A self-switching retracting reel for an electrical cord houses a fully enclosed and insulated switch wired in series with the cord to automatically selectively energize and de-energize the cord and an attached appliance. The switch is triggered by a lever arm having an extension that contacts a ball stop attached to the cord.

3 Claims, 3 Drawing Figures
SELF-SWITCHING RETRACTING REEL

BACKGROUND OF THE INVENTION

This invention relates in general to reels and in particular to a self-switching retracting reel for electrical cords.

In automobile service stations, machine shops and the like, it is frequently desirable to have a trouble light that is both readily available and easily returned to storage. Spring-retracted reels carrying an extension cord for the trouble light are widely used for this purpose. The reel is typically suspended overhead with the trouble light brought to the work site by pulling the light to unwind the cord. A conventional switch located on a hand grip adjacent to the light turns the light on and off.

This type of reel presents a significant safety hazard in that the location of the switch exposes the user to electrical shocks and subjects the appliance to short circuits in the event of fouling of the switch or damage or wear to the appliance. In view of this problem, a regulation promulgated under the Occupational Safety and Health Act requires that such electrical appliances not have switches, or other likely points of electrical contact such as outlets, on or near the appliance.

It is therefore a principal object of this invention to provide a self-retracting reel for an electrical cord that is self-switching at the reel and that fully encloses and insulates the switch and its associated conductors.

Another object of this invention is to provide a retracting reel that is highly insulated and presents a minimal exposure of energized electrical conductors to the operator.

Yet another object of this invention is to provide a retracting reel trouble light that meets all of the standards established under the Occupational Safety and Health Act.

Still another object is to provide a retracting reel with the above features that is compact, reliable and easily manufactured.

SUMMARY OF THE INVENTION

A retracting reel for an electrical cord provides highly insulated, automatic switching of current in the cord in response to whether the cord is wound or unwound from the reel. In the wound condition, a ball stop carried on the cord engages a balance lever which opens a normally closed switch wired in series with the cord. As the cord is unwound for use, the ball stop moves off of the lever, thereby allowing the lever to pivot off the switch. In a preferred embodiment, the safety and reliability of the device are enhanced by enclosing the switch and the associated wiring in an insulated portion of the reel housing.

These and other features and objects of the invention will become more fully evident from the following detailed description of the preferred embodiments, to be read in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a self-switching retracting reel constructed according to the invention,
FIG. 2 is a side elevation, with portions broken away, of the retracting reel shown in FIG. 1, and
FIG. 3 is a plan view of the balance lever shown in Figs. 1 and 2.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 illustrates a self-switching retracting reel 12 having a housing 14, an electrical cord 16, and a trouble light 18 suspended from an overhead beam 20 by a bracket 22 that rides on a pair of trunnion pins 24 mounted on the housing. The light 18 has a handle 26 and a swing-open cage-like guard 28 that surrounds a light bulb 30. The handle 26 is molded from any suitable insulating material, such as an impact phenolic resin, and the guard 28 is completely coated with an insulating material, such as vinyl. The handle 26 has no outlets, tool taps or other potential conductive paths between its outer surface and the portion of the cord 16 within the handle. A hooked extension 32 of one of the wires forming the guard 28 allows the light 18 to be hung during use rather than being hand held or laid down.

The cord 16 is a suitable length of insulated electrical wiring, preferably of the three conductor type in order to ground the light and the reel. At the light end, the cord terminates in an electric light socket mounted in the handle 26. In the reel, the cord terminates in electrical contact with a pair of commutator rings (not shown) in a well-known manner.

A pigtail 34 electrically connects a conventional grounded outlet 36 with the commutator rings. As shown in FIG. 2, the pigtail 34 passes through a central passage 38 in the reel 12 and terminates under a terminal cover 40 mounted on the housing 14 by means of a flanged portion 40a. In the enclosed compartment under the cover 40, one pigtail conductor 34a is grounded under screw 42 to the housing 14, a second pigtail conductor 34b is directed to one of the commutator rings and a third pigtail conductor 34c is directed to the common terminal of a microswitch 44. A short lead wire 46 completes the circuit by connecting the "normally closed" terminal 44b of the microswitch 44 to the second commutator ring. For production purposes, a solderless connector 48 preferably joins the pigtail conductor 34c to a lead from the common terminal 44a of the microswitch. Thus, the microswitch 44 is wired in series with the cord 16, so that the cord is energized when the microswitch is closed and deenergized when the microswitch is open.

Rivets 50, 52 mount the microswitch 44 securely to the housing 14 so that a roller 52 mounted on the free end of microswitch arm 54 extends partially through a window 56 formed in the peripheral of the cover 40. A sufficient portion of the roller 52 extends out from the cover 40 so that the triggering movement of the arm 54 does not require that the roller be depressed to a point within the cover. Thin sheets 58 of a suitable insulating material, such as that commonly termed "fish paper," line the interior surfaces of the cover 40 and case 14 that are adjacent to exposed electrical conductors. It is recommended that the insulating sheets 58 extend over the top surface of the cover 40, the area of the case 14 under and around the switch 44, and the peripheral wall of the cover 40 adjacent to the switch 44.

