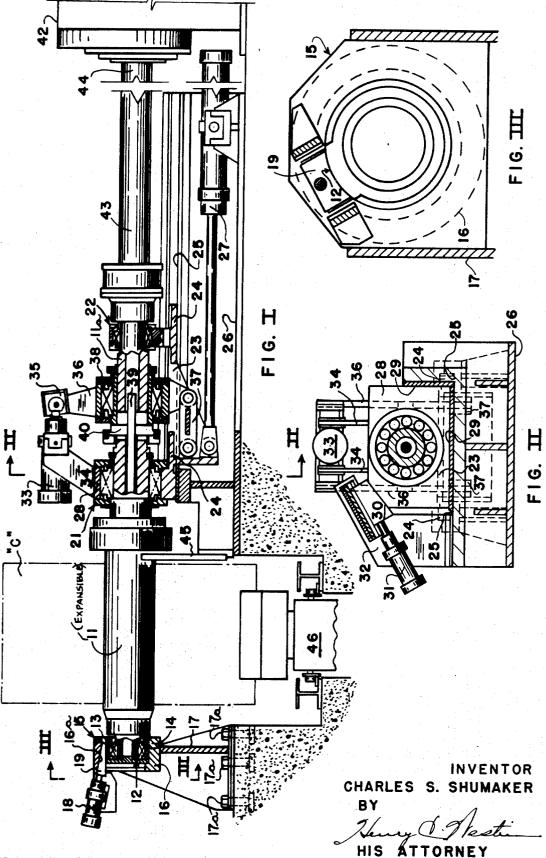
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C. S. SHUMAKER

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RETRACTABLE TENSION REEL

Filed Sept. 19, 1968



United States Patent Office

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3,527,425 RETRACTABLE TENSION REEL

Charles Storer Shumaker, Glenshaw, Pa., assignor to United Engineering and Foundry Company, Pittsburgh, Pa., a corporation of Pennsylvania Filed Sept. 19, 1968, Ser. No. 760,898 Int. Cl. B21c 47/02

U.S. Cl. 242-78.1

5 Claims

ABSTRACT OF THE DISCLOSURE

The tension reel disclosed is designed to minimize deflection of the expandable mandrel employed to impose tension on metallic strip being coiled. The mandrel rotatably supported by bearing block assemblies located at 15the outboard and inboard ends of the mandrel. These bearing block assemblies are rigidly held to foundation mounted structures by wedges which, when released by piston cylinder assemblies, allow the mandrel, including its expanding mechanism, to be completely retracted on a sled from a newly formed coil to one side thereof. During this time the coil is supported by a coil transfer car. The mandrel is connected to a gear drive by an elongated splined shaft that telescopes into the drive when 25the mandrel is retracted from the coil.

BACKGROUND OF THE DISCLOSURE

Tension reels, as they are known in the art, are em- 30 ployed to coil metallic strip delivered from a rolling mill, as well as strip processing lines. During the formation of a coil, the oncoming strip is placed under tension generated by the reel for the principal purpose of insuring that the coil is formed of aligned, tightly-wound, 35 consecutive wraps of strip. It is very desirable, if not even essential, that the completed coil should have straight sides which are free from both irregularly projecting wraps and a telescoping shape. In this respect, should the coil not have straight sides, the projecting portions 40 of the strip are frequently damaged during subsequent handling of the coil, thus increasing the scrap losses of the coil.

Known tension reels generally take the form of driven expandable mandrels rotatably supported at one end in 45 a cantilever manner. Such a mandrel is subject to large bending forces causing it to deflect under the weight of coiled strip, which in present-day practice may exceed 70,000 pounds, and the strip tension generated by the reel. It is pointed out here that such deflection of the 50 mandrel is not only detrimental to parts of the mandrel but also results in the formation of a coil having nonuniform or non-straight sides, as previously mentioned.

