A reel for connecting a cable to the reel and power connections that includes a winding reel housing that has a biasing member and a connection assembly. The assembly is received in the housing and has an insulator with two recesses, a return barrel terminal and a power barrel terminal. One of the insulator recesses receives a return barrel terminal and the other insulator recess receives a power barrel terminal. The return barrel terminal is connected to a return contact, and the power barrel terminal is connected to a power contact. The power contact is connected to a power output member and the return contact is connected to a return output member. The return barrel terminal is rotatable with the return contact while maintaining electrical contact with the return contact and the power barrel terminal is rotatable with the power contact while maintaining electrical contact with the power contact.
FIELD OF THE INVENTION

[0001] The present invention relates to a reel for winding and unwinding a cable. More specifically, the reel winds and unwinds the cable when opening and closing a drawer containing a device powered by the cable.

BACKGROUND OF THE INVENTION

[0002] Electronic devices require power supplied through the attachment of power cables. Computer servers often contain components, such as disk drives that are housed in drawers and also require power cables. To provide access to the components housed in computer server drawers, the drawers typically slide out to expose the interior portions of the component for maintenance. The sliding out process requires a power cable long enough to allow such movement. That extra cable length presents a problem, however, when pushing the server drawer back into the server chassis because the cable may be damaged or may bunch up behind the component, thereby preventing the drawer from being fully closed. To correct this problem, some in the industry have tried articulated arms and harnesses to manage the extra cable length. The set up required for the use of both, however, is time consuming and difficult, and requires a large amount of space. Therefore, a need exists for a compact, self-winding, and easily assembled cable reel with an extended amperage range.

SUMMARY OF THE INVENTION

[0003] Accordingly, the present invention provides a reel that includes a winding reel housing that may have a biasing member and an assembly for connecting a cable to the reel and power connections. The assembly may be received in the housing and may have an insulator with opposite first and second recesses, a return barrel terminal and a power barrel terminal. One of the insulator recesses receives a return barrel terminal and the other insulator recess receives a power barrel terminal. The return barrel terminal may be connected to a return contact, and the power barrel terminal may be connected to a power contact. The power contact may be connected to a power output member and the return contact may be connected to a return output member. The return barrel terminal may be rotatable with respect to the return contact while maintaining electrical contact with the return contact and the power barrel terminal may be rotatable with respect to the power contact while maintaining electrical contact with the power member.

[0004] The present invention also provides a reel that may include a winding reel housing with a coil spring mechanism. The reel housing may have a center cylinder with an opening for accepting an assembly for connecting a power cable to the reel and power connections. The assembly may have an insulator symmetrically divided into opposite first and second recesses, the first recess may be adapted to receive a portion of a return barrel terminal and the second recess may be adapted to receive a portion of a power barrel terminal. The assembly also may have a return cable connector and a power cable connector. The return cable connector may be configured with a circular opening to couple with the return barrel terminal, and the power cable connector may be configured with a circular opening to couple with the power barrel terminal. The return barrel terminal may be inserted into the return cable connector and the power barrel terminal may be inserted into the power cable connector. The assembled portion of the assembly may be placed inside the reel housing cylinder, a return pin contact may be inserted into the return barrel terminal and a return pin contact may be inserted into the return barrel terminal. The return pin contact may rotate with respect to the return barrel terminal while maintaining electrical contact with the return barrel terminal and the power pin contact may rotate with respect to the power barrel terminal while maintaining electrical contact with the power barrel terminal. The power pin contact may be connected to a power output lug portion and the return pin may be connected to a return output lug portion.

[0005] Other objects, advantages and salient features of the invention will become apparent from the following detailed description, which, taken in conjunction with the annexed drawings, discloses a preferred embodiment of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] A more complete appreciation of the invention and many of the attendant advantages thereof will be readily obtained as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings, wherein:

[0007] FIG. 1 is an exploded perspective view of an exemplary embodiment of a reel of the present invention;

[0008] FIG. 2 is a top planar view of the reel of the present invention, showing the reel with a top cover removed;

[0009] FIG. 3 is an exploded perspective view of a cable connection assembly of the reel of the present invention;

[0010] FIG. 4 is a partial perspective view of the assembly illustrated in FIG. 3;

[0011] FIG. 5 is an exploded view of the assembly illustrated in FIG. 3 showing the assembly with the cable connected;

