means for detachably securing said segments to said frame.

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