

[54] **SPOOL AND COIL HANDLING DEVICE FOR A ROLLING MILL**

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[56]

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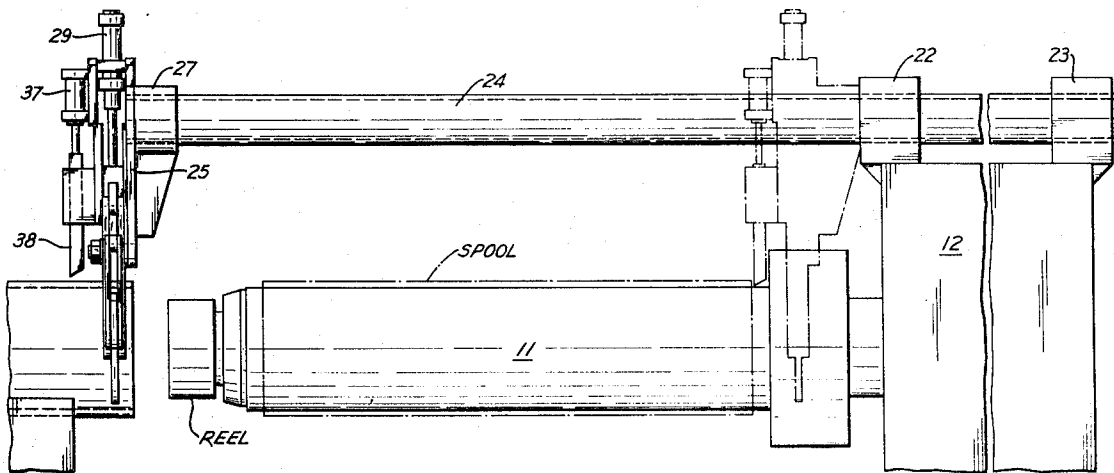
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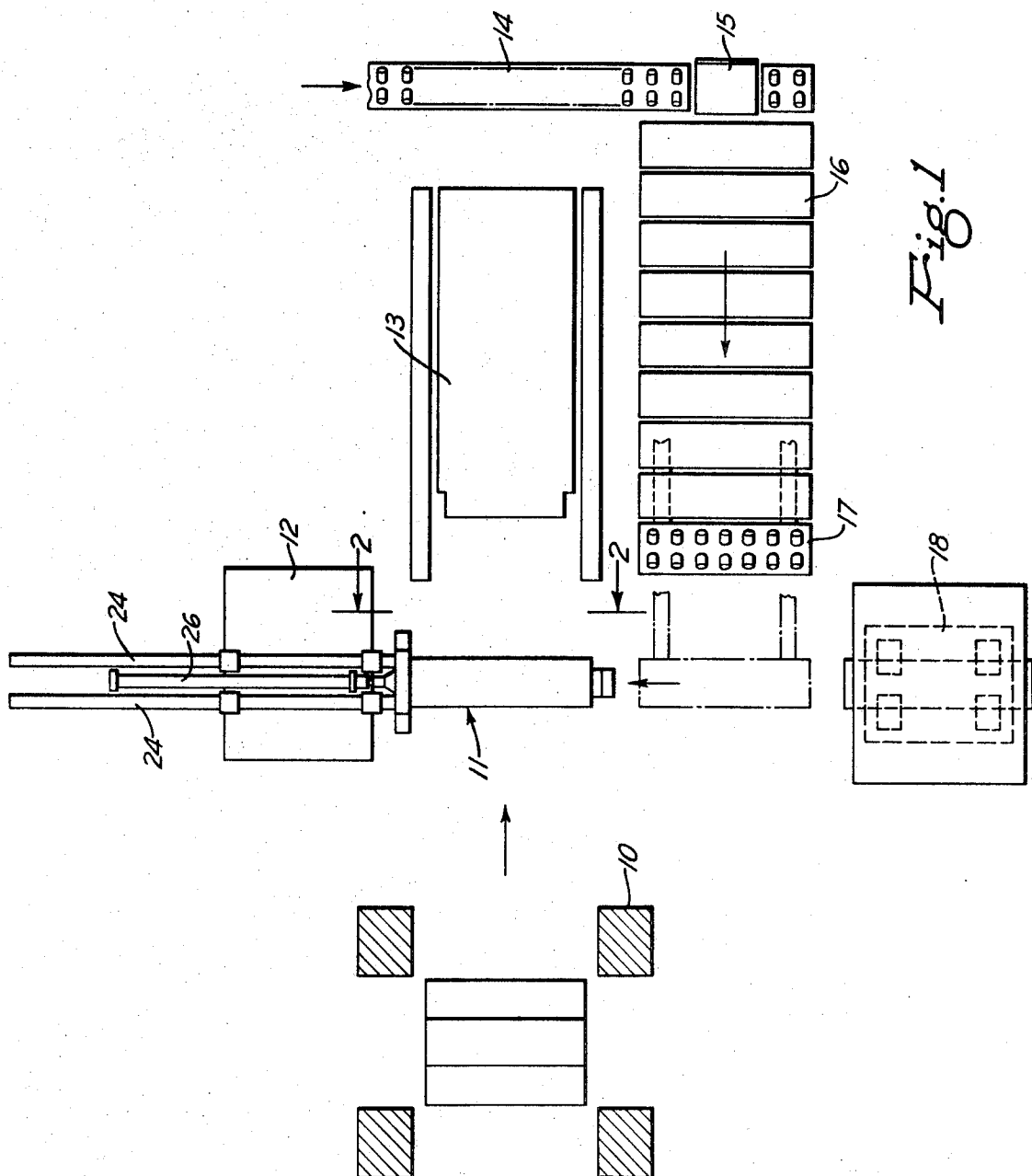
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ABSTRACT