[0012] FIG. 6 is a cross-sectional view showing the barrel terminals placed in the insulator and the barrel terminals coupled with cable connector of a cable;

[0013] FIG. 7 is a perspective view of the barrel terminals, insulator, cable connectors and cable, shown in FIG. 6;

[0014] FIG. 8 is a cross-sectional view of barrel terminals of the reel without the cable and cable connectors, showing the barrel terminals placed into an insulator;

[0015] FIG. 9 is a perspective view of the insulator and the barrel terminals shown in FIG. 8, showing the barrel terminals placed in the insulator; and

[0016] FIG. 10 is a cross-sectional view of the reel showing the reel assembled with the cable.

DETAILED DESCRIPTION OF THE INVENTION

[0017] Referring to FIGS. 1-10, the present invention relates to a reel 50 for maintaining the shortest unreeled cable length while at the same time providing a constant and reliable power source to the component (not shown). The reel 50 also provides a compact footprint inside a component drawer, which conserves space. Additionally, the reel 50 provides unidirectional winding and unwinding without a manually operated apparatus to control the stopping and starting of the winding and unwinding, making such a device usable in a drawer configuration where access to a control mechanism when the drawer is closed is restricted. Also, the reel 50 solves the problem of easily attaching the power cable 300 to the reel and power, and connecting the reel to power for service. Further, the reel 50 provides a much higher amperage range than the prior art.

