A cable dispensing apparatus for laying cable has a support for a coil, e.g., a drum, of cable. A boom assembly that includes an arm extends from a location fixed relative to the coil support. Cable guides are fixed relative to the arm at an end of the arm remote from the support. In use, the cable guides direct cable from the coil into a trench during use.
CABLE DISPENSING APPARATUS

CROSS REFERENCE TO RELATED APPLICATION

[0001] This application claims the benefit of and takes priority from Australian Patent Application No. 201216815 filed on Sep. 13, 2012, the contents of which are hereby incorporated by reference.

TECHNICAL FIELD

The present invention is directed to an apparatus for conveniently laying cables.

BACKGROUND ART

[0002] Any references to methods, apparatus or documents of the prior art are not to be taken as constituting any evidence or admission that they formed, or form part of the common general knowledge.

[0003] It is common practice to lay cables, for example heavy duty electrical power cables, data cables, telephone cables and the like, into trenches.

[0004] Some of these cables, for example heavy duty electrical power cables are of substantial weight per meter because they contain metal conductors of copper or aluminum. In addition, they are relatively inflexible and unwieldy to handle since the metal conductors are typically covered by a number of layers of protective and insulating material.

[0005] In the past one approach to laying cables into a trench has been to unfurl a reel of cable from a spool. Typically the reel of cable is unfurled from the rear of a trailer or a truck located alongside the trench and is manually pulled over and inserted into the trench. It will be realized that this operation is time-consuming and may present a danger to personnel involved.

[0006] It is an objective of the present invention to provide a cable dispensing apparatus which addresses the above described problem or which is at least a useful alternative to those apparatus hitherto known in the prior art.

SUMMARY OF THE INVENTION

[0007] According to a first aspect of the present invention there is provided a cable dispensing apparatus comprising a frame assembly adapted to support a cable containing drum, at least one arm member adapted for movement between a stowed position and a cable dispensing position, and a cable guide on the arm member adapted to guide cable from the drum to a desired location.

[0008] The apparatus is particularly suited for laying cable in to a trench without needing the drum to be positioned too close to the trench.

[0009] Thus, in another aspect of the present invention there is provided a cable dispensing apparatus for laying cable in a trench, said apparatus including:

[0010] a support for a coil of cable;

[0011] at least one arm member,

[0012] at least one cable support fixed relative to said arm member, the cable support and the arm member adapted to direct cable from the coil into the trench during use.

[0013] In an embodiment, the arm member can be mounted to or be part of a truck or other prime mover. The truck can also support a coil/drum of cable. The arm member can be swung out or otherwise moved such that the end of the arm is above the trench. Cable can then be unwind or pulled from the coil and guided straight into the trench. The truck can remain a safe distance from the trench.

[0014] In one embodiment of the invention, the at least one arm member is pivotally connected to the support for the coil of cable for movement between an extended dispensing position and a retracted stowed position. The arm member may pivot about a substantially horizontal axis to move between a raised stowed position and a lowered dispensing position.

[0015] Preferably the at least one arm member comprises part of a boom assembly.

[0016] Preferably the at least one cable support comprises a roller assembly.

[0017] Preferably the apparatus includes one or more actuators coupled to the at least one arm member and arranged to bring the arm member from a dispensing configuration to a stowed configuration.

[0018] It is preferable that the apparatus be portable. For example the apparatus may be provided mounted to a vehicle, such as a truck for example.

[0019] Preferably the support is arranged for an axis of the reel to be disposed parallel to a long axis of the vehicle.

[0020] In a preferred embodiment of the invention the support comprises a spool support frame supporting an axle of the spool about which the coil of cable is disposed.

[0021] Preferably self-guiding axle and supports are mounted to each of the opposed uprights each of said supports including surfaces converging downwards to a recess for supporting respective ends of the axle.

[0022] Preferably the spool support frame includes opposed uprights between which the axle is mounted.

[0023] Preferably the spool support frame is mounted upon a tray of the vehicle.

[0024] Preferably the one or more actuators comprise one or more hydraulic rams. Alternatively, the one or more actuators may instead comprise electrically drive actuators.

[0025] The hydraulic rams may be pivotally mounted between a point on the at least one arm and a point on the frame for example.

[0026] In a preferred embodiment of the invention boom assembly comprises two arm members, each pivotally connected to the spool support frame with their remote ends joined.

[0027] In a preferred embodiment of the invention the remote ends are joined by a cross bar spanning therebetween. It will be realized however that in other embodiments of the invention the remote ends might join each other at an angle so that no cross bar is required.

[0028] Preferably the roller assembly is mounted to the cross bar.

[0029] The roller assembly may include a guide support member that is mounted to the cross bar and which may be selectively slid along the cross bar in order that its location thereon may be adjusted.

