

April 15, 1969

D. C. REED

3,438,593

COIL- AND SPOOL-HANDLING APPARATUS

Filed Aug. 16, 1967

Sheet 1 of 2

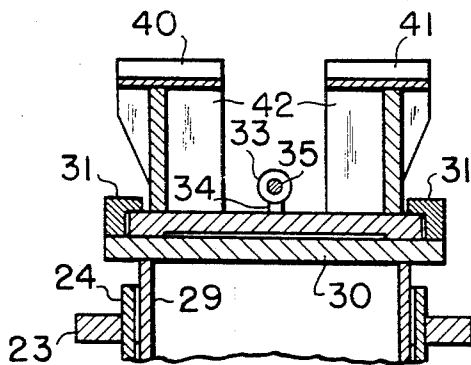


Fig. 3

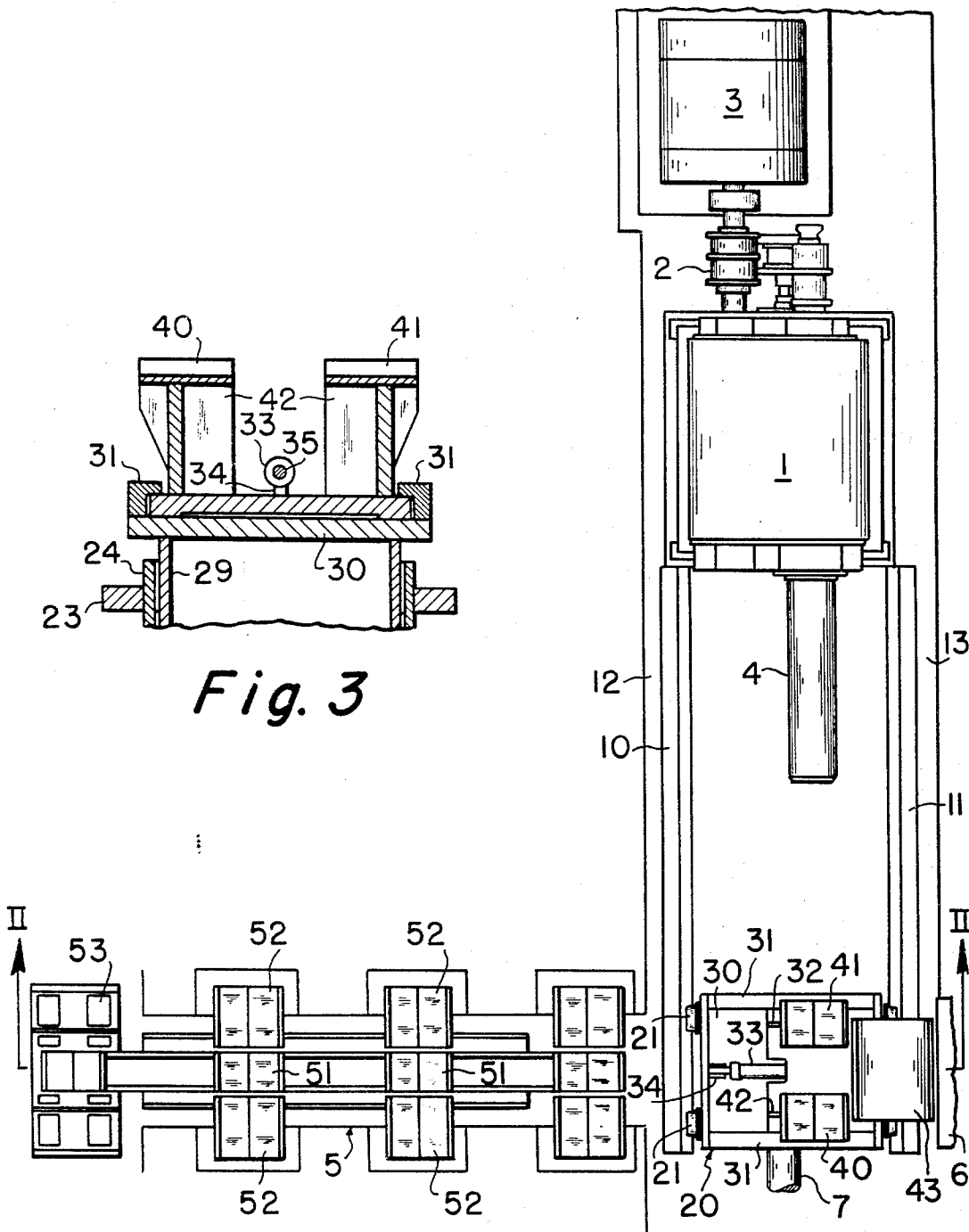


