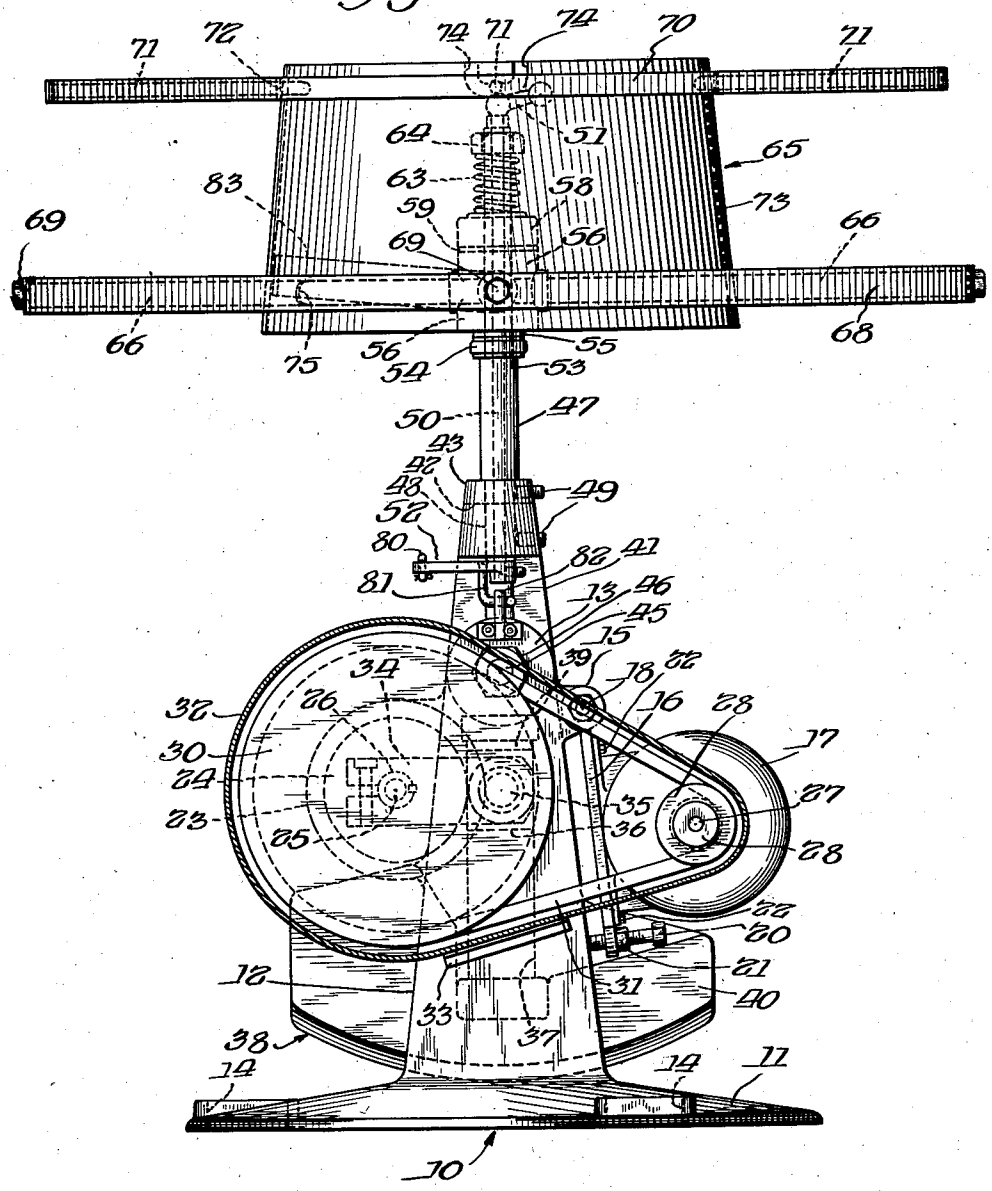
Dec. 18, 1945. F. M. LITTELL 2,391,321

COIL SUPPORTING REEL

Filed April 13, 1944 5 Sheets-Sheet 1

Fig. 1.