[0030] Preferably the roller assembly includes at least two rollers for guiding the cable wherein said rollers are mounted to the guide support member. Preferably long axes of the rollers extend upward and outward from the cross bar.

[0031] In another embodiment of the invention the at least arm member comprises a boom which is mounted relative to a turntable to enable the boom to turn. Suitably, the turntable enables the boom to rotate by at least 90° and preferably by up to 360°. The boom can also preferably be raised and lowered relative to the turntable.
The boom may comprise a first arm member and a second arm member which may be hinged relative to each other. The boom may comprise at least one extendible or telescopic member. The boom may have an extended length of between 2-6 meters but it should be appreciated that no unnecessary limitation should be placed on the invention merely by indicating certain lengths of the boom. The arm members may be moveable relative to each other by rams or other operating devices.

A number of cable supports may be fixed to or associated with the boom to guide cable along the boom. The supports may comprise rollers, sheaves or other guiding devices.

The apparatus may include at least one cable driver to drive cable off the drum and along the boom. The cable driver may comprise a cable puller. The cable puller may comprise a driven pinch roller or other device. The cable puller may be positioned on the boom and is preferably positioned at or adjacent the end of the boom to enable cable to travel along the boom and be dropped into an adjacent trench.

More than one cable driver may be provided. For instance there may be provided a cable puller as well as a small motor to rotate the cable drum to unwind cable from the drum.

If a turntable is provided to rotate the boom, the turntable may be mounted or otherwise be part of a vehicle. The vehicle may include a driver/operator cabin. The vehicle may be self-propelled by an engine of some sort and may be supported by wheels such as road wheels or rail wheels. The vehicle may have steering capabilities. The vehicle may tow or be another connected to a trailer or similar device which may support the cable drum. Thus the vehicle may be articulated with the front part possible containing the cabin and boom and turntable and the rear part containing the drum. Alternatively, the vehicle may be constructed in a non-articulated manner and may be large enough to support the cable drum as well as the other components.

BRIEF DESCRIPTION OF THE DRAWINGS

Preferred features, embodiments and variations of the invention may be discerned from the following Detailed Description which provides sufficient information for those skilled in the art to perform the invention. The Detailed Description is not to be regarded as limiting the scope of the preceding Summary of the Invention in any way. The Detailed Description will make reference to a number of drawings as follows:

FIG. 1 is a view of a cable dispensing apparatus according to a preferred embodiment mounted upon a vehicle in the form of a truck.

FIG. 2 is a view of the cable dispensing apparatus in use.

FIG. 3 is a view of the rear of the cable dispensing apparatus in use.

FIG. 3A is a view of an arrangement for supporting opposed ends of a drum axle according to a further embodiment of the invention.

FIG. 4 is a view of a remote end of one of the arms of the boom assembly and a cable guide of the apparatus in use.

FIG. 5 is a plan and stylized view depicting a cable dispensing apparatus according to a further embodiment of the present invention.

FIGS. 6-8 are stylized views of a cable dispensing apparatus according to a further embodiment of the invention and which embodies an articulated machine with a pivoting operator cabin and boom arm

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Referring initially to FIG. 1, there is depicted a cable dispensing apparatus 2 according to a first aspect of the present invention. In the presently described preferred embodiment of the invention the cable dispensing assembly 2 is portable in that it is mounted on the rear tray 6 of a vehicle, namely a truck 3.

The cable dispensing apparatus includes a frame 9, which is mounted upon the tray 6 and which includes opposing uprights 8, 11. An axle 10 of a drum or spool 12 is disposed between the uprights 8, 11. The axle 10 is captured at either end by collars 51 which are mounted atop respective uprights 8 and 11. About the spool there is disposed a coil of cable 14.

In a variation the collars 51 are replaced by self-guiding supports 41, as shown in FIG. 3A, which are instead mounted on top of the uprights 8 and 11. These self-guiding supports 41 include opposed guide surfaces 45 and 47 and a rearward surface 49 all which converge downwards into a recess 43 for receiving and supporting opposed ends of the axle 10.

The inventor has found that this arrangement assists in speedily changing drums and is more convenient than the collars 47.

A hydraulically powered wheel 40 abuts a rim of the spool 12. In use the wheel 40 is rotated so that it in turn causes the spool 12 to rotate to thereby either take up or dispense cable 14.

Extending outwardly from the opposed uprights 8, 11 there is a boom assembly 16 comprising a pair of spaced apart arms 18 and 20. Arms 18 and 20 are respectively pivotally connected to uprights 8, 11. For example arm 18 is connected to upright 8 at pivot point 34. Arm 20 is similarly connected to upright 11.

A cross bar 22 interconnects remote ends of arms 18 and 20. A cable guide in the form of roller assembly 24 is fastened to the cross bar 22. In the presently described preferred embodiment the roller assembly 24 comprises a member in the form of plate 25 from which paired rollers 27, 29 extend.