Fig. 1

INVENTOR,
Duane C. Reed
BY
Walt, Burden, Robinson & Walt
HIS ATTORNEYS

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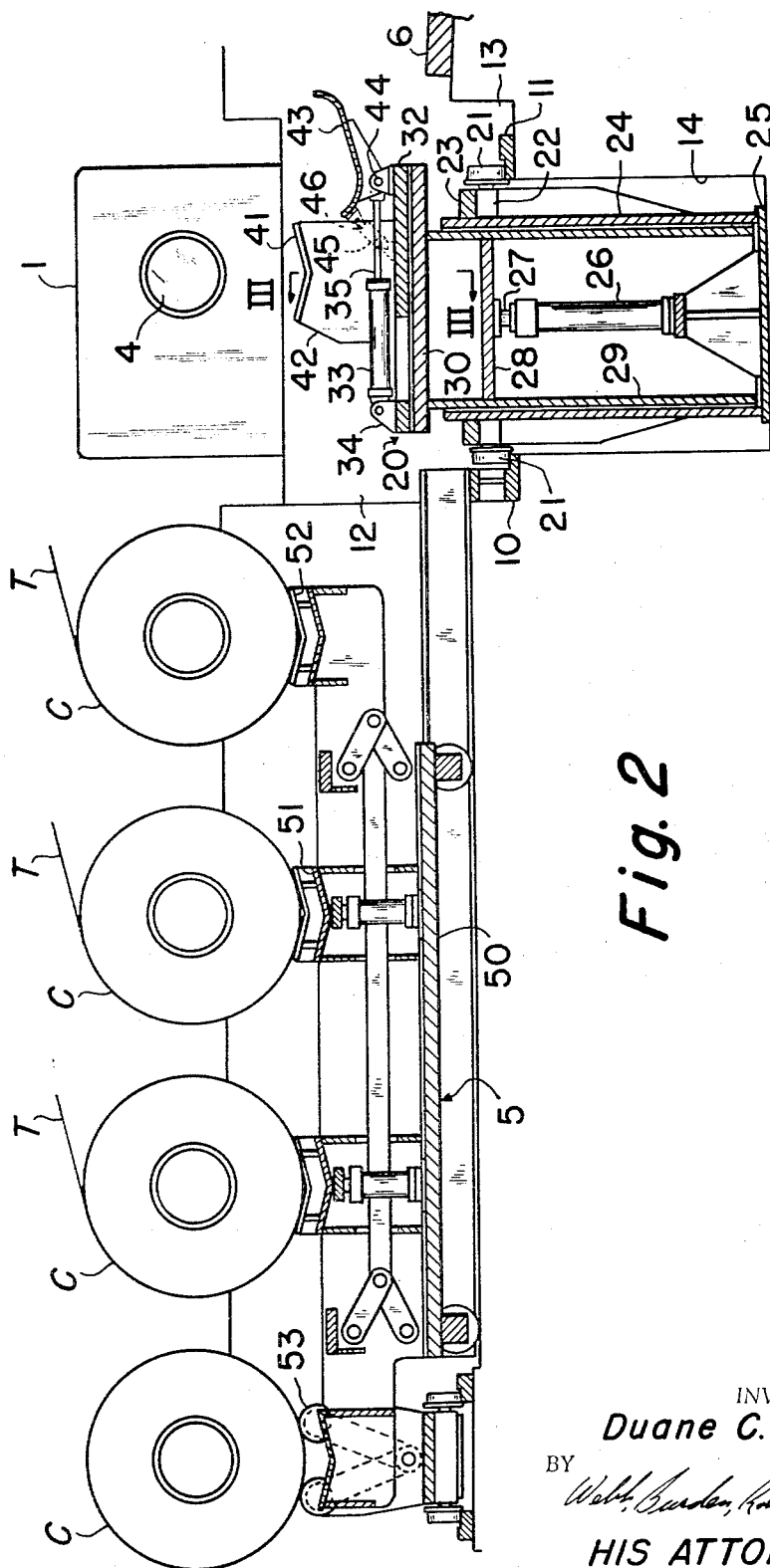