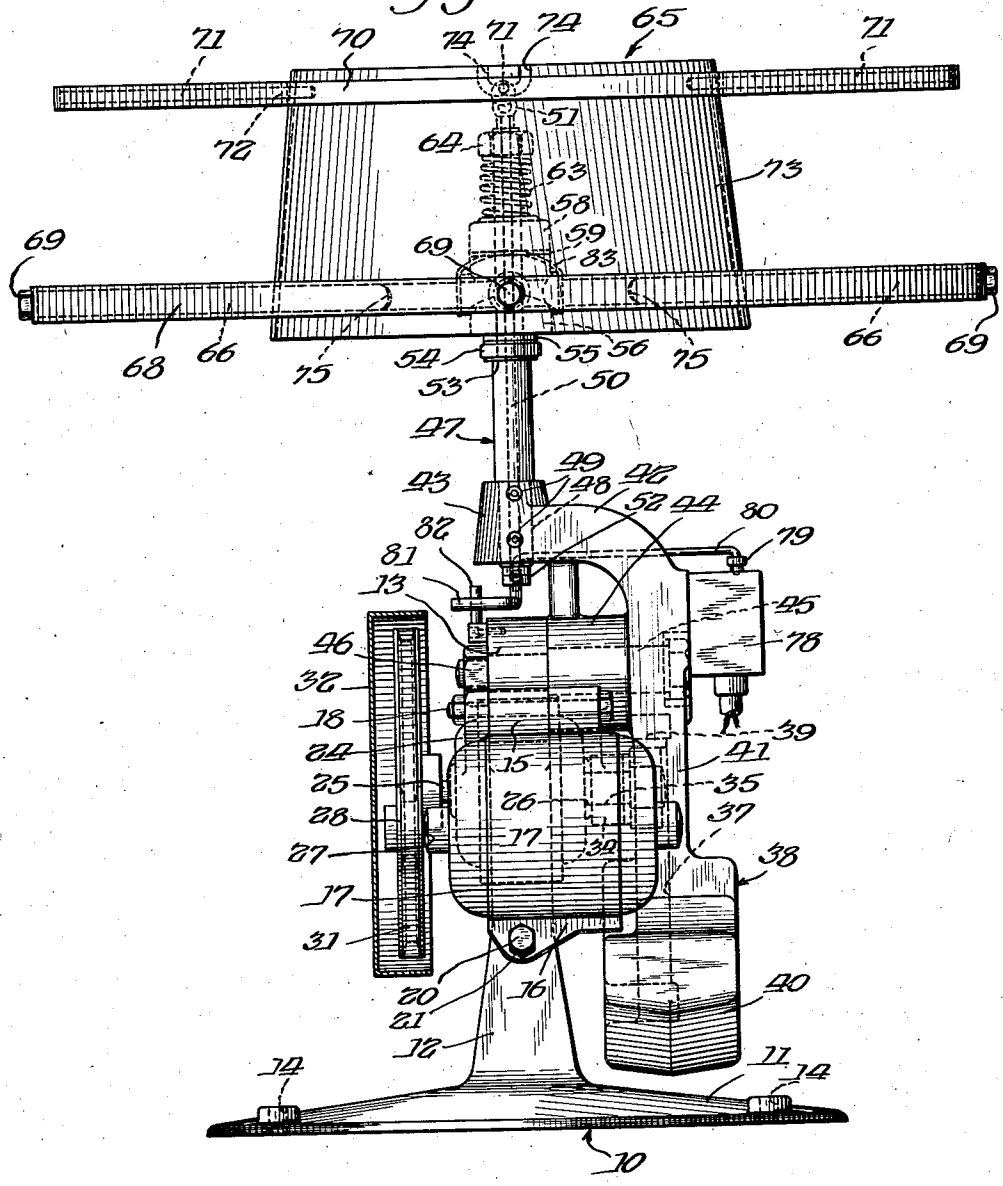
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COIL SUPPORTING REEL

Filed April 13, 1944 5 Sheets-Sheet 2

Fig. 2.



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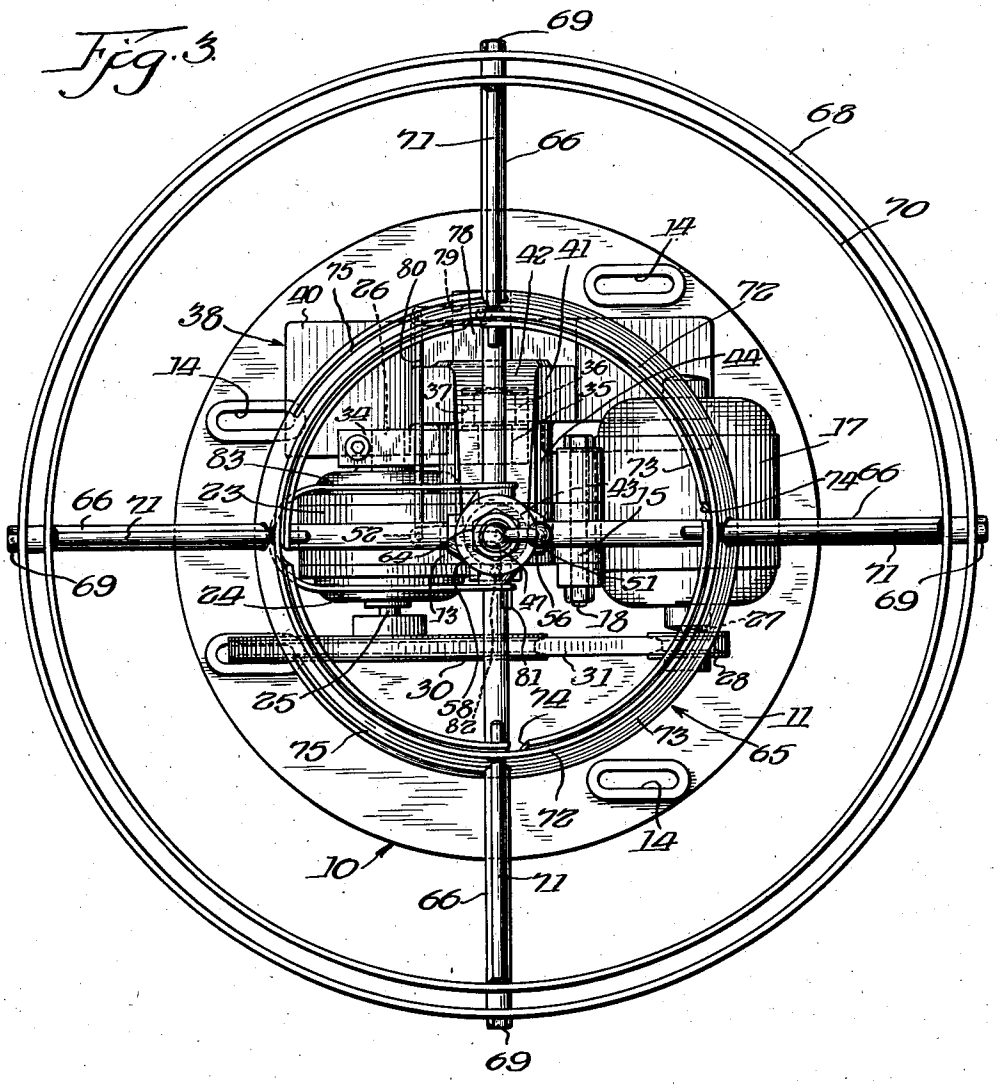
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COIL SUPPORTING REEL

