Nov. 1, 1966 F. C. HOLMES 3,282,518

COIL REEL

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Fig. 6.

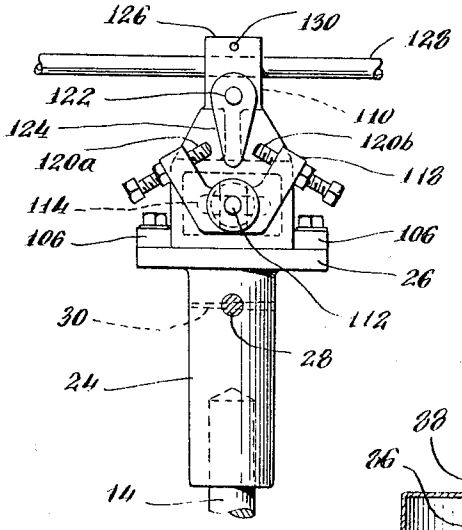


Fig. 1.

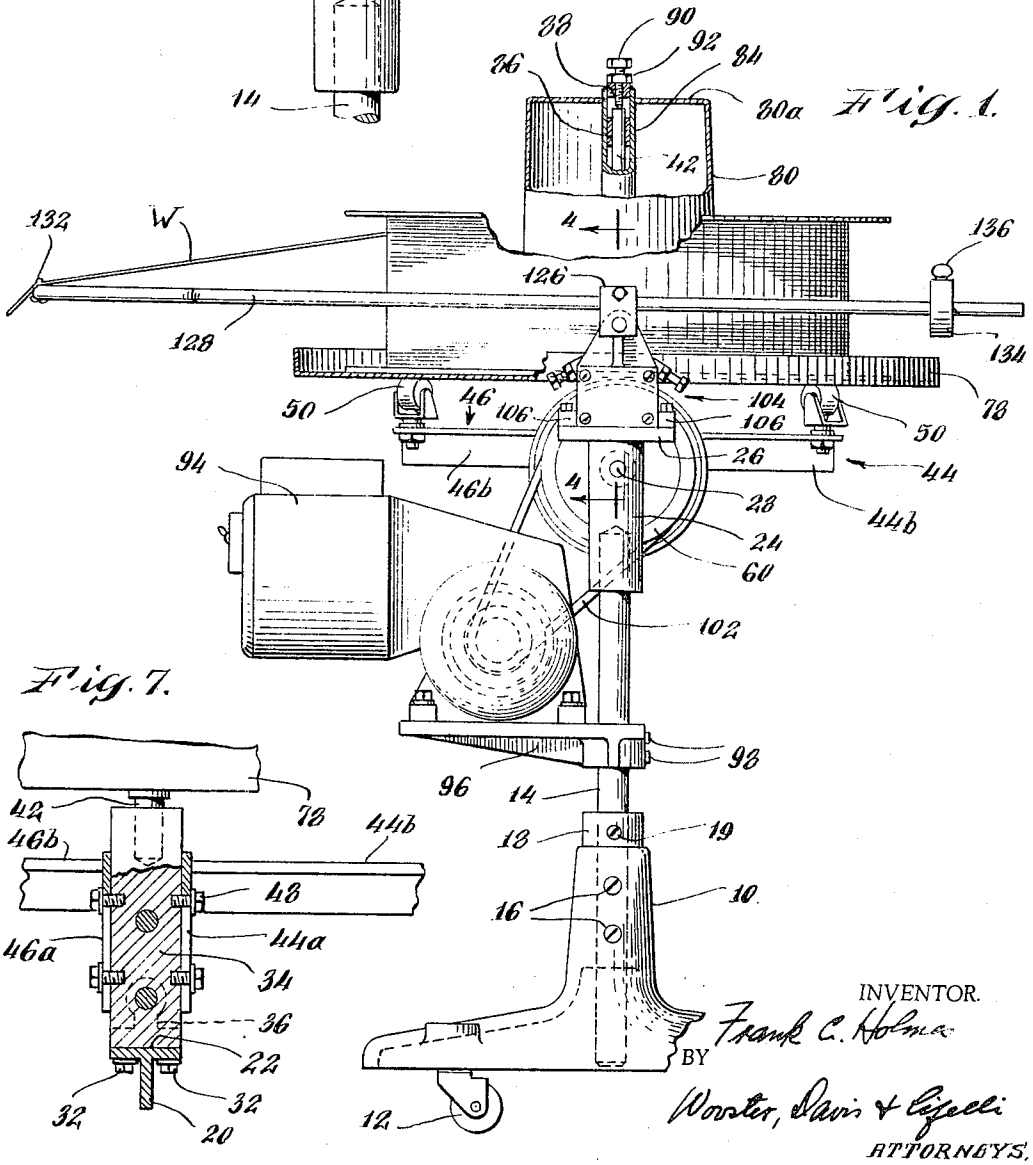


