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Bennett et al.

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[45] **Aug. 27, 1974**

[54] **WIRE PULLING APPARATUS**

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[51] **Int. Cl.** **B65h 75/40,** B65h 49/00

[58] **Field of Search** ..... 242/86.5 R, 118.61, 118.62, 242/129, 77, 77.2, 77.3, 77.4; 248/129

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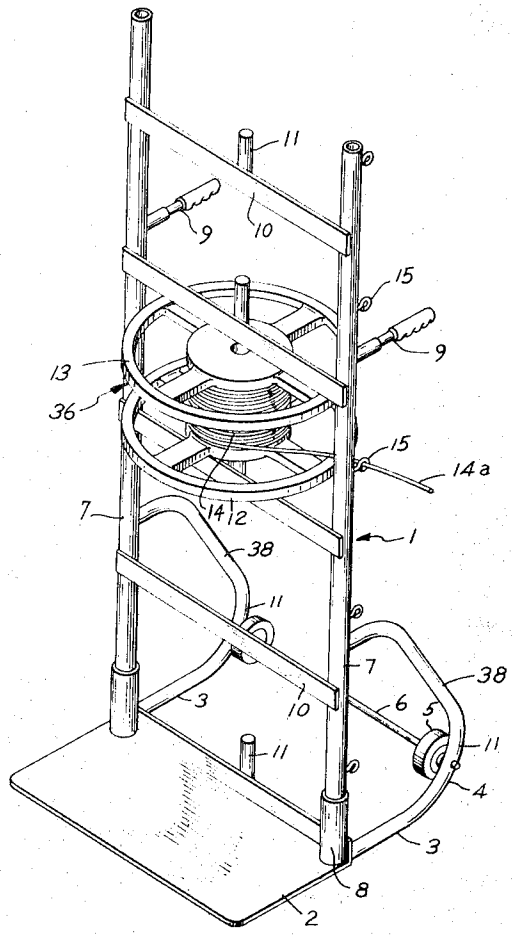
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Assistant Examiner—John M. Jillions
Attorney, Agent, or Firm—Molinare, Allegretti, Newitt & Witcoff

[57] **ABSTRACT**

A portable wire cart for transporting a plurality of wire coils and dispensing wire from the coils, which includes a plurality of horizontally positioned, detachable, rotatable, circular base members, to support the wire coils, independently mounted on the cart's frame structure. Detachably positioned over each base member is a circular guide member to hold the wire coils in place. The wire cart is adapted for use in a vertical position, and wire may be independently added or drawn from any of a plurality of coils which may be placed on the cart.