To reduce deflection of such tension reel mandrels, 55 it is known in the art to support its outboard end by a movable bearing support which must be retracted to some remote position to allow the newly formed coil to be removed by stripping it axially from the mandrel by a coil car or other means. While such outboard bearing sup-60 ports have met with a certain degree of success, they have not been wholly acceptable since wear and distortion of their movable parts over a period of time, along with necessary operating clearances, allow the mandrel to deflect while the coil is being formed.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a more economical tension reel incorporating a minimum of movable parts to resist deflection of the coiling mandrel.

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It is another object of the present invention to provide a tension reel having a robust foundation-mounted support for the outboard end of the expandable mandrel to effectively resist its deflection during coiling of strip material.

It is a further object of the present invention to provide a tension reel having an expandable mandrel assembly supported at both ends by a foundation-mounted structure, which mandrel is retractable from a newly formed coil of strip for removal thereof from the mandrel.

In addition to the foregoing, a tension reel according 10 to the present invention further includes:

Mandrel expansion means carried by said housing;

Coil stripping means carried by the stationary base for restraining movement of the coiled strip during removal of the mandrel therefrom;

First wedge means carried by the stationary base for rigidly holding the housing during coiling of the strip on the mandrel:

Second wedge means carried by the rigid frame for 20 rigidly holding the outboard bearing assembly during coiling of the strip and the mandrel; and

A piston cylinder assembly connected to each of the wedge means for releasing the wedge means from the housing and the outboard bearing assembly.

These features, as well as others, will be better understood when the following description is read in light of the accompanying drawings of which:

FIG. 1 is an elevational view, partly in section, of a tension reel incorporating the features of the present invention;

FIG. 2 is an enlarged sectional view taken along lines -II of FIG. 1; and

FIG. 3 is an enlarged sectional view taken along lines III—III of FIG. 1.

With reference to FIG. 1, there is illustrated a tension reel for winding strip into a coil "C." The tension reel includes an expandable mandrel 11 constructed in a manner, per se, well known in the art. Mounted on the outboard end of the mandrel is a bearing assembly 12 which essentially includes an antifriction bearing 13 received within a tubular bearing block 14. According to the present invention, the outboard bearing assembly 12 is supported by a foundation mounted and robustly constructed support 15, which includes a support housing 16 formed with an inside diameter slightly larger than the outside diameter of the bearing block 14. The support housing 16, as best shown in FIGS. 1 and 3, is included as an integral part of a robustly constructed weldment 17 that is secured to the foundation by bolts 17a. Offset from the top of the support 15, there is mounted a piston cylinder assembly 18 connected at its rod end to a wedge 19. This wedge is constructed and arranged to be slidably received in a tapered slot 16a formed in the housing 16. The piston cylinder assembly actuated wedge is employed to releasably secure the outboard bearing assembly 12 to the support 15 during coiling of strip on the mandrel.

The inboard end of the mandrel is constructed with an extended shaft 11a on which are mounted spaced-apart bearing block assemblies 21 and 22. These bearing assemblies form part of a sled 23 which is constructed with horizontal projections 24 that are slidably supported in longitudinally arranged guideways 25 formed in a foundation mounted base 26. The sled is provided with a 65 downwardly extending projection to which is secured the rod end of a piston cylinder assembly 27 employed to traverse the sled, hence, also the mandrel supported by the bearing block assemblies 21 and 22 relative to the coil "C."

As best shown in FIGS. 1 and 2, the bearing assembly 21 is constructed as an extension of the sled whereby the rectangularly shaped bearing block 28 is supported by

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bearing lined surfaces 29 formed as a part of the base 26. With particular reference to FIG. 2, the bearing block 28 is releasably secured to the bearing lined surfaces by a wedge 30 connected to the rod end of a piston cylinder assembly 31. An arm 32 projects upwardly from the base for mounting the piston cylinder assembly 31, as well as providing support surfaces for the wedge 30.