Fig. 7.

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Fig. 3.

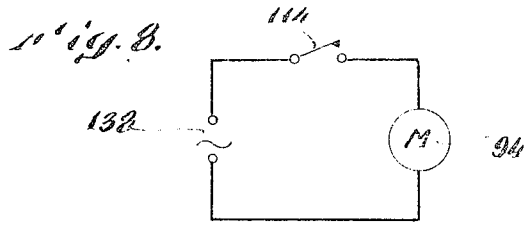
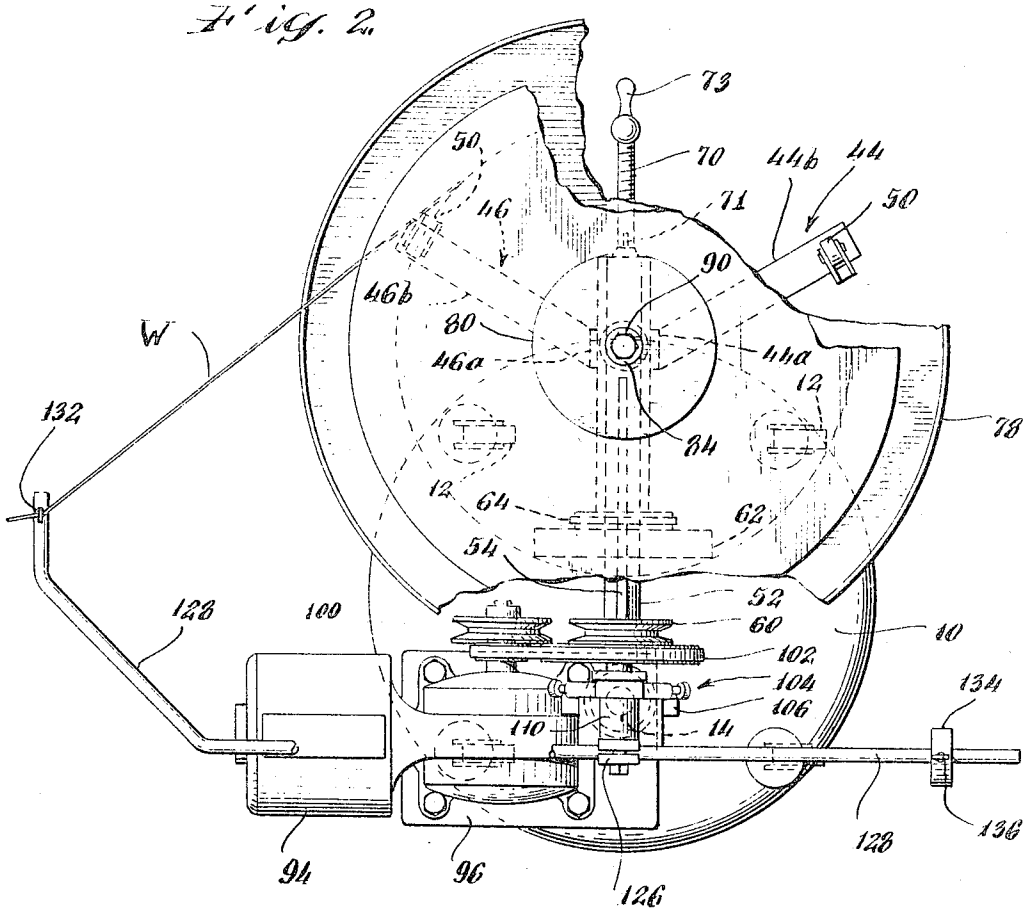


Fig. 2.