7 Claims, 8 Drawing Figures



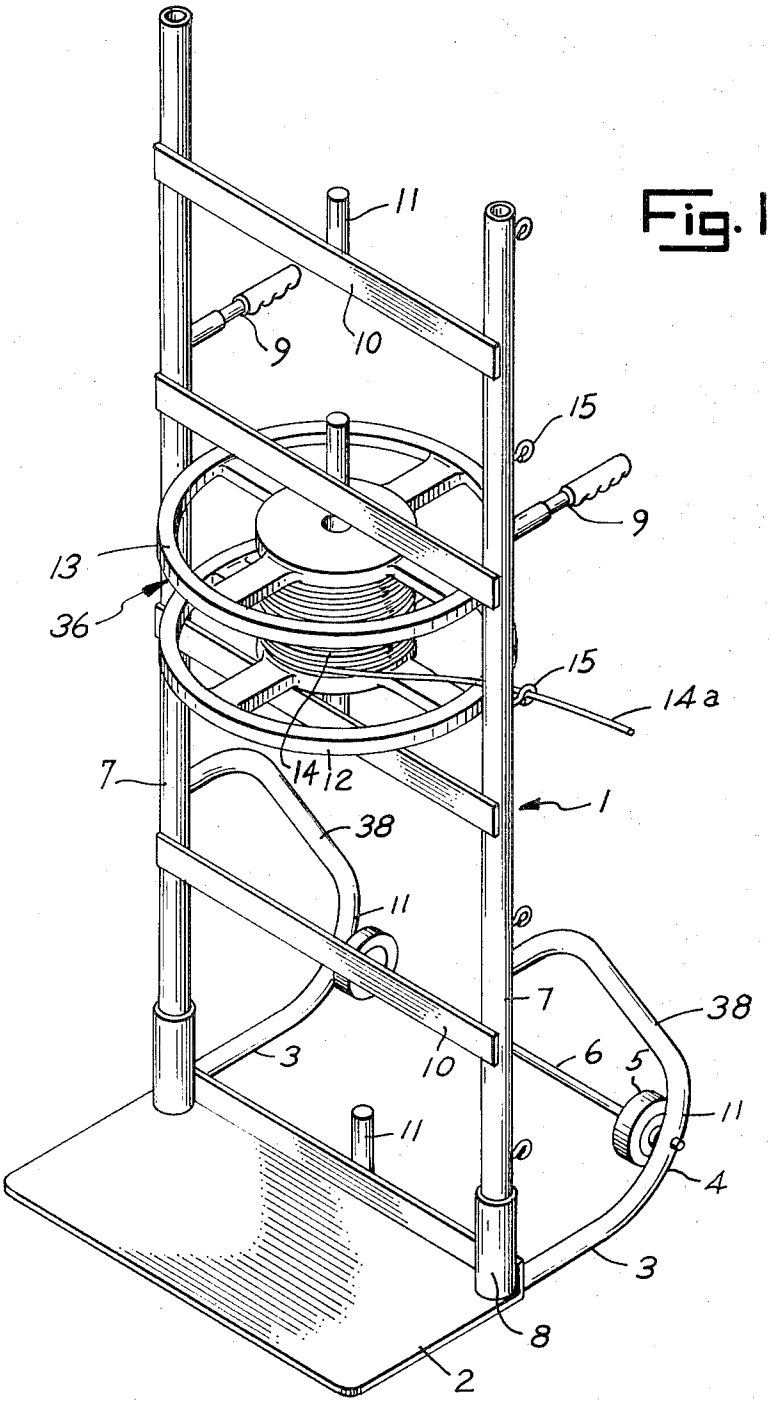


Fig. 1

Fig. 2

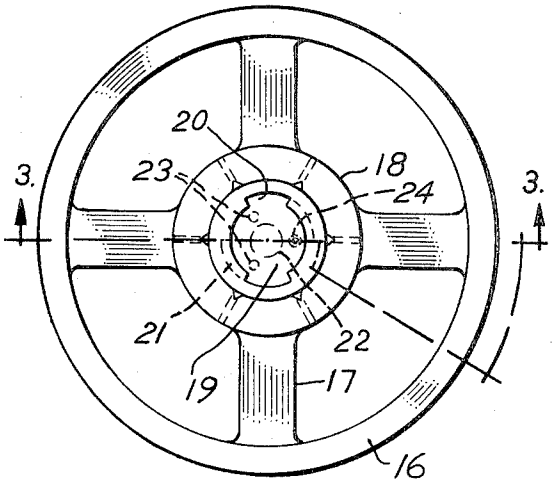


Fig. 4

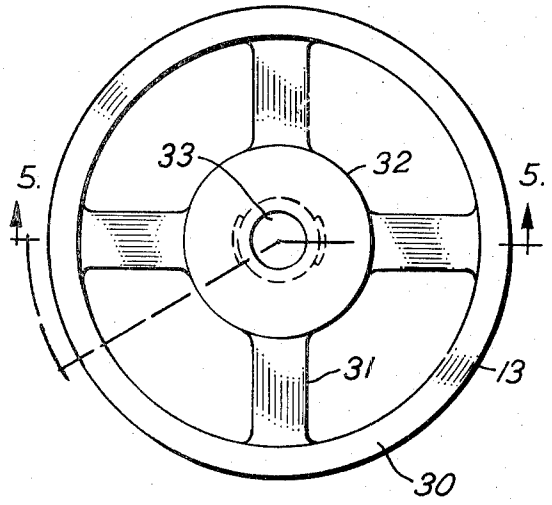


Fig. 3

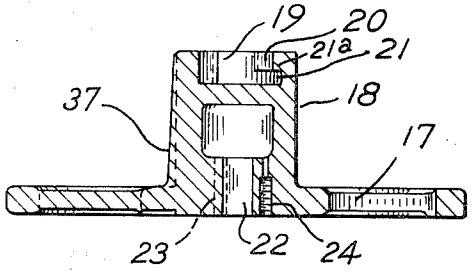
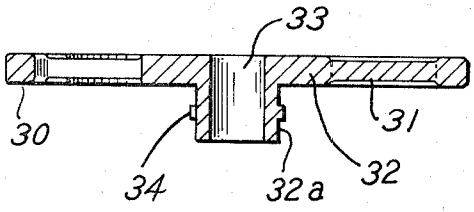


Fig. 5



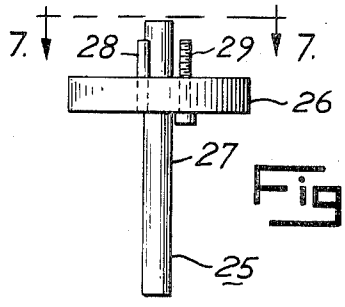
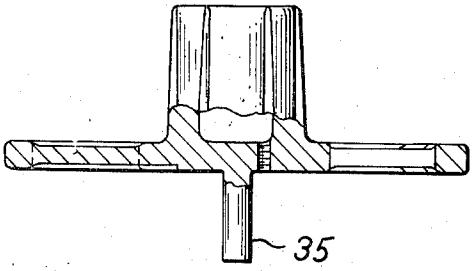


Fig. 6

Fig. 8



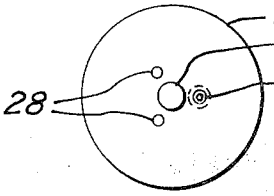


Fig. 7

WIRE PULLING APPARATUS

BACKGROUND OF THE INVENTION

This invention relates to winding and reeling carriers and, in particular, to a hand-operated, portable carrier for wire reels.

Electrical contractors frequently purchase wire in large coils, i.e., 500 ft., packaged in cardboard cartons. Wire is dispensed from these cartons from the center which frequently results in the formation of kinks in the wire. These kinks interfere with pulling the wire through conduits and must often be straightened or cut out of the length of wire. This results in a considerable loss of time and wire on construction projects. However, if wire is pulled from the perimeter of the coil, these kinks are substantially eliminated.

Electricians also frequently utilize wires of several different color codes, sizes or types on one job. This wire is often supplied in reels or boxes which have considerable weight and are very difficult for an individual to transport. Further, the electrician must pull several different wires from different reels or boxes at one time, particularly, when working on large industrial projects. For these reasons, it is difficult for an electrician to physically carry and dispense the different types of wire required in different locations on a construction project.

To accommodate the electrician in his work and to partially solve the problems associated with transporting a number of wire spools and drawing wires from a plurality of sources, the art has devised various portable wire reel supports for transporting several wire reels. In U.S. Pat. No. 2,705,114 there is disclosed a reel-carrying rack for carrying a plurality of reels. In this portable rack, the reels are vertically positioned on the rack and, as a consequence, the wire can be drawn from the rack in only one, forward, horizontal direction. If the wire is drawn from the reels at angle sideways from the cart, the wire-pulling operation may tip the cart. Further, while each wire reel in this reference can be independently removed and replaced without interference from adjacent reels, for a reel to be removed, the entire reel assembly must be dismounted from the cart. In other words, to place a new coil of wire on an empty reel requires the removal of the entire reel assembly. This is time consuming and inconvenient.

In U.S. Pat. Nos. 2,965,327; 3,072,357 and 3,134,555, there is disclosed other means for supporting and transporting a plurality of wire reels. In these devices, the wire is dispensed from the reels, when the support cart is in a generally horizontal position. Accordingly, when the cart is used to dispense wire, it occupies a considerable amount of space on a construction project because of its horizontal position. In construction projects wherein space is at a premium, this is a very serious drawback in these reel carts.