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Fig. 3.



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COIL SUPPORTING REEL

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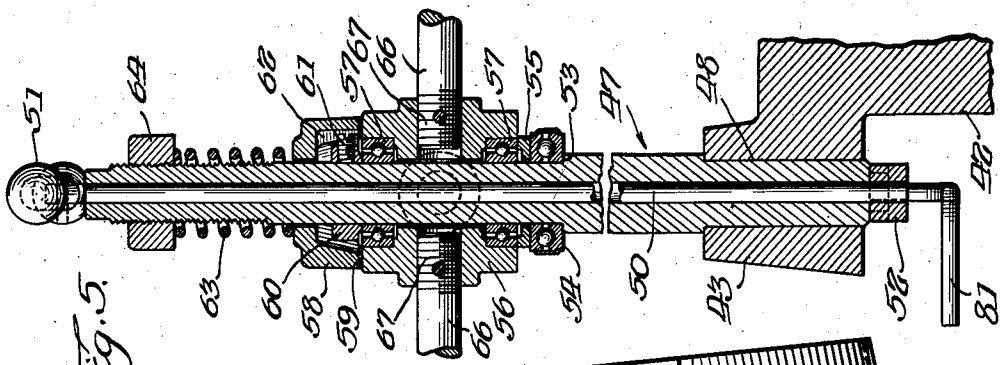


Fig. 5.

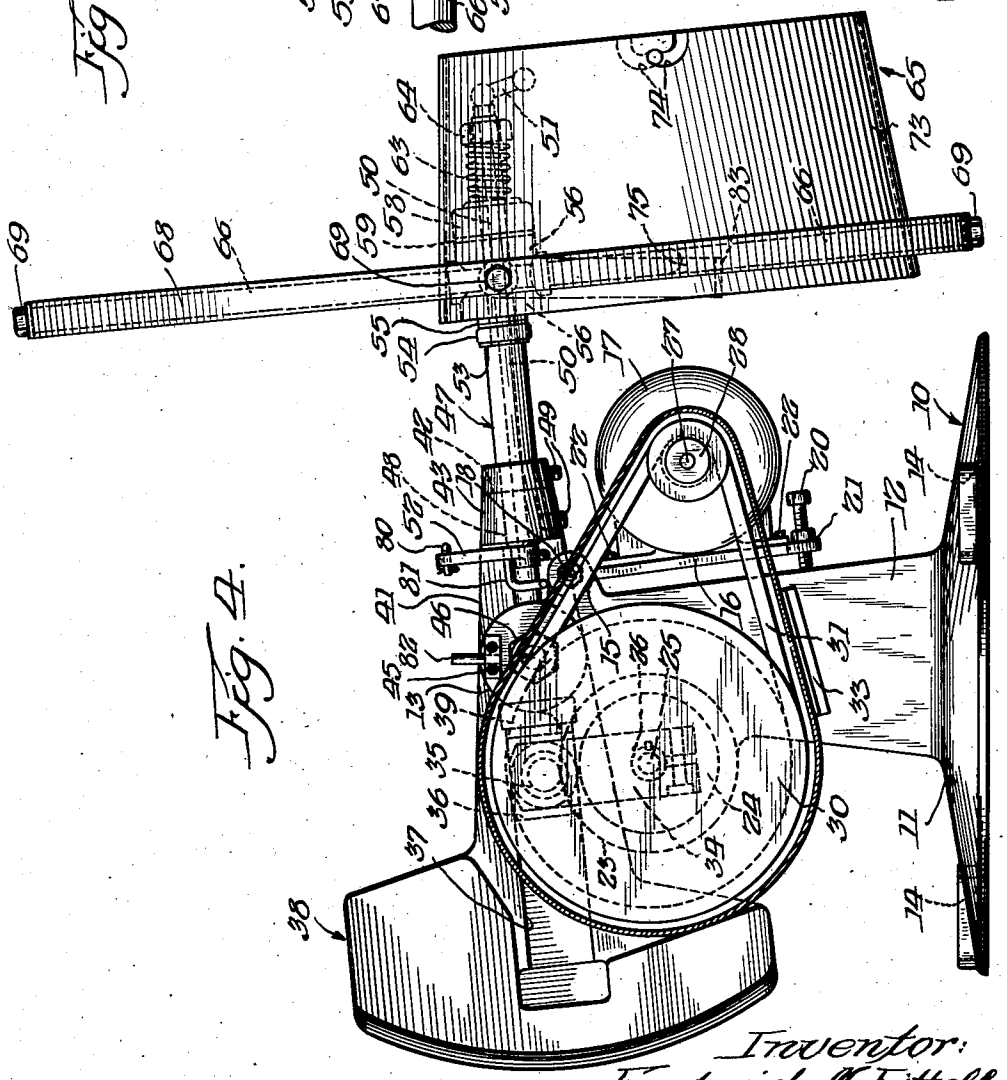


Fig. 4.