The disclosure of this invention relates to an handling device for spools or similar cylindrical tubular members as used, for example, for winding metallic strip material produced by a rolling mill.

1 Claim, 3 Drawing Figures





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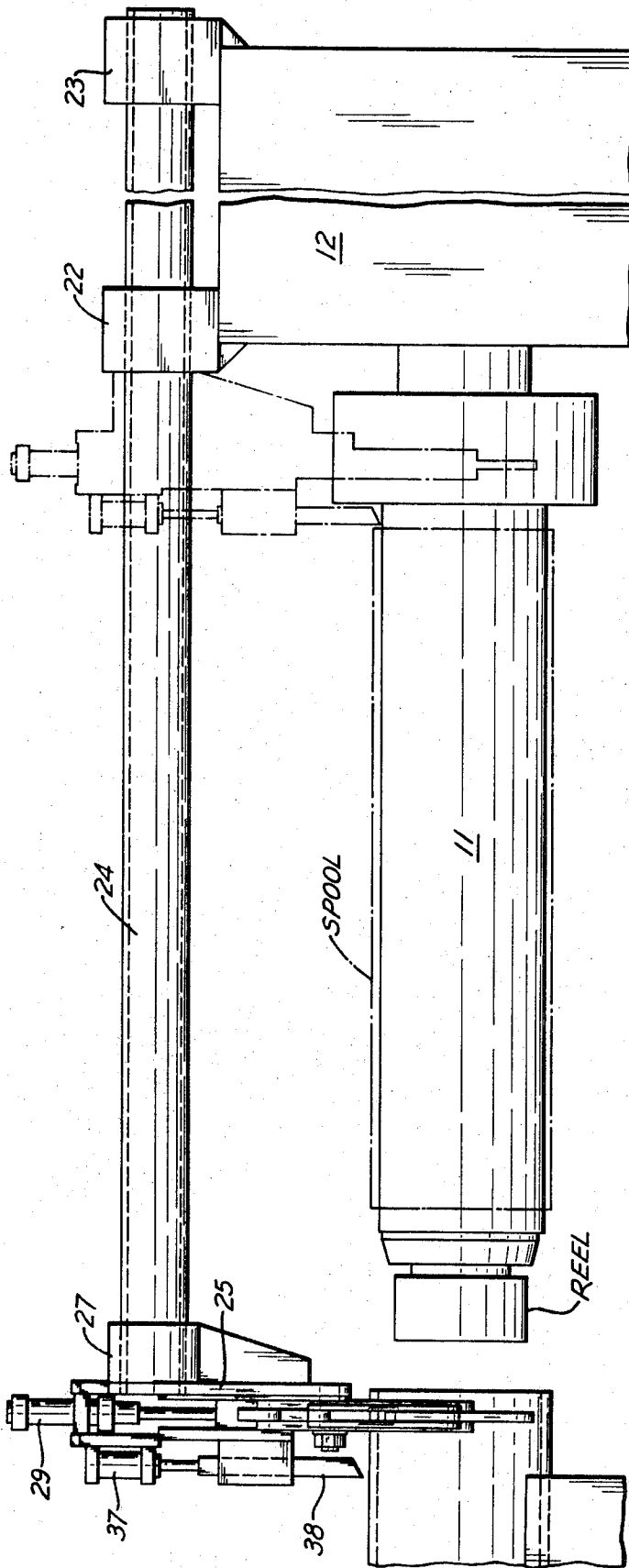