Further, in the cart illustrated in U.S. Pat. No. 3,072,357 each intermediate wire reel assembly is physically supported on a lower reel assembly and also supports a superimposed, upper reel assembly. When one reel is depleted of wire, it cannot be replaced or removed without disturbing all of the other reels. Because, on typical construction projects, varying amounts of wire are drawn from different reels, and the reels run out of wire at different times, it becomes time consuming and inconvenient to remove several reels in order to merely replace the wire on one depleted wire reel.

SUMMARY OF THE INVENTION

It is an object of this invention to provide a portable wire cart for transporting a plurality of wire spools which is easily transportable and which can be, for example, wheeled up and down stairs.

It is another object of this invention to provide a portable wire cart which can be used in a stable vertical position wherein the wire can be removed from horizontally-positioned wire support reels in several horizontal directions.

It is a further object of this invention to provide a portable wire cart having a plurality of wire support reels wherein each wire support reel is independent of the other support reels, and wherein wire can be placed on each support reel without completely removing the entire support reel from the cart.

It is another object of this invention to provide a portable wire cart wherein a wire support reel can be placed on the wire cart in a ready, facile manner.

It is a further object of this invention to provide a portable wire cart wherein there is utilized a wire support reel having two readily detachable, circular members.

It is a limited object of this invention to provide a portable wire cart and reel assembly wherein the wire support reels include a detachable adaptor to be attached to a support reel when removed from the cart to facilitate the winding of wire on the support reel.

In an embodiment, therefore, the present invention relates to a portable wire cart for transporting wire coils or spools and dispensing wire from the coils or spools, which comprises a frame structure having a pair of spaced-apart, generally vertical side members. Extending between these side members in a parallel, spaced-apart relationship, are a plurality of superimposed, horizontal cross members. A horizontal support member and a wheel member are positioned on the bottom of the frame structure to support the cart in a vertical position as wire is drawn therefrom. The horizontal support member and the wheel member are positioned in opposite relation to each other to provide support for the cart on either side of the frame structure. The wire coils or spools are placed on a detachable, rotatable, bottom, circular base member which is positioned horizontally on each cross member. This bottom base member has a vertically extending center hub to receive the wire coils or spools and to further receive a detachable top circular guide member which is detachably connected to the base member and guides the wire dispensed from the wire coils placed on the bottom base. In this portable wire cart, the wire may be dispensed from the cart when the cart is in a vertical position. Further, the wire coils or spools can be independently placed on the cart without disturbing other coils already positioned thereon. In addition, wire can be placed on the removable wire wheel assembly without removing all of the component parts of the wheel assembly from the cart.

In a further more limited embodiment, the removable wire wheel assembly includes an adaptor having a neck portion and a base portion. The base portion can be detachably connected to the bottom of the base member of the wire wheel assembly when that member is re-

moved from the cart. The neck portion of the adaptor is adapted for engagement to a suitable rotating power source whereby wire from large spools can be wound onto the circular bottom base in a ready manner.

Other objects, embodiments, and a more detailed description of the present invention will be found in the following detailed description of the present invention with reference to the appended drawings. It should be understood, however, that the figures and embodiments described and illustrated herein are not limiting on the generally broad scope of the present invention but, rather, merely illustrate a preferred embodiment thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the inventive wire pulling apparatus with a wire reel mounted thereon;

FIG. 2 is a plan view of the bottom base wheel;

FIG. 3 is a sectional elevational view of the bottom base wheel taken along section line 3—3 of FIG. 2;

FIG. 4 is a plan view of the top guide wheel;

FIG. 5 is a sectional elevational view of the top guide wheel taken along section line 5—5 of FIG. 4;

FIG. 6 is an adaptor which can be positioned on the bottom side of bottom base wheel to wind wire thereon;

FIG. 7 is a plan view of the adaptor taken along section line 7—7 of FIG. 6; and

FIG. 8 is a sectional elevational view of an alternative embodiment of the bottom base wheel.