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COIL SUPPORTING REEL

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Fig. 6.

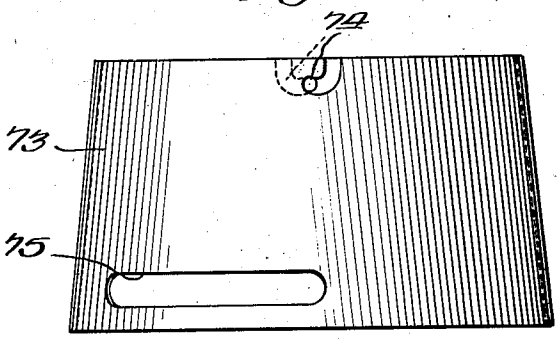
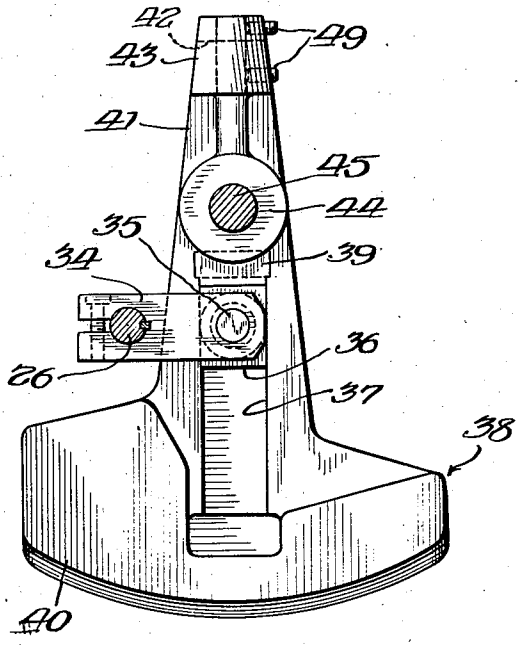


Fig. 7.



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Patented Dec. 18, 1945 2,391,321

UNITED STATES PATENT OFFICE

2,391,321

COIL SUPPORTING REEL

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Application April 13, 1944, Serial No. 530,771

12 Claims. (Cl. 242—85)

The invention relates to reels for supporting coils of wire or coils of metal stock and has reference in particular to a reel rotatably supported by a vertical spindle capable of tilting approximately to a horizontal position for loading purposes with power operated means for tilting and for elevating the loaded reel.

An object of the invention is to provide a power operated tilting reel to take the place of manually loaded reels The present device eliminates the heavy work required in lifting large coils of wire or metal stock from the floor to the reel. To lower the reel for loading purposes the operator merely turns a control lever conveniently located on the end of the vertical spindle and the reel descends by power, shutting off automatically upon reaching a horizontal position. In this position it is relatively easy to roll a coil onto the reel. A reverse turn of the control lever starts the motor to elevate the loaded reel and said motor is automatically shut off as the reel returns to its original elevated position.

Accordingly, another object of the invention is to provide a tilting reel equipped with a power drive for lowering the reel to a horizontal loading position and for elevating the reel under load, thereby materially speeding up production and eliminating possible injuries to the operator in addition to relieving the strain and effort ordinarily required in lifting the heavy metal coils onto the reel.

Another object is to provide a reel supported for rotation on a vertical axis by a spindle and having a power operated drive for tilting the spindle for loading purposes. The power operated drive for the present reel requires a small amount of power for operation since the apparatus employs a heavy counterweight to keep the elevating torque on the motor to a minimum and further, since the toggle means in the power drive diminishes torque requirements at each end of the cycle to practically zero.

A further object resides in the provision of a power operated tilting reel having a toggle acting drive for reducing the torque requirements on the motor at each end of the cycle so that the motor starts up under practically no load and gradually takes over the work of elevating or lowering the reel upon reaching full speed. Also the action of the toggle drive is such as to positively lock the reel in either extreme position so that mechanical latches are not required.

With these and various other objects in view, the invention may consist of certain novel features of construction and operation, as will be more fully described and particularly pointed out in the specification, drawings and claims appended hereto.

In the drawings, which illustrate an embodiment of the device and wherein like reference characters are used to designate like parts—

Figure 1 is a view in side elevation, parts being shown in section, of the tilting reel and supporting structure for the same with power operated tilting means embodying the improved features of the invention;

Figure 2 is an end elevational view of the tilting reel shown in Figure 1;

Figure 3 is a top plan view of the reel of the invention;

Figure 4 is a side elevational view similar to Figure 1 but showing the reel in tilted position for loading purposes;

Figure 5 is a vertical detail view in section showing the construction of the spindle and the manner of rotatably journalling the reel on the spindle;

Figure 6 is an elevational view of the tapered drum showing the elongated slots; and

Figure 7 is a detail view, with parts in section, showing the counterweight and actuating crank arm.