Fig. 2

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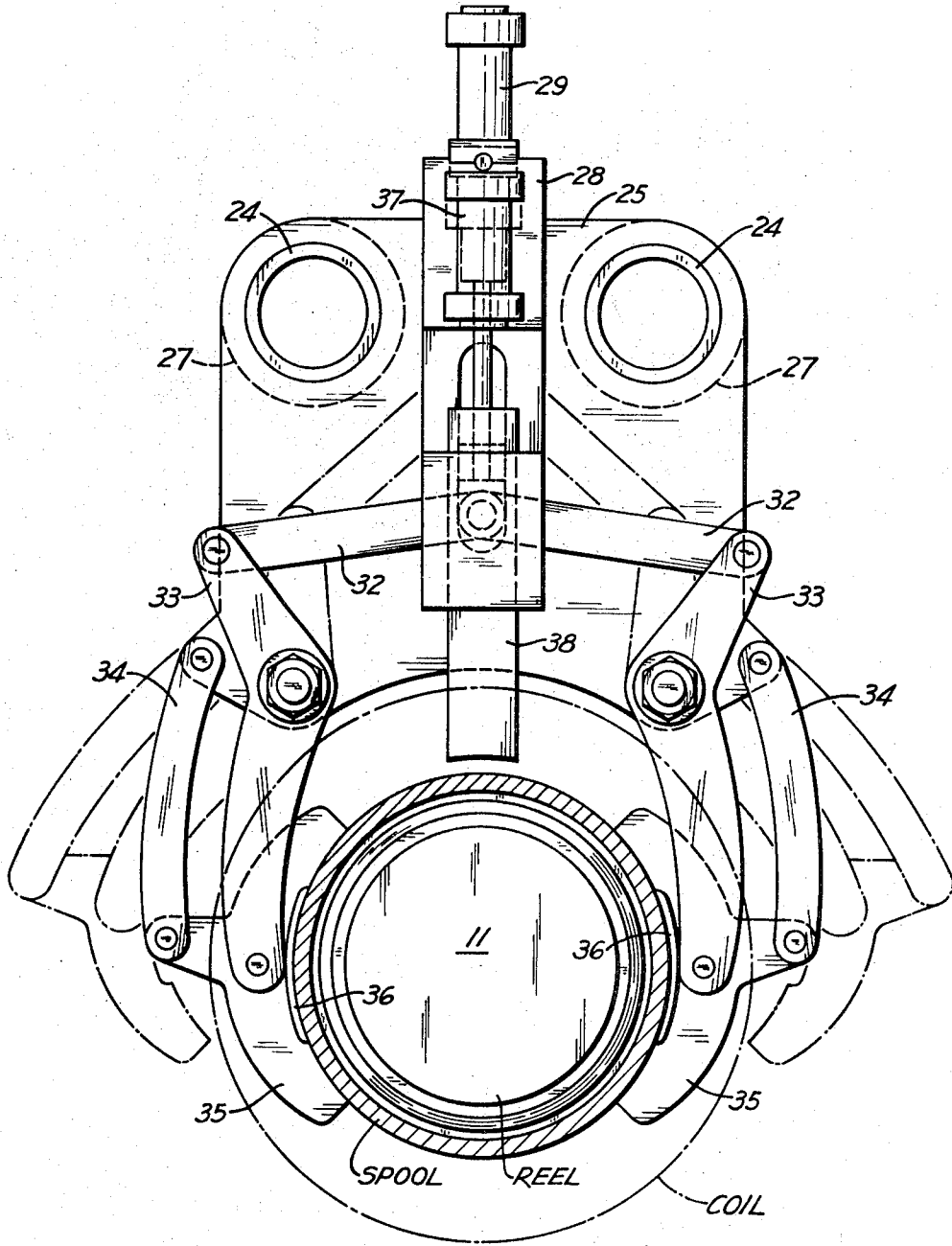


Fig. 3

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SPOOL AND COIL HANDLING DEVICE FOR A ROLLING MILL

In present-day rolling mill practice it is customary for certain materials to be coiled on spools instead of forming coils having no center support. As a result, equipment must be provided as part of the uncoiling and coiling facilities for handling the spools which greatly complicates the designs and operations of such facilities.