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Fig. 4

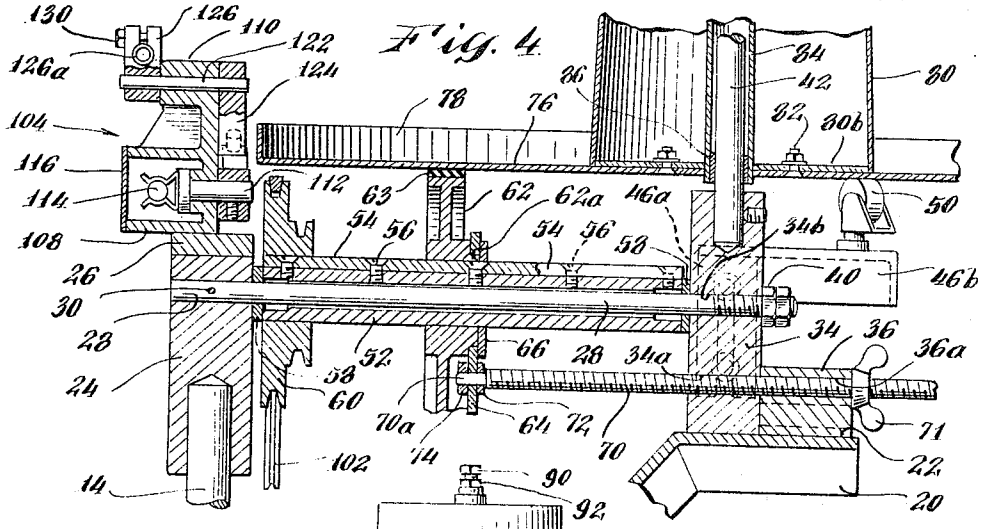


Fig. 3

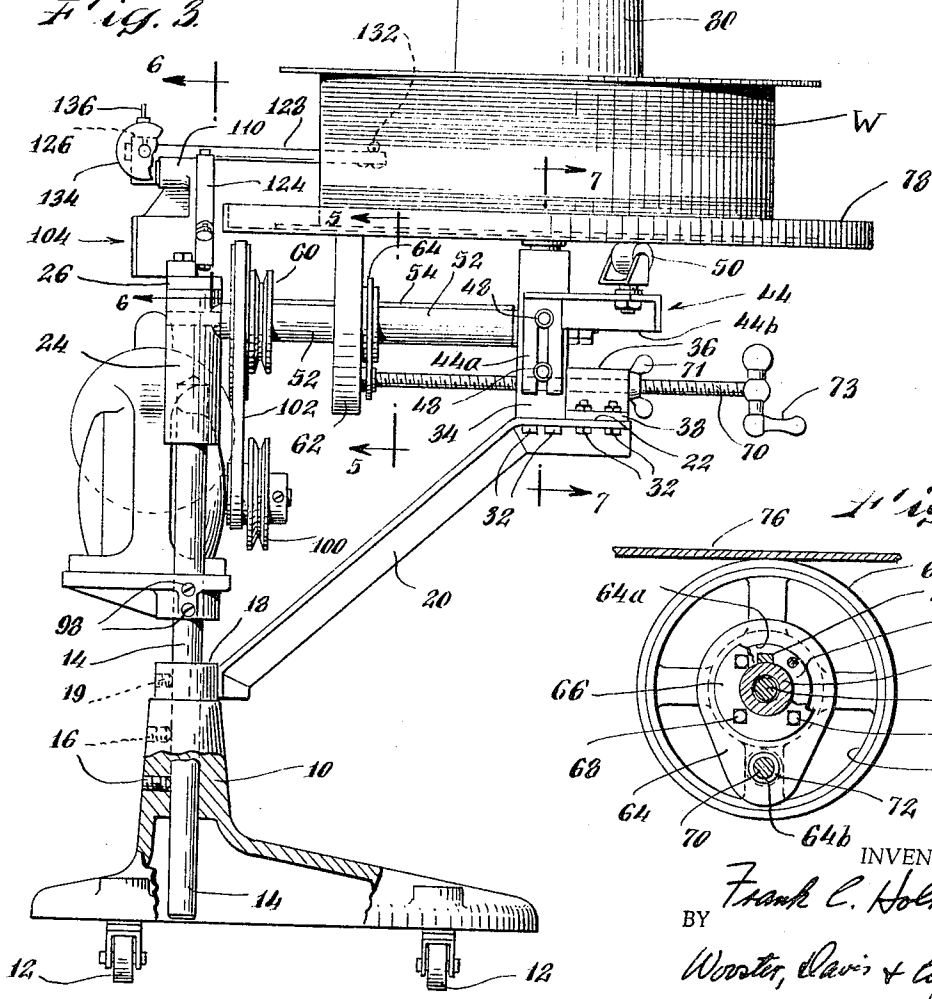


Fig. 5

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COIL REEL

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Filed Dec. 11, 1964, Ser. No. 417,709

11 Claims. (Cl. 242—54)

This invention relates to a coil reel and, more particularly, to such a reel having automatic pay off features.

Wire which is supplied to wire forming machines is customarily fed from spools or coils. It has been customary in the past to place such coils on freely rotating supports in order that the forming machine could pull off wire as required. Under certain circumstances, however, a number of difficulties arise when using this type of pay off arrangement. For example, a full coil of wire is quite heavy and considerable force may be needed to overcome its inertia. This creates a serious problem when handling small diameter wire as the forces which are exerted on the wire may be sufficiently great to cause kinking or other deformation, thus altering the physical properties of the wire and detracting from the uniformity of the part being produced. This may have deleterious effects on the coating of wire and may completely alter the designed load capacity of springs which are formed from such wire. The forces mentioned frequently impose such loads that the layers of wire are shifted, causing tangling of the wire, necessitating shutdown of the machine to correct the problem. In some cases, it is cheaper to scrap a badly tangled bundle of wire than attempt to salvage it.

Accordingly, it is the primary object of the present invention to provide a coil reel having an automatic motor driven pay off mechanism that will provide a free length of wire from which the feed mechanism can draw its requirements without imposing any load upon the wire coil. Other objects are to provide such a reel wherein the automatic pay off mechanism may be operated continuously, intermittently, or completely dispensed with as desired; to provide a motor driven coil reel having easily adjustable speed variation; and to provide a reel which is easily portable, even when supporting heavy coils of wire.