[0018] In general, the reel 50 may include a reel housing 100; a biasing member 150; a cable 300; an assembly 200 (FIGS. 6 and 7) for connecting the cable 300 to a power
source; electrical contacts 401 and 402 for providing power to the cable; and output members 410 and 411 with lug portions
403 and 404.
[0019] As seen in FIG. 3, the reel housing 100 may be formed by first and second planar members 102 and 103
separated by a partial cylindrical member 101. The first and second planar members 102 and 103 each may have a cen-
tered circular hole 105, the holes being coaxially aligned. The first planar member 102 may have a recessed area 104 on
the side opposite the partial cylindrical member 101 for securing a biasing member 150 (shown in FIGS. 1-2). The biasing
member 150 may be in the form of a coil spring or torsion spring. The circular hole 105 for the first planar member 102
also may have insulation 106 around the hole to provide an insulative barrier between the biasing member 150 and the
return barrel terminal 210.
[0020] The partial cylindrical member 101 provides a protec-
ted area for housing the assembly 200 that may be used to
connect the cable 300 to a power source. The partial cylindri-
cal member 101 also may provide support for wrapping the
cable 300 around the inside of the reel housing 100 between
the first and second planar members 102 and 103, as shown in
FIG. 1.
[0021] As seen in FIG. 6, the assembly 200 for connecting
the cable 300 may have an insulator 205, a return barrel
terminal 210, a power barrel terminal 211, a return cable con-
ector 230, and a power cable connector 231.
[0022] The insulator 205 may have a first recess 206 for
receiving a portion of the return barrel terminal 210 and a
second recess 207 for receiving a portion of the power barrel
terminal 211. The insulator may be made of any nonconduc-
tive material, such as plastic. The first recess 206 and the
second recess 207 preferably provide a tight fit for the barrel
terminals 210 and 211 such that the barrel terminals 210 and
211 do not rotate within the recesses 206 and 207, respec-
tively. In this embodiment the insulator 205 may be sym-
metrically divided into the first recess 206 and the second re-
cess 207 with an insulative middle portion 208 situated
between the first recess 206 and the second recess 207. The
insulative middle portion 208 also may have a portion 209
that extends beyond the overall cylindrical shape of the insu-
lator 205 to provide insulation between the return cable con-
nectors 230 and the power cable connector 231.
[0023] As seen in FIG. 3, the barrel terminals 210 and 211
of the assembly are preferably radially resilient electrical
sockets that may have an internal hollow cylindrical sleeve
220 for receiving contacts 401 and 402. The hollow cylindri-
cal sleeves 220 (FIG. 8) may be formed by adding contactor strips to the inside of the barrel, as described in commonly
owned U.S. Pat. No. 4,734,063, herein incorporated by re-
ference. The contactor strips may provide a continuous el-
ctrical connection to an inserted object, such as the contacts
401 and 402, while permitting the contacts 401 and 402 to
rotate within the cylindrical sleeve 220. The barrel terminals
210 and 211 may operate up to and including 1,000 amps. The
purpose of the barrel terminals 210 and 211 is to provide a
robust and continuous electrical connection at the core of the
assembly 200 between the cable connection 230 and 231 and
the power connection contacts 401 and 402 in a configuration
that allows the reel 50 to rotate around the contact contacts
401 and 402 in the barrel terminals 210 and 211 without
power loss. This novel concept of implementing barrel termi-
nals 210 and 211 in a connection assembly 200 provides a
compact and high amperage cable connection solution that
may be easily assembled.
[0024] The return cable connector 230 and the power cable
connector 231 provide the electrical connection point
between the assembly 200 and the cable 300. As seen in FIGS.
3 and 7, return cable connector 230 and power cable connec-
tor 231 may be substantially ‘‘L’’ shaped conductive pieces
made of an electrically conductive material. The electrically
conductive material is not limited to but may be copper or
aluminum. Each of the return cable connector 230 and the
power cable connector 231 respectively may have a centered
circular opening 232 and 233 large enough to allow the inser-
tion of the respective barrel terminals 210 and 211.
[0025] As seen in FIGS. 1, 2 and 5, the end of the cable 300
opposite the assembly 200 may have a locking connector plug 305 for connecting the cable 300 to a locking connector 310.
The locking connector 310 is attachable to the device to be
powered by the cable 300. The locking connector plug 305
locks into the locking connector 310 by pushing the connect-
or plug 305 into a snap-in mechanism. Other suitable con-
nectors plugs and connectors may be used such as nylon force
fit plugs or circular connectors. The locking connector plug
305 may be manually released by depressing the snap-in
mechanism to disengage the locking connector plug 305 from
the locking connector 310. The purpose of the locking con-
ector plug 305 is to insure that the locking connector plug
305 will not be pulled out of the locking connector 310 when
the drawer is opened and the cable 300 is unwound from the
reel housing 100, against the constant pressure supplied by
the biasing member 150.
[0026] Referring to FIGS. 3, 6 and 7, the assembly 200 may
be assembled by attaching the return cable connector 230 and
the power cable connector 231 to the cable 300 by a crimping
process. The insulator 205 may be inserted between the return
cable connector 230 and the power cable connector 231 align-
ing the first recess 206 opening with the return cable con-
ector 230 and aligning the second recess 207 opening with the power cable connector opening 232. The combined
insulator 205 and cable 300 configuration may be inserted through the opening in the partial cylindrical mem-
ber 101 between the first planar member 102 and the second
planar member 103 aligning the return cable connector cir-
cular opening 232 and power cable connector circular open-
ing 233 with the centered coaxial circular openings 105. The
power barrel terminal 211 may be inserted through the open-
ing 105 on the second planar member 103 and through the
power cable connector opening 233 into the second recess
207 of the insulator 205. The return barrel terminal 210 then
may be inserted through the opening 105 on the first planar
member 102 and through the return cable connector opening
232 into the first recess 206 of the insulator 205. The biasing
member 150 may be added to the first planar 102 biasing
member area 104 either before or after the assembly 200 is
assembled.
[0027] As seen in FIGS. 3, 4, 8 and 10, power from power
output member 411 and return output member 410 may be
provided via return lug portion 403 and power lug portion 404
coupled to the assembly 200 by inserting a power contact 402 into the
hollow cylindrical sleeve 220 of the power barrel terminal 211
and by inserting return contact 401 into the hollow cylindrical slee-
ve 220 of the return barrel terminal 210 along axis 450. The
power contact 401 and return contact 402 may be in the
form of a pin.
[0028] While a particular embodiment has been chosen to
illustrate the invention, it will be understood by those skilled
in the art that various changes and modifications can be made
taken without departing from the scope of the invention as
defined in the appended claims.
What is claimed is:

1. A reel comprising:
a power output member having a power contact;
a return output member having a return contact;
a winding reel housing having a biasing member; and
an assembly received in said housing, said assembly hav-
ing an insulator, a return barrel terminal, and a power
barrel terminal, said insulator having opposite first and
second recesses, said first recess receiving said return
barrel terminal and said second recess receiving said
power barrel terminal, said return barrel terminal being
connected to said return contact, and said power barrel
terminal being connected to said power contact,
wherein said return barrel terminal is rotatable with respect
to said return contact while maintaining electrical con-
tact with said return contact and said power barrel ter-
minal is rotatable with respect to said power contact
while maintaining electrical contact with said power
contact.