Heretofore, it has been a problem to provide means for efficiently and quickly placing the spools onto the tension reel provided at the delivery side of the mill. The congestion in this area added to the difficulty of providing an economical and dependable apparatus for handling the spools.

The present invention provides a spool handling device capable of use in a very minimum amount of space; one that can also be combined with existing equipment and which will assure that the spools will not hang up or damage the surface of the reel as they are brought over the reel.

A further object of the present invention is to provide a spool feeder, comprising a cantileverly supported frame extending over a tension reel on which a spool is to be placed for winding of strip thereon under tension. The inner end of the frame is mounted on the drive or bearing stand of the reel and serves as a guide track for a gripper assembly. The gripper assembly consists of a pair of opposed movable jaws that grip the adjacent end of a spool supported in front of the reel in axial alignment therewith. The gripper assembly is advanced to and from the front of the reel by a piston cylinder assembly and when in the innermost position it ambushes beyond the collapsed reeling surface of the reel. The gripper assembly may also include a coil stripper having a cylinder operated stripper plate that engages the inside end of a coil formed on the reel. When the gripper is moved toward the front of the reel, the stripper plate forces the coil and spool over the collapsed reel.

These objects, as well as other features and advantages of the present invention, will be better understood when the following description is read along with the accompanying drawings of which:

FIG. 1 is a partial plan view of the delivery side of a rolling mill incorporating the features of the present invention;

FIG. 2 is an elevational view taken on lines 2—2 of FIG. 1; and

FIG. 3 is an end view of the equipment illustrated in FIG. 2.

In referring first to FIG. 1 there is shown in diagrammatical form a rolling mill 10 which is adapted to receive strip and roll it in the direction indicated by the arrow and after which the strip is fed to a tension reel 11 for coiling. The tension reel is driven by a drive 12 and, while not shown, includes an expanding and collapsible mechanism of a design well known in the art. The two positions of the reel will vary from 20 - 22 inches. Following the tension reel 11 and in line with the rolling mill 10, there is provided a belt wrapper 13 which is adapted to be advanced to and from the reel 11 and in its advanced position cause the leading end portion of the strip to pass around a spool supported by the expanded reel surface of the reel 11. The operation and construction of the belt wrapper 13 and the reel 11

are well known in the art as illustrated in U. S. Pat. No. 2,172,616 that issued to Clarence J. Klein on Sept. 12, 1939.

As noted previously, the present invention relates, in part, to a device for placing the spool on the reel 11. Before describing the device illustrated, reference will first be made to the conveyor system for the spools. In FIG. 1 there is provided a conveyor 14 on the outside of the belt wrapper 13 which receives spools from behind the mill and brings them to a position in front of the mill. Accordingly, there is provided at the end of the conveyor 14 a lifting device 15 which lifts and transfers the spools one at a time from the conveyor 14 onto a spool storage and feeder rack 16. This rack is designed to handle at least eight spools which are shown in FIG. 1. It will be observed that a ninth spool is shown shifted in front of the tension reel 11. This shifting is accomplished by a device 17 which consists of a pair of sliding rams projecting from under the rack 16 and which takes a spool from the storage rack and transfers it to a position directly in front of and in axial alignment with the reel 11.

Before leaving FIG. 1 it should also be noted that outward from the spool, previously identified as being located in front of the mill, there is shown a completed coil with its supporting spool which has been moved away from the reel 11 past the storage rack 16 by a coil car 18, where the coil will be removed to allow the next coil to be moved away from the reel 11. The movement of the car 18 is subject to the shifting device 17 being retracted to its position shown in FIG. 1. The size of the coils may range in diameter from 36 to 96 inches, weighing up to 40,000 pounds, being formed of aluminum strip 30 - 78 inches wide and up to ¼ inch thick.