Referring to Figures 1 and 2, the numeral 10 indicates a supporting member including a base 11 and a standard 12, said standard having a boss 13 at the end opposite the base for receiving a pivot pin. The base is provided with elongated slots 14 for bolting the same to a floor or the like. A laterally extending boss 15 is provided for pivotally securing the motor plate 16 of the electric motor 17 to the standard. The numeral 18 indicates the pivotal connection for the motor plate and said plate at its lower end has an adjusting screw 20 which is held in adjusted position by nut 21. The screw passes through the plate 16 to contact the standard and by regulating the screw this end of the motor plate can be located in the desired position either close to the standard or away therefrom within the limits of said screw. The fastening screws 22, Figure 4, secure the motor 17 to its plate 16.

On the side of the standard opposite the motor plate a second boss 23 is provided integral with the standard and of relatively large diameter. The side edges are accurately finished to provide a boss of the proper width and the edges are tapped to form a plurality of threaded openings, not shown. Also the boss is cored to form an opening of the proper size for receiving the heliocentric speed reducer 24. Said reducer is

thus located by boss 23 in proper position on the standard and by means of screws having threaded engagement with said threaded openings in the boss 23 the speed reducer 24 is fixedly secured in place.

The speed reducer is of the type having a center input shaft 25 projecting from one side of the housing thereof and having a center output shaft 26 projecting from the opposite side of the housing. The reduction in speed between the input and output shafts may be any ratio desired but for the purposes of this invention a ratio has been selected of approximately sixty to one. In other words, sixty complete revolutions of the input shaft 25 will result in output shaft 26 rotating one complete revolution.

The shaft 27 of the electric motor 17 is provided with a grooved pulley 28. This pulley is in alignment with grooved pulley 30, fixed to the input shaft 25 of the speed reducer 24. The pulleys are operatively connected by the V-belt 31 and in this manner the motor 17 is caused to drive the speed reducer. For safety purposes it is desirable to surround the pulleys 28 and 30 and the V-belt 31, with a guard 32, which may be suitably supported from the standard 12 by the bracket 33.

A crank arm 34 is fixed to the projecting end of the output shaft 26. This crank arm carries a stud 35 at its outer end, having connection with a slide block 36 located within the longitudinally extending groove 37 in the counterweight 38. A rubber plug 39 forming a shock absorber is located at the upper terminal end of the longitudinal groove 37 and said slide block 36 is in contact with the shock absorber when the tilting reel is located in either of its two extreme positions. The counterweight 38 includes a heavy base portion 40 and a shank portion 41. The shank portion, shown in Figures 2 and 7, is vertical for the greater part of its extent, although at its upper end the same includes a curved laterally extending part 42 having a vertically disposed boss 43 at its end. As a result the boss 43 is disposed directly over standard 12. The hub 44 is integral with the shank portion 41 of the counterweight and said hub and shank portion receive the pivot pin 45 which extends through these parts and through boss 13 formed on the standard. The pivot pin 45 is secured to the standard by means of nut 46 and the counterweight is supported in this manner on standard 12 and journalled for pivotal movement with respect thereto. It will be observed that rotation of the output shaft 26 will cause movement of crank arm 34 and stud 35 in a manner to impart actuation to counterweight 38. Rotary movement of arm 34 will produce sliding movement of the slide block 36 within the longitudinal groove 37 and since this groove extends longitudinally of the counterweight the said counterweight may be caused to move from a vertical depending position, as shown in Figure 1, to a substantially horizontal position, as shown in Figure 4.

The spindle shaft 47 is supported by the counterweight, being releasably secured to boss 43. The lower reduced end 48, Figure 5, of the spindle shaft is located within an opening formed in boss 43 and the same is releasably secured by screws 49. Since the boss 43 is directly over and in alignment with standard 12, it will be understood that spindle shaft 47 is likewise in alignment with said standard, and, in fact, may be considered as a continuation thereof. A switch shaft 50 extends centrally through the spindle shaft and projects from the opposite ends thereof. The upper projecting end of the switch shaft 50 has the switch lever 51 secured thereto. The lower depending end of said switch shaft has the switch arm 52 secured thereto. The upper half of the spindle shaft 47 is reduced in diameter to form a shoulder 53 for supporting the thrust bearing 54. A spacing washer 55 is in contact with the thrust bearing and the spindle hub 56 is in contact with said washer. Said hub is accordingly mounted on the spindle shaft and supported by the thrust bearing. By means of the ball bearings 57, located at the top and bottom of the spindle hub, the same has substantially frictionless rotation on the spindle shaft. It is desirable to frictionally retard rotation of the spindle hub 56 and for this purpose the invention provides the friction collar 58 and the friction washer 59 having location between the collar and the hub 56. The friction collar is prevented from rotating with the hub by means of the collar 60 located on the spindle shaft and housed within the friction collar 58. Said collar 60 is fixed to the spindle shaft by the set screw 61 which is located within a recessed portion 62 formed on the inside surface of friction collar 58. The coil spring 63 applies the desired tension to the friction collar and which may be adjusted by varying the position of the threaded nut 64.