Actuators 26, 23 (actuator 23 is visible in FIG. 2) are provided to raise and lower the boom assembly 16. Actuator 26 is pivotally connected between a point 30 on upright 8 and a point 32 on boom arm 18. Actuator 23 is correspondingly pivotally interconnected between boom arm 20 and upright 11.

In the presently described preferred embodiment the actuators 26, 23 comprise hydraulic rams which are powered by hydraulic fluid through hoses such as hose 34. It will be realized however that other types of extensible actuators are possible, for example electrically driven and controllable actuators may be used instead. By operating the actuators 26 and 23 the boom arm 18 may be brought from a dispensing position (shown in FIGS. 2, 3, and 4), in which it is pivoted outwardly, to a stowed position (not shown) in which it is pivoted to a near vertical attitude for transport.
Referring now to FIGS. 2 and 3, in use the actuators 23, 26 are operated so that the boom 16 is extended out from the spool 12 in order that roller assembly 24 is brought close to the edge of trench 42.

Wheel 40 is then operated so that spool 12 rotates to slowly dispense cable 14. The free end of cable 14 is then threaded through the rollers of roller assembly 24 and introduced into the trench 42.

Truck 3, may then be driven slowly alongside trench 42 as the spool 12 is rotated to thereby dispense the cable into the trench as seen in FIG. 4.

Once all of the cable has been laid, or the desired amount of cable has been dispensed and cut off, the actuators 26, 23 are operated to lift the boom 16 to an upright, stowed position. The truck 3 can then be driven from site.

Referring now to FIGS. 6-8, there is illustrated a further embodiment of the invention. In this embodiment, there is again provided a cable dispensing apparatus 60 comprising a frame assembly 61 adapted to support a cable containing drum 62. The apparatus includes at least one arm member 63 in the form of a boom (arm member 63 will hereinafter be called boom 63). The boom 63 supports a cable guide which in the present embodiment comprises a pinch roller 64. As illustrated in FIG. 6-8, the apparatus can lay cable 65 at a desired location (e.g. in a trench) which is some considerable distance from the cable drum 62. Thus, there is no danger of the apparatus falling into the trench. Another advantage is that the boom can be lifted over any obstacles between the apparatus and a trench (such as a rubble pile).

Referring to FIG. 6-8 in greater detail, apparatus 60 comprises a leading vehicle 66 which is mounted on wheels and which can be self-propelled by having a motor. The apparatus further comprises a trailing vehicle 67 which is also on wheels and which is coupled to the leading vehicle 66 by a pivot 74 so that the leading and trailing vehicles can pivot relative to each other as indicated by the arcuate double headed arrows in FIG. 6. The pivot 74 might also comprise a universal joint. The apparatus can also comprise an articulated vehicle with the two parts.

The trailing vehicle supports the cable drum 62. The type of support can be similar to that described with reference to FIGS. 1-5 and the drum can also be rotated by a drive means such as hydraulic wheel 40 illustrated in at least FIG. 1.

The leading vehicle is provided with a turntable 68. Turntable 68 and the leading vehicle are configured such that the turntable can move by at least 90° and preferably by 360°. This provides great versatility to the cable dispensing apparatus.

The at least one arm member (boom 63) in the particular embodiment is formed in two parts being a first arm member 69 and a second arm member 70. These members 69, 70 are hinged/pivoted together in a manner which is known and can move relative to each other by the usual hydraulics such as hydraulic rams 71. The length of boom 63 can vary but it is envisaged that the length will be between 3-10 meters (9’6” to 32’ feet). If necessary, the leading vehicle can be provided with stabilisers or outriggers which can be activated to minimise tipping of the leading vehicle upon extension of boom 63. The stabilisers/outriggers are known in the art. Boom 63 can be raised and lowered relative to the turntable.

Boom 63 is provided with a plurality of cables supports 72 which are in the form of rollers. These are positioned along the boom and function to facilitate movement of cable 65 along the boom.

The end of boom 63 is provided with a cable guide which, in the present embodiment, comprises a powered pinch roller assembly 64. Cable 65 passes between the pinch rollers and, as one or both of the pinch rollers are driven, the cable guide will function as a “cable puller” to assist in pulling the cable along boom 63 to a desired position (e.g. in a trench).

The leading vehicle 66 is provided with a driver/operator cabin 73 containing the various controls to operate the apparatus.

It will therefore be realised that the previously described embodiments of the invention provides a cable dispensing apparatus for conveniently laying cable into trenches, or to any other desired location. Particularly, the apparatus as illustrated in FIG. 6-8 is able to lay cable at elevated positions due to the flexible boom and rotatable turntable.