Other objects, features and advantages will be more apparent from the following description, the appended claims, and the figures of the attached drawings wherein:

FIG. 1 is a front view of a coil reel in accordance with this invention;

FIG. 2 is a top view of the reel of FIG. 1;

FIG. 3 is a right side view of the reel of FIG. 1;

FIG. 4 is an enlarged cross sectional view taken along the line 4—4 of FIG. 1;

FIG. 5 is an enlarged cross sectional view taken along the line 5—5 of FIG. 3;

FIG. 6 is an enlarged cross sectional view taken along the line 6—6 of FIG. 3;

FIG. 7 is an enlarged cross sectional view taken along the line 7—7 of FIG. 3; and

FIG. 8 is an electrical schematic diagram of the motor wiring for the coil reel of this invention.

The objects of the present invention are achieved by means of a reel including a base, a rotatable tray for supporting the wire coil, and a variable speed drive for rotating the tray at a selected speed.

With more particular reference to the drawings, there

is illustrated a circular base 10 which is mounted on casters 12 for easy portability. The base 10 includes a hub supporting therein a vertical post 14 which is adjustable as to height by means of set screws 16. An adjustable collar 18 is also mounted on the post 14 by means of set screw 19 and an angled support arm 20 is welded thereto. The support arm 20 is a T iron which is bent horizontally at its outer extremity to form a support surface 22. On the upper end of post 14 is mounted a pivot shaft support block 24. Support block 24 comprises a cylindrical body which is drilled at its lower end to receive the upper end of post 14 and includes a horizontal rectangular plate 26 at its upper end. The support block 24 also includes a horizontally disposed opening which supports one end of a pivot shaft 28 (FIG. 4). The pivot shaft 28 is fixed relative to the support block 24 by means of a dowel pin 30 which extends through both members.