DETAILED DESCRIPTION OF THE INVENTION

Referring to FIG. 1, there is illustrated a perspective view of the inventive wire pulling apparatus 1 having mounted thereon wire reel assembly 36. Wire pulling apparatus 1 comprises a generally flat, horizontal, forward extending bottom base portion 2 and a bottom backward extending base portion 3. Base portion 3 is also horizontal and has extending upwardly therefrom an upturned portion 4. Upturned portion 4 provides support for wheels 5 mounted and rotatable around axle 6. Horizontal base portions 2 and 3 provide a stable support for the wire pulling apparatus, and allows wire to be pulled therefrom in a variety of horizontal and vertical directions while the apparatus is in a vertical position. The upturned portion 4 raises the wheel 5 off the ground when apparatus 1 is in a true vertical position, thereby further ensuring a stable vertical position. The apparatus, however, may be readily moved from one point to another simply by tilting the apparatus backward onto upturned portion 4 and wheels 5 and pushing the apparatus forward. Bottom base portion 2 preferably comprieses a rectangular planar surface so that the apparatus can also function as a portable hand cart of a type well known to those trained in the art when wheel assemblies 36 are not positioned on the cart. Interconnecting upturned portion 4 and an intermediate point of side brace members 7 is a brace and guide member 38. Member 38 lends structural support to base 3 and side brace 7 and, more importantly, provides a guide surface on which cart 1 can rest when it is transported up and down stairs. Guide member 38 allows the cart to be gradually lowered or raised from one step to another in a smooth continuous manner rather than by a sudden jerky movement.

Side brace members 7 are connected to bottom base portion 2 by interconnecting braces 8. Braces 7 and 8 can be manufactured from square, hollow, metallic stock on hollow, circular, metallic tubes. Handles 9 connected to the upper portions of side braces 7 provide a ready means for hand-propelling the wire pulling apparatus, when tipped back on wheels 5. Horizontally positioned cross braces 10 interconnect with and are supported by side braces 7 and provide a support for vertical mount 11 which coacts with wheel assembly 36. Preferably, side braces 7 are in a spacedapart vertical, parallel relation. However, it is within the scope of this invention to have side braces 7 tapered in an upward, generally vertical, extending direction from bottom base portions 2 and 3. This allows the installation of varying-sized wire wheel assemblies on the wire pulling apparatus. For example, large-diameter wire wheel assemblies could be placed on the bottom portion of the apparatus, with smaller-diameter assemblies placed on the upper portion.

Wire wheel or reel assembly 36 comprises a bottom support wheel 12 and a top guide wheel 13. Positioned between wheels 12 and 13, in a manner to be more fully described later, is a wire spool 14 formed by a length of wire 14*a*. Guide wheel 13 prevents wire 14*a* from creeping over the top of spool 14. Typically, wheels 12 and 13 are of equal diameter and are of sufficient dimension to support a 500 ft. wire spool. Wire guide eyelet 15 positioned on side brace 7 provides a guide for the wire 14*a* as it is dispensed from wire spool 14. However, wire 14*a*, as it is dispensed from wire spool 14, need not pass through guide eyelet 15. In fact, in certain embodiments, it is particularly advantageous not to use guide eyelet 15 since the wire, because of the horizontal orientation of wheel assembly 36, can be pulled horizontally from assembly 36 in a wide variety of horizontal directions without disturbing the vertical stability of the wire pulling apparatus 1. For example, wire 14*a* could be pulled either forward, to the left, or to the right, without moving the entire apparatus. This is especially advantageous in large construction jobs wherein an electrician must pass wire through a number of conduits which are positioned at different portions in a room. The electrician can proceed essentially laterally across the entire room, pulling wire from wire spool 14, without changing the position of the apparatus.