An expanding mechanism is provided for the mandrel 11 which, while it may be in the form of a number of well-known constructions, the one illustrated in FIG. 1 10 consists of a piston cylinder assembly 33 supported by arms 34 extending from the bearing block 28. A crosshead 35 interconnects the rod end of the piston cylinder assembly with one of the ends of spaced parallel arms 36. These arms are pivotally secured at their opposite 15 ends by links 37 to the extensions of the bearing block 28. Trunnions, not shown, are used to connect the midpoints of the arms 36 to the bearing block assembly 38 by which it is slidably displaced along an extending portion 11a of the mandrel by the piston cylinder assembly 33. The sliding movement of the bearing block 38 is transmitted to the actuating rod 39 of the mandrel by a bar 40 which passes through an elongated slot formed in the mandrel.

A drive 42 interconnects a motor, not shown, with the 25 mandrel through a spindle 43. The spindle has a splined end 44 that telescopes into and out of the drive when the mandrel is retracted from a coil along the base 26. To facilitate removal of the coil "C" from the mandrel, there is provided a coil stripper plate 45 secured to the 30 base 26. The plate 45 is constructed with a concaved upper surface to conform generally to the circular shape and size of the mandrel.

When it is desired to remove a newly formed coil from the mandrel, the wedge 19 is released by the piston cylin- 35 der assembly 18 and the wedge 30 is released by the piston cylinder assembly 31. After this occurs, a coil car 46, constructed in a manner well known in the art, is brought into a supporting relationship with the coil, after which the piston cylinder assembly 27 is actuated to re-40 tract the mandrel from the coil by traversing the sled 23 along the guideways formed in the base 26. It will be appreciated by those skilled in the art that a tension reel constructed in accordance with the present invention permits the employment of small, less expensive bearings, 45 particularly those incorporated in the bearing block assemblies 21 and 22. This is made possible because the weight of a coil during its formation and after completion is always sustained by the inboard and outboard bearings at the same time and not separately. 50

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. A tension reel comprising:

an expandable mandrel for forming metallic strip into a coil:

drive means connected to said mandrel for generating -tension on strip during coiling;

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- first bearing means mounted on the outboard end of said mandrel;
- a frame rigidly mounted on a foundation for supporting said first bearing means;
- second bearing means mounted on the inboard end of said mandrel and including sled means mounting said second bearing means;
- a base rigidly mounted on a foundation and including elongated surfaces for slidably supporting said sled means;
- means operatively associated with said sled means for displacing said sled along said support surfaces a distance sucient to retract said mandrel from a coil; and
- means for supporting the coil during displacement of said mandrel by the said last-named means.

2. A tension reel according to claim 1 further com-20 prising:

- mandrel expansion means carried by said second bearing means; and
- coil stripping means carried by said base adjacent said mandrel for restraining against movement a coil during removal of said mandrel therefrom.

3. A tension reel according to claim 1 further comprising separate and independent locking means for securing said first bearing means to said frame and said second bearing means to said base.

4. A tension reel according to claim 3 wherein each of said locking means includes a wedge connected to a piston cylinder assembly.

5. A tension reel comprising:

- an expandable mandrel for forming metallic strip into a coil;
- a sled rotatably supporting one end of said mandrel; a base for slidably supporting said sled;
- bearing means carried on the other end of said mandrel;
- a foundation mounted frame for supporting said bearing means;
- means connected to said sled means for slidably displacing said sled relative to said base a distance sufficient to retract said mandrel from a coil formed thereon; and

means for supporting the coil during removal of said mandrel from the coil by said last-named means.

References Cited

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	Kajiwara O'Brien	

NATHAN L. MINTZ, Primary Examiner

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UNITED STATES PATENT OFFICE CERTIFICATE OF CORRECTION

Patent No. 3,527,425

September 8, 1970

Charles Storer Shumaker

It is certified that error appears in the above identified patent and that said Letters Patent are hereby corrected as shown below:

Column 1, line 3, after "mandrel" insert -- is --. Column 4, line 15, "sucient" should read -- sufficient --.

Signed and sealed this 6th day of April 1971.

(SEAL) Attest:

EDWARD M.FLETCHER,JR. Attesting Officer WILLIAM E. SCHUYLER, JR. Commissioner of Patents