Fig. 2

INVENTOR.

Duane C. Reed

BY

Walter C. Burden, Robinson & Hall

HIS ATTORNEYS

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2

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COIL- AND SPOOL-HANDLING APPARATUS
Duane C. Reed, East Palestine, Ohio, assignor, by mesne assignments, to L. W. Nash Company, East Palestine, Ohio, a corporation of Delaware

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9 Claims

ABSTRACT OF THE DISCLOSURE

Apparatus for handling coils and spools including a frame mounted on wheels and a hollow outer member attached to the frame. An inner member carrying a base on its upper end fitted within the outer member for vertical movement relative thereto and a lifting mechanism to move the inner member. Spaced guideways on the upper surface of the base and a slide moveable in the guideways carrying supports for a coil and a tiltable cradle for an empty coil spool.

This invention relates to apparatus for handling coils of metal strip and empty coil spools and more particularly to apparatus for moving a coil of strip and an empty coil spool relative to a reel.

It is important in handling coils of strip metal that each coil and each empty coil spool be rapidly transferred to and from the reel to minimize interruption in the operation of the reel and the mill line. Additionally, it is essential that coils be handled carefully so that the outer wrap and the ends are not damaged during handling. My invention provides novel apparatus which can rapidly move a coil and an empty spool and can accurately place a coil on the mandrel of an unwind reel and remove an empty spool from the mandrel. The apparatus is relatively simple and, therefore, is inexpensive and easy to maintain. My novel apparatus may be utilized in conjunction with standard mill equipment such as coil supply mechanism, spool storage mechanism and reels and can handle coils and empty spools of different sizes and weights.

In the accompanying drawings, I have shown a preferred embodiment of my invention in which:

FIG. 1 is a plan view of my novel apparatus in relation to an unwind reel, a coil supply mechanism and a ramp for empty spools;

FIG. 2 is a section on line II—II of FIG. 1; and

FIG. 3 is a partial section on line III—III of FIG. 2.

Referring to FIG. 1 of the drawings, a coil unwind reel 1 including a drive mechanism 2 connecting a motor 3 to a collapsible mandrel 4 is spaced from a coil supply mechanism 5 and a spool ramp 6. The mandrel is rotated by motor 3 to feed the tail of a coil carried on the mandrel to the tension rolls in a mill line. After the strip has been picked up by the tension rolls, the mandrel is no longer driven and tension is imparted to the coiled strip by the tension rolls to unwind the strip from the coil. A pair of parallel elongated rails 10 and 11 are located on opposite sides of the mandrel in spaced offsets 12 and 13 at the longitudinal edges of a pit 14. The rails extend from the unwind reel to a position between coil supply mechanism 5 and spool ramp 6. The novel coil and spool handling apparatus 20 of my invention is moved along the rails on wheels 21 which are carried on axles 22 mounted below a frame 23. The cart is moved by a rod 7 which is actuated by a cylinder or other well known power means (not shown).