2. A reel of claim 1, wherein
said housing has a first planar member, a second planar
member and a partial cylindrical member therebetween,
said first planar member has a centered circular opening
of at least a circumference to receive said return barrel
terminal and said second planar member has a centered
circular opening of at least a circumference to receive
said power barrel terminal, said circular openings being
co-axial.

3. A reel of claim 2, wherein
said first planar member has a recessed area on a side
opposite said partial cylindrical member, said recessed
area is formed to accept said biasing member.

4. A reel of claim 1, wherein
said assembly has power and return cable connectors, said
return barrel terminal is inserted in a first circular open-
ing in said return cable connector, and said power barrel
terminal is inserted in a second circular opening in said
power cable connector.

5. A reel of claim 4, wherein
a cable is connected to said return cable connector and said
power cable connector of said assembly.

6. A reel of claim 5, wherein
said cable has a locking connector plug opposite said
assembly for securely connecting said cable to power
receiving device.

7. A reel of claim 5, wherein
said cable is pulled from the reel in a first direction and
released back to the reel in an opposite second direction.

8. A reel of claim 1, wherein
said return barrel terminal and said output barrel terminal
are radially resilient electrical sockets having a hollow
cylindrical sleeve, and said cylindrical sleeve has a plu-
rality of elongated contactor strips.

9. A reel of claim 1, wherein
said return barrel terminal and said output barrel terminals,
respectively, in a tight fit.

10. A reel of claim 1, wherein
said power output member has a power output lug portion
substantially perpendicular to said power contact and
said return output member has return output lug portion
substantially perpendicular to said return contact.

11. A reel of claim 1, wherein
each of said return barrel terminal and said power barrel
terminal operates up to and including 1,000 amps.

12. A reel of claim 1, wherein
said biasing member is a coil spring.

13. A reel of claim 1, wherein
said biasing member is a tension spring.

14. A reel comprising:
a power output lug portion having a power pin contact;
a return output lug portion having a return pin contact;
a winding reel housing having a coil spring mechanism,
said housing having a center cylinder with an opening; and
an assembly received in said opening of said center cylin-
der for connecting a cable to said power pin contact and
said return pin contact, said assembly having an insula-
tor symmetrically divided into opposite first and second
recesses, said first recess being adapted to receive at least
a portion of a return barrel terminal and said second
recess being adapted to receive at least a portion of
a power barrel terminal, and said assembly having a return
cable connector and a power cable connector, said return
cable connector being configured to couple to said return
barrel terminal, and said power cable connector being
configured to couple to said power barrel terminal, said
return barrel terminal being inserted into said return
cable connector circular opening and said return pin
contact being inserted into said return barrel terminal,
and said power barrel terminal being inserted into said
power cable connector circular opening, and said power
pin contact being inserted into said power barrel termi-
nal;
wherein said return pin contact rotates with respect to said
return barrel terminal while maintaining electrical con-
tact with said return barrel terminal and said power pin
contact rotates with respect to said power barrel terminal
while maintaining electrical contact with said power
barrel terminal.

15. A reel of claim 14, wherein
said return barrel terminal and said output barrel terminal
are radially resilient electrical sockets having a hollow
cylindrical sleeve, and said cylindrical sleeve has a plu-
rality of elongated contactor strips.

16. A reel of claim 14, wherein
said power output lug is substantially perpendicular to a
power output member, and power return lug is perpen-
dicular to a return output member.

17. A reel of claim 14, wherein
said return barrel terminal and said power barrel terminal
operate up to and including 1,000 amps.

18. A reel of claim 14, wherein
a cable is connected to said return cable connector and said
power cable connector of said assembly.

19. A reel of claim 14, wherein
said cable has a locking connector plug at the opposite end
of said cable from said assembly, said cable is pulled
from the reel in a direction and released back to the reel
in an opposite direction.

20. A reel of claim 14, wherein
Each of said first and second recesses of said insulator has
a shape to accommodate barrel terminals and hold said
barrel terminals in a tight fit.

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