Secured to the support surface 22 of support arm 20 by means of bolts 32 are a bracket 34 and an adjusting shaft guide 36. Adjusting shaft guide 36 includes mounting flanges 38 and a horizontal generally cylindrical body portion which defines an unthreaded adjusting shaft opening 36*a* therethrough. The bracket 34 is a block of rectangular cross section which defines a threaded adjusting shaft guide opening 34*a* which is aligned with adjusting shaft opening 36*a*. The bracket 34 also includes a horizontal pivot shaft support opening 34*b* aligned to receive the end of the pivot shaft 28. The threaded end of pivot shaft 28 extends through this opening and is secured by a pair of nuts 40. The upper end of bracket 34 is drilled to receive the lower end of a vertically extending reel shaft 42. Mounted against opposite sides of bracket 34 are a right hand support member 44 and a left hand support member 46. Each support member includes a slotted base plate (44*a*, 46*a*) which is mounted against the bracket 34 by means of bolts 48 and a horizontal extending arm (44*b*, 46*b*) which is formed from an angle iron and supports at its outer end inverted caster 50.

Encircling the pivot shaft 28 is a tubular drive shaft 52 having a length of key stock 54 affixed along its length by means of screws 56. At each end of the drive shaft 52 and abutting against the support block 24 and bracket 34, respectively, there is positioned a thrust washer 58. Mounted on the left end of drive shaft 52 as seen in FIGS. 3 and 4, and keyed thereto by key stock 54, is a two diameter pulley 60. A friction wheel 62 having a friction material 63 on its periphery is keyed on shaft 52 and is longitudinally slidable relative to the shaft. The friction wheel 62 includes an axially extending hub portion 62*a*. An adjusting yoke 64 having a central opening 64*a* is fitted against the friction wheel 62 with the central opening encircling hub 62*a*. The yoke 64 includes a radially extending portion which defines an offset opening 64*b* which is aligned with the adjusting shaft guide opening 34*a* in bracket 34, and shaft opening 36*a* in adjusting shaft guide 36. The friction wheel 62 is secured to yoke 64 by means of an annular retainer 66 which is also keyed to drive shaft 52 and is screwed to the hub 62*a* by means of screws 68. An adjusting shaft 70, which is threaded throughout substantially its entire length, extends through guide opening 34*a* and is threaded into the shaft opening 36*a* of adjusting shaft guide 36. At its left end, as viewed in FIG. 4, the adjusting shaft 70 is necked down to provide an unthreaded pin portion

70*a* which extends through the offset opening 64*b* of adjusting yoke 64. The shoulder formed at the point of reduced diameter of the adjusting shaft 70 is spaced from the adjusting yoke 64 by means of a washer 72. A collar 74 is secured to the pin portion 70*a* of shaft 70 on the side of yoke 64 opposite washer 72 by means of a spring pin (not shown). At its right end, adjusting shaft 70 is provided with a crank handle 73.

Mounted on top of the reel shaft 42 is a drum reel comprising a disc shaped tray 76 having an annular rim 78 and a slightly conical upwardly extending hub 80. Hub 80 is of sheet metal and includes a flat upper surface 80*a* and a flat lower surface 80*b* which is secured to the tray 76 by means of bolts 82. A section of steel tubing 84 extends vertically through hub 80 and is permanently secured in the drum reel assembly by welding or soldering. A pair of bushings 86, provided with suitable oil grooves, are mounted in the tubing 84, one at its extreme lower end and the other spaced from the upper end of the tubing. The upper end of tubing 84 is closed by a plug 88 which is welded therein and drilled and tapped to receive an adjusting screw 90. A jam nut 92 is employed to position the adjusting screw.

The reel of this invention is driven by means of the geared head motor 94 which is mounted on a motor plate 96 which, in turn, is secured to the post 14 by means of set screws 98. The two diameter sheave 100 is connected with the two diameter pulley 60 by means of a V belt 102.