Frame 23 carries a hollow square outer member 24 which extends downwardly into pit 14 between rails 10 and 11. Member 24 has a bottom plate 25 which supports a vertical cylinder 26 having a rod 27 connected to

a cross plate 28. Plate 28 is welded to the inside of an inner member 29 to permit vertical movement of the inner member relative to the outer member upon extension of the rod from cylinder 26. A plurality of bronze ways are located between outer member 24 and inner member 29 to reduce friction when member 29 is raised and lowered. A base 30 is welded to the top of member 29 and carries spaced parallel guideways 31 which form U-shaped channels at the opposed edges of the base. A slide 32 rests on base 30 and is moved along the base in guideways 31. A cylinder 33 is attached to a lug 34 welded to base 30, and rod 35 of this cylinder is attached to slide 32 as shown in FIG. 2. Spaced V-shaped platens 40 and 41 are carried on slide 32 by vertical support members 42. It is to be understood that each V-shaped platen may be replaced by a pair of spaced rollers without departing from the scope of my invention. The axes of the rollers will be perpendicular to the axis of cylinder 33, and the rollers may be either driven or nondriven. The use of rollers, either driven or nondriven, in place of the V-shaped platens will be determined by the material being handled and by the necessity of indexing the coil on apparatus 20. For example, rollers may be used with coils of aluminum since aluminum is easily damaged.

It is important that the transverse movement of slide 32 is limited to an extent insuring that the center line of a coil resting on the platens or rollers is maintained within the edge of member 29. This arrangement requires that the center line of the coil is within the horizontal cross section of the inner member; and, therefore, there is no cantilever action on members 24 and 29. The lack of cantilever action makes it possible to construct my apparatus from lighter weight material than would be required if the center line of the coil were located outside the periphery of member 29.

A spool cradle 43 is tiltably mounted on the end of slide 32 opposite lug 34. The cradle is tilted about pin 44 by rod 46 of a cylinder 45. Extension of rod 46 tilts the cradle in a clockwise direction to roll an empty spool resting thereon onto spool ramp 6 which has a slight slope so that the spool will roll down the ramp into a storage area.

Supply mechanism 5 for placing a coil on platens 40 and 41 consists of a laterally movable carriage 50 carrying a plurality of spaced vertically movable saddles 51 for shifting a coil onto the platens. Spaced stationary coil support members 52 are positioned on opposite sides of carriage 50, and the spacing of members 52 is equal to the spacing of saddles 51 so that a coil may be indexed between members 52 by movement of carriage 50. Rolls 53 are located adjacent a tail puller (not shown); and after a tail T is pulled on a coil, the coil is picked from rolls 53 by the first saddle 51 on carriage 50. The coil is then indexed from one set of support members 52 to the next by carriage 50 until it is finally placed on platens 40 and 41. After a coil has been placed upon mandrel 4 by apparatus 20, the tail T is fed to the tension rolls in a mill line and the coil is unwound for processing of the strip.

In the operation of my apparatus, a coil C with a tail T is moved into position over platens 40 and 41 by carriage 50. The platens are in the left-hand or coil receiving position, and rod 35 is retracted into cylinder 33. The support member 51 on the right-hand end of carriage 50, as seen in FIGS. 1 and 2, is located between the spaced platens and is lowered by the cylinders on the carriage to place the coil on the platens. When the coil rests on the platens, carriage 50 is withdrawn and slide 32 is shifted to the right by extension of rod 35 until the center lines of the coil and the mandrel are in the same vertical plane. The apparatus is then moved along rails 10 and 11

until the coil is adjacent the free end of mandrel 4. When the coil is adjacent the outer end of mandrel 4, cylinder 26 is actuated to raise inner member 29 until the center line of the coil is in the same horizontal plane as the center line of the mandrel at which point cart 20 is moved toward the unwind assembly and the spool carrying the coil is fitted over the mandrel. The mandrel is then expanded to take the weight of the coil, and the platens are lowered after which the coil is unwound leaving an empty spool on the mandrel.