The spindle hub 56 is part of the reel, indicated in its entirety by numeral 65, Figures 1 and 2, which is accordingly rotatably mounted on the spindle 47. Said reel additionally consists of four radially extending arms 66 having threaded connection at their inner ends, as at 67, with the hub 56, and which are connected at their outer ends by the lower circular band or hoop 68. Said lower band is suitably secured to the outer ends of the radially extending arms 66 by means of the screws 69. The hub 56, the radially extending arms 66 and the band 68 comprise the base portion of the reel. The upper portion of the reel is formed by the upper band 70, and the radially extending rods 71 connected to said band. Said rods 71 extend inwardly for approximately one-half the distance to the center, as clearly indicated in Figures 1 and 2. The rods are connected adjacent their inner terminal ends by means of the inner band 72 and the inwardly projecting portions of said rods 71 are adapted to have releasable connection with a tapered drum 73. For this purpose bayonet slots 74 are formed in the upper edge of said tapered drum. When it is desired to place a coil of wire on the reel it is, of course, necessary to remove the upper band 70, which merely requires that the operator rotate the band with respect to drum 73, thereby releasing the rods 71 from their bayonet slots 74 whereby this upper part of the reel can be removed.

The tapered drum 73 has an operating position and a loading position with respect to the supporting arms 66 of the reel. As best shown in Figure 3, two of the arms 66 pass through elongated slots 75 formed in the tapered drum. The other two arms 66 pass through openings in the drum just slightly larger than necessary to receive the arms. It will therefore be understood that the tapered drum may be moved on arms 66, which form the base of the reel, from a central position, as shown in Figures 1, 2 and 3, to an eccentric position, as shown in Figure 4. In said figure the reel is shown in loading position and the same is adapted to receive a coil of wire or a coil of metal stock as the case may be.

The reversing switch 76 controls the starting and stopping of the electric motor 17. Said switch

also controls the direction of rotation of shaft 27 of said motor, both controlling functions being accomplished by actuation of the control lever 79.

A connecting link 80 operatively connects the control lever with switch arm 52 fixed to the lower projecting end of the switch shaft 50. A trip lever 81, having several right angled bends, is fixed to the switch arm 52 in a manner to depend therefrom and contact the trip lever pin 82. Said pin is suitably fixed to the boss 13 of the standard 12 so as to project vertically with respect to the standard. For locating the reel in vertical operating position, as shown in Figures 1 and 2, said trip lever 81 has been actuated by contact with pin 82 to locate the switch arm 52 and thus the control lever 79 in a neutral position. In this position of the control lever the switch 78 opens the electric circuit to the motor 17 and said motor is stopped with the reel vertical. The function of pin 82, therefore, is to automatically actuate switch arm 52 and control lever 79 so as to disconnect motor 17 from its source of power, bringing the motor to rest with the reel in proper vertical position.

For tilting the reel to loading position the operator turns the switch lever 51, located centrally within the tapered drum 73. The switch lever is thus conveniently located for actuation by the operator and the same may be actuated for the purpose of tilting the reel to loading position and for also causing elevating movement of the reel. The trip lever 81 is in contact with pin 82 when the reel is located in upright vertical position, as has been described, and accordingly the operator can rotate lever 51 in one direction only, namely, in a direction to cause the trip lever 81 to move out of contact with pin 82. This actuation of the lever will move the control lever 79 to start operation of the electric motor 17, but which operation will be in a direction to effect a lowering of the reel. More particularly, reference being had to Figures 1 and 4, shaft 27 of the motor will rotate in a clockwise direction, producing rotation of pulley 30 also in a clockwise direction. The output shaft 26 of the speed reducer will likewise rotate in the same direction and therefore the crank arm 34 will rotate clockwise. This action of the arm through stud 35, which rides within the longitudinal groove 37 of the counterweight 38, will produce pivotal movement of the counterweight about the pivot pin 45, with the result that the reel is lowered to a substantially horizontal position, as shown in Figure 4. As the reel approaches said position the trip lever 81 will contact boss 15. Tilting movement of the reel to loading position therefore automatically returns the trip lever 81 to a neutral position which also returns the control lever 79 to neutral position and operation of the motor is terminated.

It will be observed that at the start of the tilting movement the stud 35 and slide block 36 are located adjacent the upper end of the slot 37 in contact with shock absorber 39. Said slide block is similarly located in contact with the shock absorber when the reel is located in tilted loading position. However, the crank arm 34 has rotated approximately 270 degrees to effect movement of the reel from its upright position to its loading position. The action of the shock absorber is to take up the small amount of overrun which the electric motor necessarily has.

To facilitate the loading of the reel the tapered drum 73 may be moved downwardly on the supporting arms 66 to the position shown in Figure 4. A latching member 83 is located within the drum supported for pivotal movement on a pair of diametrically extending arms 66. When the reel is upright in operating position the latch is located to the left, as shown in Figure 1. However, either before or after the reel has assumed a loading position the latch is rotated 180 degrees, in which position the drum 73 is allowed to move downwardly on the arms 66 by reason of the elongated slot 75.