Bottom support wheel 12 is more fully illustrated in FIGS. 2 and 3. Bottom support wheel 12 comprises an outer rim 16 and a central hub 18, said central hub 18 interconnected to rim 16 by spokes 17. Vertical, tapered ridges 37 on the side of hub 18 provides a general frustroconical shape to the hub and aid in positioning wire coils on the hub. Positioned in the center of hub 18 is a circular opening 19 having a pair of spaced-apart, generally vertical grooves or slots 20 which interconnect with lower, generally horizontal grooves or slots 21, which extend around part of the perimeter of opening 19. Vertical groove or slot 20 and horizontal groove or slot 21 form internal shoulder 21a and produce a locking lug opening which cooperate with top guide wheel 13 in a manner to be described below to interconnect wheels 12 and 13. Center opening 22 on the bottom of bottom support wheel 12 provides a means for mounting support wheel 12 on vertical mount 11. In other words, support wheel 12 is mounted on wire pulling apparatus 1 by the engagement of vertical mount or finger 11 with center opening 22. Center

opening 22 can contain a bushing or top cover (not illustrated) to accommodate finger 11.

Top support or guide wheel 13 is illustrated in detail in FIGS. 4 and 5. Guide wheel 13 comprises an outer rim 30 and a center hub 32, said center hub 32 interconnected to rim 30 by spokes 31. Center hub 32 has an opening 33 therein and has positioned on the lower portion thereof a pair of spaced-apart shoulders 34 which form a pair of locking lugs to coact with bottom wheel 12. Particularly, shoulders 34 are adapted to engage vertical groove 20 and horizontal groove 21 of bottom support wheel 12. More particularly, top support wheel 13 is engaged with bottom support wheel 12 by inserting bottom neck 32*a* of center hub 32 into opening 19 of central hub 18. Shoulders 34 are positioned to engage vertical groove 20 thereby allowing bottom neck 32*a* to descend into opening 19. When bottom neck 32*a* reaches near the bottom of opening 19, shoulder 34 reaches the bottom of groove 20 and the opening of groove 21 and top guide wheel 13 is turned whereby shoulders 34 engage horizontal groove 21 which is of a greater diameter than opening 19. Shoulder 34 thus engages shoulder 21*a* formed in hub 18 by groove 21. This provides a very firm interlocking between top guide wheel 13 and bottom support wheel 12. If desired, biasing means, (not shown), can be placed in opening 19 to force an intimate contact between shoulders 34 and 21*a*. However, bottom neck 32*a* and shoulders 34, as well as opening 19 and grooves 20 and 21, can be machined to ensure a close and thorough attachment of wheels 12 and 13. As illustrated, a pair of locking lugs are used. However, it is within the scope of this invention to utilize a single lug or three or more lugs and complementary lug openings.

Illustrated in FIGS. 6 and 7 is a winding attachment 25 comprising a top flange or base portion 26 and a center rod or neck portion 27, mounted perpendicular to flange 26. Unthreaded guide rods 28 and threaded bolt 29 are positioned on the front face of top flange 26. Winding attachment 25 is connected to the bottom portion of bottom support wheel 12 by inserting center rod 27 into center opening 22, with guide rods 28 engaging unthreaded side holes 23. Threaded bolt 29 is then threaded into threaded hole 24 in the base of bottom support wheel 12, to provide a firm connection between winding attachment 25 and wheel 12. Winding attachment 25 allows wire wheel assembly 36 to be mounted on a rotating power source, such as a powered rotating chuck, and allows an electrician to wind wire onto support wheel 12. Thus, an electrical contractor may purchase wire in large lots, such as 10,000-foot reels, which can be transferred to wire wheel assembly 36 in approximately 500 to 1,000-foot coiled sections. In other words, as wire wheel assembly 36 rotates on a rotating power source, (not illustrated), wire can be wound onto the wheel assembly 36 from a large supply source. This enables the electrical contractor to purchase wire on a less-expensive, larger-volume basis, yet retain all the benefits and convenience of shorter-length wire spools.

In FIG. 8 there is illustrated an alternative form of bottom support wheel 12. In this embodiment, wheel 12 is identical to that construction illustrated in FIGS. 2 and 3, with the exception that there is provided a vertical extension 35 positioned on the bottom side of wheel 12. Wheel 12 is then mounted on cross braces 10 by means of bracket, (not illustrated), in which there is an opening adapted to receive extension 35. For example, vertical mount 11 could be a hollow tube adapted to receive extension 35. However, the embodiment illustrated in FIGS. 2 and 3 is preferred since it allows a number of wire wheel assemblies 36 to be stacked or stored on each other, thus saving considerable space when the wire wheel assemblies are shipped or stored.