During the unwind operation, slide is shifted to the left and the center line of pin 44 for cradle 43 is aligned with the spool center line. When the unwind operation is completed, member 29 is raised until the cradle contacts the lower periphery of the empty spool and the mandrel is collapsed so that the spool rests on the cradle. Cart 20 is now moved away from the unwind reel until the spool is removed from the mandrel at which point member 29 is lowered. The cart is moved along the rails until it is between supply mechanism 5 and ramp 6 at the opposite end of the rails; and in this position, another coil is placed upon the platens. After the coil is in position, the slide is moved to the right and cradle 43 is tilted by extension of rod 46 from cylinder 45 to roll the empty spool onto ramp 6. When slide 32 is in the spool discharge position, the center line of the coil is in the same vertical plane as the center line of the mandrel and the above described operation is repeated.

While the operation of my apparatus has been described in connection with an unwind reel, it should be understood that my apparatus may also be used in connection with a coil winding reel. When used with a winding reel, an empty spool may be placed on the mandrel by cradle 43 and a coil removed by platens 40 and 41. The coil is removed from the platens by carriage 50 while another empty spool is picked up by cradle 43 for transportation to the reel.

My invention has a number of important features which include flexibility of operation permitting rapid and accurate movement of both coils and empty coil spools. Additionally, it is possible to move coils with my apparatus without damage to the outer coil wrap. My apparatus requires a minimum of space which is important in the mill.

While I have shown and described preferred embodiments of my invention, it is to be understood that it may be otherwise embodied within the scope of the appended claims.

I claim:

1. Apparatus for handling coils and empty coil spools comprising:

- (A) a frame carrying wheels adapted for movement along parallel rails;
 - (B) a hollow outer member attached to said frame having an open top and a bottom plate;
 - (C) vertically adjustable means extending upwardly from the open top of said outer member;
 - (D) a base mounted on said means and having spaced guideways;
 - (E) a slide in said guideways for movement relative to said base and carrying coil supporting means and spool supporting means; and
 - (F) means for moving said slide within said guideways.
2. An apparatus as set forth in claim 1 wherein said

vertically adjustable means include a hollow member within said outer member and a cylinder and rod connecting said hollow member and said bottom plate of said outer member.

3. An apparatus as set forth in claim 2 including a cross plate secured to the inner periphery of said hollow member, the upper end of said rod being attached to said cross plate.

4. An apparatus as set forth in claim 1 wherein said coil supporting means consists of spaced V-shaped platens and said spool supporting means consists of a cradle tiltably mounted on said slide, and means to tilt said cradle.

5. In a coil and spool handling arrangement including a coil supply mechanism, a spool discharge means and a reel having a collapsible mandrel for supporting a coil spool, the improvement comprising a coil and spool handling apparatus including:

- (A) a frame carrying wheels for movement along rails extending between said coil supply means and spool discharge means at one end and said reel at the other end;
- (B) a hollow outer member attached to said frame and having a bottom plate;
- (C) a hollow inner member positioned within said outer member and extending from the top thereof for vertical movement relative to said outer member;
- (D) a base with guideways on its upper surface located on the upper end of said inner member;
- (E) a slide mounted within said guideways and having coil support means and spool support means mounted thereon, said slide being movable to position said coil support means and said spool support means relative to said mandrel;
- (F) means for moving said slide extending between said slide and said base; and
- (G) means extending between said bottom plate of said outer member and said inner member for effecting vertical movement of said inner member, whereby said coil and spool support means can be vertically adjusted between said feed means and said mandrel so that coils and empty spools can be mounted on and removed from said mandrel.

6. Apparatus as set forth in claim 5 wherein said means for moving said slide is limited in movement such that the vertical center line of a coil on said coil support means is within the horizontal cross section of said inner member.

7. Apparatus as set forth in claim 5 wherein said coil support means consists of spaced V-shaped platens and said empty spool support means consists of a cradle.

8. Apparatus as set forth in claim 7 including means extending between said slide and said cradle for tilting said cradle to discharge a spool.

9. Apparatus as set forth in claim 7 wherein said platens are located on the side of said slide adjacent said supply means and said cradle is located on the side of said slide adjacent said spool discharge means.

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NATHAN L. MINTZ, *Primary Examiner.*