For elevating the reel the operator need only actuate the switch lever 51 and it will be apparent that actuation in only one direction is permitted. Movement of said lever in this direction will move the trip lever 81 and the control lever 79 to initiate operation of the electric motor, which operation will be in a direction reverse to the direction previously described for effecting a tilting of the reel. In other words, referring to Figure 4, shaft 27 of the electric motor will now rotate in a counter-clockwise direction, driving pulley 30 in a similar direction to cause rotation of arm 34 in a counter-clockwise direction, which will rotate the counterweight 38 to its original upright position.

A small amount of power is required to tilt or elevate the present reel for the reason that the heavy counterweight 38 assists the motor in performing said work. In other words, the counterweight materially reduces the elevating torque on the motor. Also the manner in which the crank arm 34 imparts movement to the counterweight has the effect of diminishing torque requirements at the beginning of the lowering operation and also at the beginning of the elevating operation. It is possible for the motor to start under no load and to substantially reach full speed before gradually taking over the work of tilting the reel. It will also be observed that as a result of the position which the crank arm 34 has with the counterweight when in upright position and also when in tilted position is such as to positively lock the counter-weight and therefore it is not necessary to provide latches for holding the reel in its two extreme positions.

The invention is not to be limited to or by details of construction of the particular embodiment thereof illustrated in the drawings as various other forms of the device will of course be apparent to those skilled in the art without departing from the spirit of the invention or the scope of the claims.

What is claimed is:

1. In a reel of the character described, a standard having a supporting base, a counterweight pivoted to the standard so as to have movement about a horizontal axis, whereby the counterweight is supported by the standard and normally depends vertically downward from the pivot axis, a spindle shaft fixed to the counter-weight to normally extend upward in a vertical direction, a spindle hub mounted for rotation on the spindle shaft whereby the axis of rotation for the hub is normal to the pivot axis for the spindle shaft, a plurality of arms extending radially from the hub and forming the base of the reel, a drum supported by the arms, an electric motor of the reversing type supported by the standard, speed reducing means also supported by the standard and having driving connection with the motor, a crank arm actuated by the speed reducing means and operatively connecting with the counterweight to cause movement of the counterweight and tilting of the spindle shaft upon rotation of

the crank arm, and switch means for controlling operation of the motor.

2. In a tilting reel, a standard having a supporting base, a member rotatably supported by the standard so as to have movement with respect thereto about a horizontal pivot axis, the portion of said member below the pivot axis providing a counterweight and said member above the pivot axis including a spindle shaft, a spindle reel mounted for rotation on the spindle shaft and including a plurality of radially extending arms supporting a drum, a crank arm having operative connection with the counterweight to cause movement of the counterweight and tilting of the spindle shaft upon rotation of the crank arm, motor driven means for rotating the crank arm, and switch means for controlling operation of the motor, said switch means being fixed to the member so as to have movement therewith.

3. In a tilting reel, as defined by claim 2, wherein the motor driven means includes an electric motor of the reversing type, and wherein speed reducing mechanism is included in the drive from the motor to the crank arm.

4. In a tilting reel, a standard having a supporting base, a member rotatably supported by the standard so as to have movement with respect thereto about a horizontal pivot axis, the portion of said member below the pivot axis providing a counterweight and said member above the pivot axis including a spindle shaft, a spindle reel mounted for rotation on the spindle shaft and including a plurality of radially extending arms supporting a drum, said drum having a central operating position on the arms and an eccentric loading position, an electric motor of the reversing type supported by the standard, a crank arm driven by said motor and operatively connecting with the counterweight to cause movement of the counterweight and tilting of the spindle shaft upon rotation of the crank arm, switch means for controlling operation of the motor, and a switch shaft extending longitudinally of and journalled by the spindle shaft for actuating the switch means.

5. In a tilting reel, a standard having a supporting base, a member rotatably supported by the standard so as to have movement with respect thereto about a horizontal pivot axis, the portion of said member below the pivot axis providing a counterweight and said member above the pivot axis including a spindle shaft, a spindle reel mounted for rotation on the spindle shaft including a plurality of radially extending arms supporting a drum, motor driven means including an electric motor of the reversing type for actuating the counterweight to cause movement of the counterweight and tilting of the spindle shaft, switch means for controlling operation of the motor, manually actuated means projecting from the upper end of the spindle shaft for actuating the switch means to start operation of the motor, and other means fixed to the standard for automatically actuating said switch means as a result of movement of said member.

6. In a tilting reel, a standard having a supporting base, a reel supporting member pivotally secured intermediate its ends to the standard for movement about a horizontal axis, said member including a counterweight located below the pivot axis and a tubular spindle shaft extending above the pivot axis, a spindle reel including a hub journalled for rotation on the spindle shaft as an axis, and a plurality of arms extending radially from the hub, an electric motor of the reversing type supported by the standard, a crank arm rotated by the motor and operatively connecting with the counterweight to cause movement of the member whereby the spindle shaft may be lowered to a horizontal loading position for the reel and returned to an upright operating position, and a reversing electric switch for controlling operation of the motor.

7. In a tilting reel, a standard having a supporting base, a reel supporting member pivotally secured intermediate its ends to the standard for movement about a horizontal axis, said member including a counterweight located below the pivot axis and a tubular spindle shaft extending above the pivot axis, a spindle reel including a hub journalled for rotation on the spindle shaft as an axis, and a plurality of arms extending radially from the hub, an electric motor of the reversing type supported by the standard, speed reducing means also supported by the standard and having connection with the motor, a crank arm fixed to the shaft of the speed reducing means and operatively connecting with the counterweight to cause movement of the member, whereby the spindle shaft may be lowered to a horizontal loading position for the reel and returned to an upright operating position, and a reversible electric switch for controlling operation of the motor.