A switch box 104 is mounted on the rectangular plate 26 atop pivot shaft support block 24 by means of screws which extend through its feet 106 into the rectangular plate. The switch box 104 includes a lower housing 108 and an upper cylindrical bushing 110. The inner back surface of housing 108 includes a boss and an opening therethrough rotatably supporting a switch shaft 112 upon which is mounted a mercury switch 114 within housing 108. Housing 108 is closed by a suitable cover 116. Mounted on the back end of switch shaft 112, where it protrudes from the box 108, is a V shaped switching fork 118, most clearly illustrated in FIG. 6. Mounted in each arm of switching fork 118 is a screw 120*a*, 120*b*. The screws extend inwardly of the V and are provided with jam nuts for fixing their position. Extending through the bushing 110 is a switching rod 122. An elongated switching arm 124 is mounted on one end of switching rod 122 and is normally positioned between the ends of bolts 120*a*, 120*b*. On the opposite end of the switching rod 122 there is secured an adjusting block 126. Adjusting block 126 includes an opening 126*a*, transverse to the shaft 122 and above it, through which is mounted a control rod 128. Adjusting block 126 is split and a bolt 130 permits the control rod to be longitudinally positioned and then tightly gripped therein. The control rod 128 is bent as shown in FIG. 2, a cotter pin 132 is mounted in one end, and a counterweight 134 is adjustably positioned along the other end by means of a thumb screw 136.

The coil reel of this invention may be operated either as a simple rotatable wire holder or it may be motor driven. Furthermore, when motor-driven it may be operated in either of two modes, with simple continuous rotation or intermittently.

In order to operate the coil reel as a simple rotatable wire holder, it is merely necessary to release the jam nut 92 and advance the adjusting screw 90 (see FIG. 1) until it contacts the top of the reel shaft 42. Continued advancement of screw 90 will then lift the hub 80 and tray 76 will move out of contact with casters 50 and friction wheel 62. A coil of wire W may then be placed on the tray 76 and paid off in the usual fashion, the tray being freely rotatable.

To operate the reel to feed wire at a continuous speed, the adjusting screw 90 is retracted to its original position so that tray 76 rests upon casters 50 and friction wheel 62. The control rod 128 is either removed or the wire is

paid off in a direction such that it will not come into contact with the control rod. Motor 94 is then switched on and motor sheave 100 will begin to rotate, driving pulley 60 through feed belt 102. As pulley 60 revolves, it will, in turn, rotate the tubular drive shaft 52 which will rotate friction wheel 62 which is keyed thereto. As friction wheel 62 rotates, it will frictionally drive tray 76 at a speed inversely proportional to the distance of the friction wheel 62 from the center of the tray. As the central opening 64*a* in adjusting yoke 64 is circular, this yoke will not rotate but will remain fixed in position while the hub 62*a* of friction wheel 62 rotates therein. Extremely precise adjustment of the speed of tray 76 may now be achieved in order to match the wire feed requirements of the machine utilizing the wire. This is accomplished by loosening jam nut 71 and turning crank handle 73 to screw adjusting shaft 70 into or out of adjusting shaft guide 34. As the yoke 64 is rotatably fixed on the pin end 70*a* of adjusting shaft 70, it will move axially back and forth along the drive shaft 52, thereby changing the radial location of friction wheel 62 relative to the tray 76. Movement of wheel 62 outwardly from the center of tray 76 will decrease the speed of the tray while moving wheel 62 inwardly will increase the speed. In addition to this fine adjustment of speed, a coarse adjustment is also available in that the V-belt 102 may be moved to the remaining portions of the two-diameter pulley 60 and motor sheave 100.