The wire pulling apparatus illustrated is sturdy and light weight and has sufficient mobility to be wheeled up and down stairs. More importantly, the unit is always used in a vertical position, thus using a minimum of floor space under already crowded construction conditions. Further, each of the wire wheel assemblies mounted on the cart are separate and independent, and wire can be removed or replaced on each wheel assembly without interference from adjacent assemblies. Even further, when wire is to be replaced on a given wheel assembly, all of the component parts need not be removed from the complete wire pulling apparatus. For example, referring to FIG. 1, when wire spool 14 becomes empty, top guide wheel 13 can be removed from bottom support wheel 12. A new wire reel is then placed on support wheel 12 without removing the wheel from the wire cart. Similarly, support wheel 12 or the entire wheel assembly 36 can be removed from cross braces 10, by simply lifting the wheel 12 off of vertical mount 11. Since the unit is always in a vertical position, whether being transported or used in dispensing wire, the unit requires no gears, brackets, clamps or similar attaching devices to secure the wire wheel assemblies to the push cart.

We claim as our invention:

1. A portable wire cart for transporting wire coils and dispensing wire from the coils, which comprises, in combination:

a. a frame structure having a pair of spaced-apart, generally vertical, side members;

b. a plurality of superimposed, horizontal cross members extending between said side members in a parallel, spaced-apart relation;

c. a horizontal support member positioned on the bottom of the frame structure, adapted to support the cart in a vertical position;

d. wheel members positioned on the bottom of the frame structure in opposite relation to the support member, adapted to support the cart in a vertical position and to provide means for transporting the cart;

e. a plurality of removable wire reel assemblies each assembly separately supported above a horizontal cross member and comprising:

i. a detachable, rotatable, bottom circular base member having an opening in the bottom thereof;

ii. said bottom base member having a vertical extending center hub portion to receive a wire coil; and

iii. a detachable, top circular guide member detachably connected to the hub of said bottom base member to guide wire dispensed from the wire coil placed on the bottom base member;

f. each assembly separately supported above a horizontal cross member by a generally vertically extending support finger rigidly affixed to each of said cross members and attached to said cross

members at only one end of said finger and adapted to engage the opening in the base member of each assembly, the distance between the free end of each support finger and each horizontal support member sufficient to allow the top circular guide member to be removable from the cart when the cart is in a vertical position without the necessity of removing the bottom base member, said cart characterized by the ability to dispense wire from the cart when the cart is in a vertical position.

2. A wire cart as in claim 1, wherein a guide eyelet is positioned on said frame structure and is adapted to guide wire dispensed from a wire reel.

3. A wire cart as in claim 1, wherein said wheels are positioned on a wheel support member having a horizontal front portion connected to said frame and an upward-turned back portion adapted to support said wheels off the ground when the cart is in a vertical position.

4. A wire cart as in claim 1, wherein a handle is positioned on said frame for moving said cart.

5. A wire cart as in claim 1, wherein said center hub of the bottom base member has a circular opening in the center thereof, said opening including a vertical groove extending inwardly from the top of the hub, and a horizontal groove communicating with the vertical groove positioned below the top of the circular opening, having a diameter greater than said opening; and, wherein said top guide member has a circular, elongated, center hub positioned on the bottom portion of the guide member, adapted for placement in the top of the opening in the base hub, said elongated hub having a shoulder extension positioned thereon, said shoulder extension adapted to engage both the vertical groove and the horizontal groove of the bottom base hub and to detachably connect the respective circular member by placement of the top guide hub within the bottom support hub and to rotatably connect the hubs.

6. A wire cart as in claim 1, wherein said bottom, circular member and top, circular member comprise a spoked wheel.

7. A wire cart as in claim 1, wherein said circular base and guide member are of equal diameters.

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