8. In a tilting reel, a standard having a supporting base, a reel supporting member pivotally secured intermediate its ends to the standard for movement about a horizontal axis, said member including a counterweight located below the pivot axis and a tubular spindle shaft extending above the pivot axis, a spindle reel including a hub journalled for rotation on the spindle shaft as an axis, and a plurality of arms extending radially from the hub, a drum supported on the arms and having a central operating position and an eccentric loading position, an electric motor of the reversing type supported by the standard, a crank arm rotated by the motor and operatively connecting with the counterweight to cause movement of the member, whereby the spindle shaft may be lowered to a horizontal loading position for the reel and returned to an upright operating position, a reversible electric switch for controlling operation of the motor, a switch shaft extending through the spindle shaft and projecting from the opposite ends thereof, a manually actuated lever fixed to the upper projecting end of the switch shaft, and means connecting the lower projecting end of the switch shaft with the electric switch.

9. In a tilting reel, a standard having a supporting base, a reel supporting member pivotally secured intermediate its ends to the standard for movement about a horizontal axis, said member including a counterweight located below the pivot axis and a tubular spindle shaft extending above the pivot axis, a spindle reel including a hub journalled for rotation on the spindle shaft as an axis, and a plurality of arms extending radially from the hub, a drum supported on the arms and having a central operating position and an eccentric loading position, an electric motor of the reversing type supported by the standard, a crank arm rotated by the motor and operatively connecting with the counterweight to cause movement of the member whereby the spindle shaft may be lowered to a horizontal loading position for the reel and returned to an upright operating position, a reversible electric switch for controlling operation of the motor,

said switch being fixed to the member so as to have movement therewith, manually actuated means supported by the spindle shaft for actuating the electric switch to cause starting of the motor, and means provided by the standard for actuating said switch as a result of movement of the member to cause stopping of the motor.

10. In a tilting reel, a standard having a supporting base, a reel supporting member pivotally secured intermediate its ends to said standard for movement about a horizontal axis, said member including a counterweight located below the pivot axis and a tubular spindle shaft extending above the pivot axis, a spindle reel including a hub journalled for rotation on the spindle shaft as an axis, an electric motor of the reversible type supported by said standard, means operatively connecting said electric motor with said member whereby rotation of the motor in one direction causes movement of the member from an upright position to a substantially horizontal loading position and movement of the electric motor in an opposite direction returns said member to its upright position, an electric switch for starting and stopping said motor and for determining its direction of rotation, said switch being fixed to the member so as to have bodily movement therewith, switch actuating means carried by said member for effecting actuation of the electric switch, and means provided by the standard and located so as to have contacting engagement with a part of said switch actuating means as a result of movement of the member to cause said motor to stop.

11. In a tilting reel, a standard having a supporting base, a reel supporting member pivotally secured intermediate its ends to said standard for movement about a horizontal axis, said member including a counterweight located below the pivot axis and a tubular spindle shaft extending above the pivot axis, a spindle reel including a hub journalled for rotation on the spindle shaft as an axis, an electric motor of the reversible type supported by said standard, means operatively connecting said electric motor with said member whereby rotation of the motor in one direction causes movement of the member from an upright position to a substantially horizontal loading position and movement of the electric motor in an opposite direction returns said member to its upright position, an electric switch for starting and stopping said motor and for determining its direction of rotation, said switch being fixed to the member so as to have bodily movement therewith, switch actuating means including a rod extending centrally of the spindle shaft and projecting from the ends thereof, a handle secured to the upper projecting end of said rod and the opposite projecting end providing a contacting portion, and means in spaced relation on the standard providing abutments against which said contacting portion may be caused to engage as a result of movement of the member, the contacting portion of said switch rod engaging one of said abutments to effect stopping of the motor as said member and spindle reel are elevated to a vertical operating position, and said contacting portion engaging the other of said abutments to cause stopping of the motor as the member and spindle reel are lowered into a substantially horizontal loading position.

12. In a reel, a standard having a supporting base, a spindle shaft pivoted to the standard for movement about a horizontal axis and having a portion depending below the pivot axis providing a counterweight, whereby the spindle shaft normally extends upwardly in a vertical direction, a spindle hub mounted for rotation on the spindle shaft with the axis of rotation for the hub being normal to the pivot axis for the spindle shaft, means fixed to the hub providing a spindle reel therewith, an electric motor of the reversible type supported by said standard, means operatively connecting said electric motor with said counterweight, whereby rotation of the motor in one direction causes movement of the spindle shaft from an upright position to a substantially horizontal loading position for the reel and movement of the electric motor in an opposite direction returns said spindle shaft to its upright position, an electric switch for starting and stopping said motor and for determining its direction of rotation, switch actuating means including a rod extending centrally of the spindle shaft and projecting from the ends thereof, a handle secured to one projecting end of said rod so that the switch may be actuated thereby to start operation of the motor, and the opposite projecting end of said rod having a contacting portion which is automatically actuated to effect a stopping of the motor by movement of the spindle reel supporting structure.

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