When larger diameter wire is to be paid off from the coil reel of the invention, use may be made of the tension on the wire to cause the reel to operate intermittently only when required. This is accomplished by means of the control rod 128 which is positioned, as shown in the drawings, with the wire strand W passing over it to the machine to be fed. A cotter pin 132 is positioned in the end of the control rod and the wire passes through its eye as shown in FIG. 2. Assuming that insufficient wire has been paid out, the machine utilizing the wire will begin to exert tension upwardly against the emerging strand of wire W. As this tension increases, the end of control rod 128 carrying the cotter pin is raised, aided by the force exerted by counterweight 134. The control rod 128 and the adjusting block 126 pivot together with the switching rod 122 which is mounted through the bushing 110 (FIG. 4). The switching arm 124 (FIG. 6) also rotates and contacts the screw 120*b*, tipping the switching fork 118 clockwise. As the switching fork rotates, it also rotates the switching shaft 112 thereby activating the mercury switch 114 contained in the housing 108 of switch box 104. The electrical schematic of FIG. 8 illustrates, in highly simplified form, the motor 94 and switch 114 connected in series across a power supply 138. Activation of the mercury switch starts motor 94, which thereupon begins to drive the reel, paying off wire until the tension is relieved, the cotter pin end of the control rod lowers and switch 114 opens. It will be noted that the degree of tension required to operate the reel is adjustable by changing the position of counterweight 134 and also by changing the position of control rod 128 within the adjusting block 126. It will also be noted that the switching mechanism of FIG. 6 is symmetrical, so that it is operable regardless of the direction of rotation of the motor 94 and the reel tray 76. Accordingly, the reel of the invention is capable of feeding wire from coils having either a right-hand or a left-hand wind.

The intermittent operation of the reel has been described as initiated by wire tension exerting an upward force against the cotter pin carrying end of control rod 128. This is the preferred form of operation due to the increased sensitivity resulting from the additive action of counterweight 134. However, the reel may also be operated by the increasing wire tension exerting a downward force on the cotter pin carrying end of control rod 128 by making minor adjustments in the apparatus.

It will be apparent from the foregoing description that

all of the objectives which have been set forth above are attained with this invention. It will also be apparent that a number of variations and modifications may be made in the invention without departing from its spirit and scope. Accordingly, the foregoing description is to be construed as illustrative only, rather than limiting. This invention is limited only by the scope of the following claims.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A coil reel which comprises: support means; a substantially vertical shaft having a lower first end and an upper second end, and mounted on said support means at said first end; a coil support tray rotatably mounted about said vertical shaft and including a central hub portion encircling said vertical shaft; a drive wheel mounted below said tray and in frictional engagement therewith, said drive wheel being rotatable in a plane substantially perpendicular to the radius of rotation of said tray at the point of contact between said drive wheel and said tray; positioning means for selectively positioning said drive wheel along said radius of rotation; drive means arranged to drive said drive wheel and rotate said tray; and screw means positioned in said hub means for vertical downward advancement against the upper second end of said vertical shaft to lift said hub portion and disengage said tray from said drive wheel.

2. The reel of claim 1 wherein said positioning means comprises: a rotatable drive shaft supporting said drive wheel; keying means intermediate said drive shaft and drive wheel to secure said wheel to said drive shaft to rotate jointly therewith but be selectively slidable axially therealong; and means for selectively axially sliding said drive wheel relative to said drive shaft.

3. The reel of claim 2 wherein said drive wheel includes a circular hub surrounding said drive shaft and said sliding means comprises: a yoke rotatably mounted on said hub and having a radially extending portion extending outwardly therefrom; and adjusting shaft means mounted between said support means and said radially extending portion to selectively axially position said yoke and drive wheel along said drive shaft.

4. A coil reel which comprises: support means; a substantially vertical shaft having a lower first end and an upper second end and mounted on said support means at said first end; a coil support tray rotatably mounted about said vertical shaft and including a central hub portion encircling said vertical shaft; a drive wheel mounted below said tray and in frictional engagement therewith, said drive wheel being rotatable in a plane substantially perpendicular to the radius of rotation of said tray at the point of contact between said drive wheel and said tray; positioning means for selectively positioning said drive wheel along said radius of rotation; an electric motor arranged to drive said drive wheel and rotate said tray; switch means connected to control said electric motor; and switch actuating means responsive to the tension of wire paying off of said reel.

5. The reel of claim 4 wherein said switch actuating means comprises: a pivot bushing; a switching rod rotatably mounted in said pivot bushing; a control rod secured to said switching rod and extending transversely thereof, one end of said control rod being positioned to contact a wire strand paying off of said tray; and a switching arm secured to said switching rod to rotate therewith to actuate said switch means.