A balance lever 60 and ball stop 62 provide a system for sensing whether the cord 16 is wound or unwound, and for tripping the microswitch 44 to an "on" or closed condition when the cord is unwound and to an "off" or open condition when the cord is fully wound. The balance lever 60 is pivotally mounted on a trun-
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ion pin 64 with a pivot washer 66 positioned between the lever and the housing. The lever edge near the microswitch 44 terminates in a flanged portion 60a that is in contact with the roller 56. At the opposite end of the lever portion 60b, the lever 60 has an angled extension portion 60c which overhangs an opening 14a through which the cord exits the reel. The weight distribution of the lever 60 is such that the portion 60c pivots downwardly in the direction of arrow 68 to the position shown in FIGS. 1 and 2. Simultaneously, the flanged portion 60a pivots upwardly. In this position, the flanged portion 60a does not depress the roller 52 sufficiently to open the microswitch 44. The lever 60 will assume and maintain this position whenever the cord 16 is unwound from the reel, provided that the reel 12 is suspended substantially as shown.

When the cord is fully reeled, the ball stop 62 contacts an outwardly turned lip 60d of the overhanging lever portion 60c and drives it upwardly. This motion pivots the lever counterclockwise on the pin 64, causing the flanged portion 60a to move downwardly and depress the roller 52 and arm 54 a sufficient amount to open the microswitch. Thus, the electrical current in the cord 16 to the light 18 is automatically shut off when the cord is fully reeled for storage. It should be noted that the term "fully reeled" is defined by the location of the ball stop on the cord 16. In most applications, the stop will be located near the light 18 so that almost all of the cord will be wound on the reel.

Positioning the stop farther away from the light 18 may, however, be desirable to make the light 18 easily accessible when the beam 20 (FIG. 1) is inconveniently far above the ground.

The dimensions of the lever 60 must leave a sufficient clearance between the portion 60c and the housing 14 to allow a sufficient pivoting motion for the flanged portion 60a to trip the microswitch 44. Also, the stop 62 must be sufficiently large to ensure contact with the lever 60 at the opening 14a. Factors influencing the stop dimensions include the size of the opening 14a and the amount of cord wound on the reel. The lever can be made of any structural material having sufficient rigidity to hold its shape. A suitable material is fourteen gauge steel with a waxed, black oxide finish. The stop 62 is preferably formed from an insulating material such as rubber.

In a typical sequence of operation, the cord is initially stored with the stop 62 holding the lever portion 60c in the raised position. This causes the lever portion 60a to hold the microswitch 44 open, and the light 18 is therefore off since there is no current in the conductors of the cord. To use the light, it is simply drawn to the point of use. The cord unwinds from the reel and the stop moves off of the lever 60. This allows the lever to pivot, due to the force of gravity, thereby closing the microswitch 44, energizing the conductors in the cord, and turning the light 18 on. After use, a slight pull initiates the retracting rotation of the reel which is driven by a standard coiled spring arrangement with pawl and ratchet control (not shown). Retraction continues until restrained by the stop 62 again contacting the lever 60.

Although the invention has been described with reference to a trouble light connected to the cord, it is possible to substitute for the light any number of electrical appliances such as a motor-driven tool or a soldering iron. Also, the stop 62 has been described as a ball stop, whereas a wide variety of shapes will suffice. In particular, it is possible for the function of the stop to be performed by the appliance itself. Further, although the lever 60 has been described as a gravity operated balance lever, it is within the scope of this invention to employ a spring or other suitable means for pivoting the lever as the cord is unwound. If such a system is used, the mounting and orientation of the reel may be appropriately altered. Still further, although the invention has been described with reference to a microswitch, any suitable switch device can be used. These and various other modifications will become apparent to those skilled in the art from the foregoing description and accompanying drawings. Such modifications are intended to fall within the scope of the appended claims.

Having thus described my invention, what is claimed is:

1. A retracting reel having a housing, a rotating spool mounted within the housing, an electrical cord wound on the spool, and retracting means for urging the spool to wind the cord, wherein the improvement comprises, in combination,
   a microswitch having an operating arm and roller means attached to the free end of the arm, said microswitch being mounted on an exterior side face of the housing,
   a stop attached to the cord at a point near the end of the cord exterior to the housing,
   a lever having a first arm pivotally mounted on said face and a second arm joined to one end of said first arm at substantially a right angle, said second arm positioned to contact the stop at a cord exit opening in the housing, the other end of said first arm having a flanged portion positioned to engage the roller means, said lever pivoting to open the microswitch when the stop is in contact with the second arm and pivoting to close the microswitch when the stop is not in contact with the second arm,
   an insulated terminal cover mounted on the housing to enclose said microswitch, said cover having window means formed in its edge through which a portion of the roller extends, and light means electrically connected to the exterior end of the cord.
2. A retracting reel according to claim 1 wherein said second lever arm has a lip portion formed on the edge proximate said stop, said lip portion being angled with respect to said second lever arm in a direction generally opposite to that of said first arm.
3. A reel according to claim 1 wherein the insulation extends over the interior surfaces of said terminal cover and the exterior surface of said housing opposite said terminal cover.
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