Other embodiments and variations are possible which fall within the scope of the present invention. For example, in the embodiment that has thus far been described with reference to FIGS. 2 to 4, the spool 12 is supported so that its axis, i.e. axle 10, is substantially parallel to the cross bar 22 and the long axis of the vehicle 3, and perpendicular to the arms 18 and 20 of the boom assembly 16.

In a variation of the invention, shown in plan view in FIG. 5, the spool is rotated 90 degrees relative to the previously described embodiment so that the cable 14 leaves the spool towards the rear of vehicle 3. However, the cable is directed about a sheave 44, which may comprise a roller for example and thence through the roller assembly 24 in the previously described manner. It will however be realised that the first embodiment is preferred since it does not require the presence of redirection sheave 44.

In compliance with the statute, the invention has been described in language more or less specific to structural and methodical features. The term “comprises” and its variations, such as “comprising” and “comprised of” is used throughout in an inclusive sense and not to the exclusion of any additional features. It is to be understood that the invention is not limited to specific features shown or described since the means herein described comprises preferred forms of putting the invention into effect. The invention is, therefore, claimed in any of its forms or modifications within the proper scope of the appended claims appropriately interpreted by those skilled in the art.

Throughout the specification and claims (if present), unless the context requires otherwise, the term “substantially” or “about” will be understood to not be limited to the value for the range qualified by the terms.

Any embodiment of the invention is meant to be illustrative only and is not meant to be limiting to the invention.

Therefore, it should be appreciated that various other changes and modifications can be made to any embodiment described without departing from the spirit and scope of the invention.

What is claimed is:

1. A cable dispensing apparatus comprising a frame assembly, the frame assembly including a pair of spaced apart upright members, an axle supported by the pair of spaced apart upright members, the axle adapted to support a cable containing drum, drive means adapted to rotate the drum to enable cable to be unwound from the drum, a pair of spaced apart arm members having one end pivotally attached to the
frame assembly and the other end interconnected by a crossbar, at least one actuator adapted to pivot the arm members between a raised stowed position and a lowered cable dispensing position, and a cable guide located on the crossbar and adapted to guide cable from the drum and over the crossbar.

2. The apparatus of claim 1, wherein the frame assembly includes a base frame adapted to mount the apparatus onto a truck body.

3. The apparatus of claim 2, wherein the upright members comprise a central vertical post member mounted to the base frame and a pair of angled brace members one end of which is mounted to the base frame and the other end of which is mounted to the top of the central post member.

4. The apparatus of claim 3, wherein the arm members are pivotly mounted to a brace member.

5. The apparatus of claim 1, wherein the drive means comprises a driven tire which contacts part of the drum to rotate the drum.

6. The apparatus of claim 1, wherein each arm member is at least 6 feet long.

7. The apparatus of claim 1, wherein the cable guide comprises oppositely rotatable rollers, the cable adapted to locate between the rollers.

8. A cable dispensing apparatus comprising a frame assembly adapted to support a cable containing drum, at least one arm member having one end attached to the frame assembly at least one actuator adapted to move the arm member between a stowed position and a cable dispensing position, and a cable guide on the arm member adapted to guide cable from the drum to a desired location.

9. The apparatus of claim 8, comprising a pair of spaced apart said arm members and a cross member interconnecting the pair of spaced apart arm members.

10. The apparatus of claim 9, wherein each said arm member is operated by a said actuator, the actuator comprising a hydraulic ram.

11. A cable dispensing apparatus comprising a frame assembly adapted to support a cable containing drum, at least one arm member adapted for movement between a stowed position and a cable dispensing position, and a cable guide on the arm member adapted to guide cable from the drum to a desired location.

12. The apparatus of claim 11, comprising a turntable, said arm member being supported by said turntable, said turntable able to turn by at least 90°.

13. The apparatus of claim 12, wherein said arm member comprises a boom having a first arm member and a second arm member which are pivoted relative to each other, at least one actuator being provided to pivot said first arm member relative to said second arm member.

14. The apparatus as claimed in claim 11 wherein said cable guide comprises a cable puller to pull cable along said arm member.

15. The apparatus as claimed in claim 14 wherein said cable puller comprises a powered pinch roller.

16. The apparatus as claimed in claim 14, including a plurality of cable supports on said arm member to support cable as the cable moves along said arm member.

17. The apparatus as claimed in claim 10, comprising a trailing vehicle, the frame assembly being supported by the trailing vehicle, and a leading vehicle, the at least one arm member being supported by the leading vehicle.

18. The apparatus as claimed in claim 17, wherein the leading vehicle supports a turntable, the at least one arm member being supported by the turntable, the turntable adapted for rotation by at least 90°.

19. The apparatus as claimed in claim 18, including a driver cabin on the leading vehicle, and an engine on the leading vehicle to enable the leading vehicle to be self-powered.