6. The reel of claim 5 wherein said switch means further comprises: a V-shaped switching fork pivotally mounted and including first and second limit arms positioned on either side of said switching arm; stop means mounted on each of said limit arms and extending inwardly of the V of said fork toward said switching arm, whereby said fork is pivoted by movement of said switching arm; and a mercury switch mounted to rotate with said fork.

7. A coil reel which comprises: a base including a vertical post extending upwardly therefrom; a support arm mounted on said base at a first end and extending outwardly therefrom, a second end of said arm being laterally spaced from said post; a bracket member mounted on the second end of said arm; a vertical reel shaft mounted on said bracket member and extending upwardly therefrom; a coil supporting tray positioned in a substantially horizontal plane for rotation about said reel shaft; a support block mounted on said vertical post, horizontally spaced from said bracket member; a horizontally disposed drive shaft rotatably supported between said support block and said bracket member; motor means mounted on said base in driving relationship to said drive shaft; a friction wheel mounted on said drive shaft for rotation therewith but axially slidable therealong, the periphery of said wheel being frictionally engageable with the lower surface of said tray; and speed adjusting means adapted to slide said friction wheel to a selected position along said drive shaft.

8. The reel of claim 7 wherein said speed adjusting means comprises: an internally threaded adjusting shaft guide mounted on the second end of said arm adjacent said bracket member; a yoke mounted on said friction wheel, axially slidable therewith but rotatable relative thereto; a threaded adjusting shaft extending through said adjusting shaft guide and including a first end rotatably mounted in said yoke and a second end; and means mounted on said second end for rotating said adjusting shaft to axially slide said yoke and friction wheel along said drive shaft.

9. The reel of claim 7 wherein said bracket member includes inverted caster means rotatably supporting said tray.

10. The reel of claim 7 wherein said tray includes a central hub surrounding said reel shaft, said hub including a downwardly extending adjusting screw positioned for advancement against the upper end of said reel shaft to lift said tray out of engagement with said friction wheel.

11. A coil reel which comprises: a base including a vertical post extending upwardly therefrom; a support arm mounted on said base at a first end and extending outwardly therefrom, a second end of said arm being laterally spaced from said post; a bracket member mounted on the second end of said arm and including inverted caster means; a vertical reel shaft mounted on said bracket member and extending upwardly therefrom; a coil supporting tray positioned in a substantially horizontal plane for rotation against said caster means about said reel shaft and including a central hub surrounding said reel shaft; a downwardly extending adjusting screw positioned in the end of said hub for advancement against the upper end of said reel shaft to selectively position said tray between a raised and a lowered position; a support block mounted on said vertical post, horizontally spaced from said bracket member; a horizontally disposed drive shaft rotatably supported between said support block and said bracket member; electric motor means mounted on said base in driving relationship to said drive shaft; a friction wheel mounted on said drive shaft for rotation therewith but axially slidable therealong, the periphery of said wheel being frictionally engageable with the lower surface of said tray when said tray is in its lowered position; an internally threaded adjusting shaft guide mounted on the second end of said arm adjacent said bracket member; a yoke mounted on said friction wheel, axially slidable therewith but rotatable relative thereto; a threaded speed adjusting shaft extending through said adjusting shaft guide and including a first end rotatably mounted in said yoke and a second end; means mounted on said second end for rotating said speed adjusting shaft to axially slide said yoke and friction wheel along said drive shaft; a pivot bushing mounted on said support block; a switching rod rotatably mounted in said pivot bushing;

a control rod secured to said switching rod and extending transversely thereof, one end of said control rod being positioned to contact a wire strand paying off of said tray; a switching arm secured to said switching rod to rotate therewith to actuate said switch means; a V-shaped switching fork pivotally mounted on said support block and including first and second generally upwardly extending limit arms positioned on either side of said switching arm; stop means mounted in each of said limit arms and extending inwardly of the V of said fork toward said switching arm, whereby said fork is pivoted by movement of said switching arm; and a motor-controlling switch mounted for actuation by said fork.

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