Coming now to FIGS. 2 and 3, where there is illustrated a preferred form of the spool feeder and coil stripper device of the present invention, it will be noted that the reel 11 is again shown in which connection it should be appreciated that the reel will be in its collapsed position in readiness to receive a spool, a portion of which is shown in FIG. 2 towards the left of the figure. The spools are constructed out of cast carbon steel tubing, each having an inside diameter of 20 inches, a thickness of 2-½ inches, being 84 inches long and having a weight of approximately 2,000 pounds. FIG. 2 also shows a portion of the reel drive 12 in which connection it will be noted that at the top thereof there are provided two spaced-apart supports 22 and 23 adapted to receive identical longitudinally extending tubular members 24 which extend over the reel 11 and are supported in a cantilever fashion by the supports 22 and 23. The members 24 actually serve as spaced-apart guides for a gripper and stripper frame 25, which in FIG. 2 is shown advanced to the very end of the reel 11 in readiness to receive and grip a spool to be mounted on the reel. This advancement is brought about through the agency of a piston cylinder assembly 26, shown only in FIG. 1.

The frame 25 of the gripper mechanism is best illustrated in FIG. 3 where it takes the form of a generally rectangular shaped plate having bushing sleeves 27 for sliding over the tubular members 24. The plate also is provided with a bracket 28 which supports a piston cylinder assembly 29, the lower end of the assembly

being connected to a pair of toggles 32. To the opposite ends of the toggles there are provided identical bell cranks 33. The movement of the bell cranks 33 are controlled by control arms 34; one end of each of which is secured to the frame 25 and the other end to associated gripper members 35 to which also the lower end of each bell crank 33 is connected. The gripper members 35 are formed with gripping surfaces complementary to the outside diameter of the spool and include in their center area gripping plates 36. One can readily see from FIG. 3 that in operating the piston cylinder assembly 29 to extend the toggle 32, the gripper members 35 are brought securely into a gripping relationship with the spool being guided through a predetermined path of travel by the toggles 32, bell cranks 33 and the control arms 34.

Referring again to the plate carried by the gripper frame 25, outward of the piston cylinder assembly 29, there is secured to the plate a second piston cylinder assembly 37, the piston of which, as in the case of the piston cylinder assembly 29, extends in a downward direction, to which there is secured a stripper plate 38. This plate is formed so as to encircle the upper portion of the reel 11, at the drive side thereof, and presents a portion of the plate against the inside surface of a coil formed on the reel. In this position on the operation of the piston cylinder assembly 26 after the reel has been collapsed, a coil formed on a spool supported by the reel will be urged with the spool over the reel. Of course, it will be understood that during this operation the coil will be supported by the coil car 18 previously referred to.

Describing now briefly the operation of the coil feeder and in referring to FIGS. 2 and 3, it will be noted that once the gripper members 35 have been caused to engage the inner end of the spool, upon operation of the piston cylinder assemblies 26, the inner end of the spool is carried over the collapsed reel 11. The remaining portion of the spool at this time will still be carried by transfer car 18 which will maintain the spool in axial alignment with the reel during the travel of the gripper. When the gripper frame 25 assumes the position shown in phantom in FIG. 2, it will be noted it has proceeded past the inner end of the spool so that it does not in any way interfere with the operation of the belt wrapper 13 or the formation of the coil itself. In this position the

gripper members 35 are in their outer positions as shown in phantom in FIG. 3. Upon the completion of the coil the cylinder 26, as previously noted, will again be operated to urge the coil off the reel after the cylinder 27 has brought the stripper plate 38 into its operative position.

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.

I claim:

1. In combination with a cantileverly mounted reel for supporting a spool around which strip material is to be wound, a spool feeder comprising:

- a frame,
- means for cantileverly mounting said frame from the inboard end of said reel so that said frame extends axially of said reel,
- said frame including a pair of spaced-apart guide rods,
- a gripper member including a pair of jaw elements having portions that engage the opposite sides of a spool and carried by said guide rods in a manner to permit movement axially of said reel,
- means for causing said gripper member to engage a spool to be placed on said reel,
- piston cylinder assemblies connected to said gripper member for causing said gripper member after the spool has been engaged thereby to carry a spool onto said reel,
- means for supporting a spool in front of said reel and in axial alignment therewith,
- said frame having a portion that overhangs a spool so supported whereby the gripper member can be positioned to grip the inboard end of a spool and carry the spool on the reel,
- a stripper member carried by said frame in a manner that it is movable with said gripper member, said stripper member preceding said gripper member with respect to the inboard end of said reel, and means for causing said stripper member to move from a position above a spool, in which position a spool may be placed on said reel, to a position behind said spool when a spool and coil are to be stripped.

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