Nov. 16, 1965 J. R. MILLER 3,218,033

CABLE FEED MECHANISM

Filed Nov. 26, 1963 4 Sheets-Sheet 1

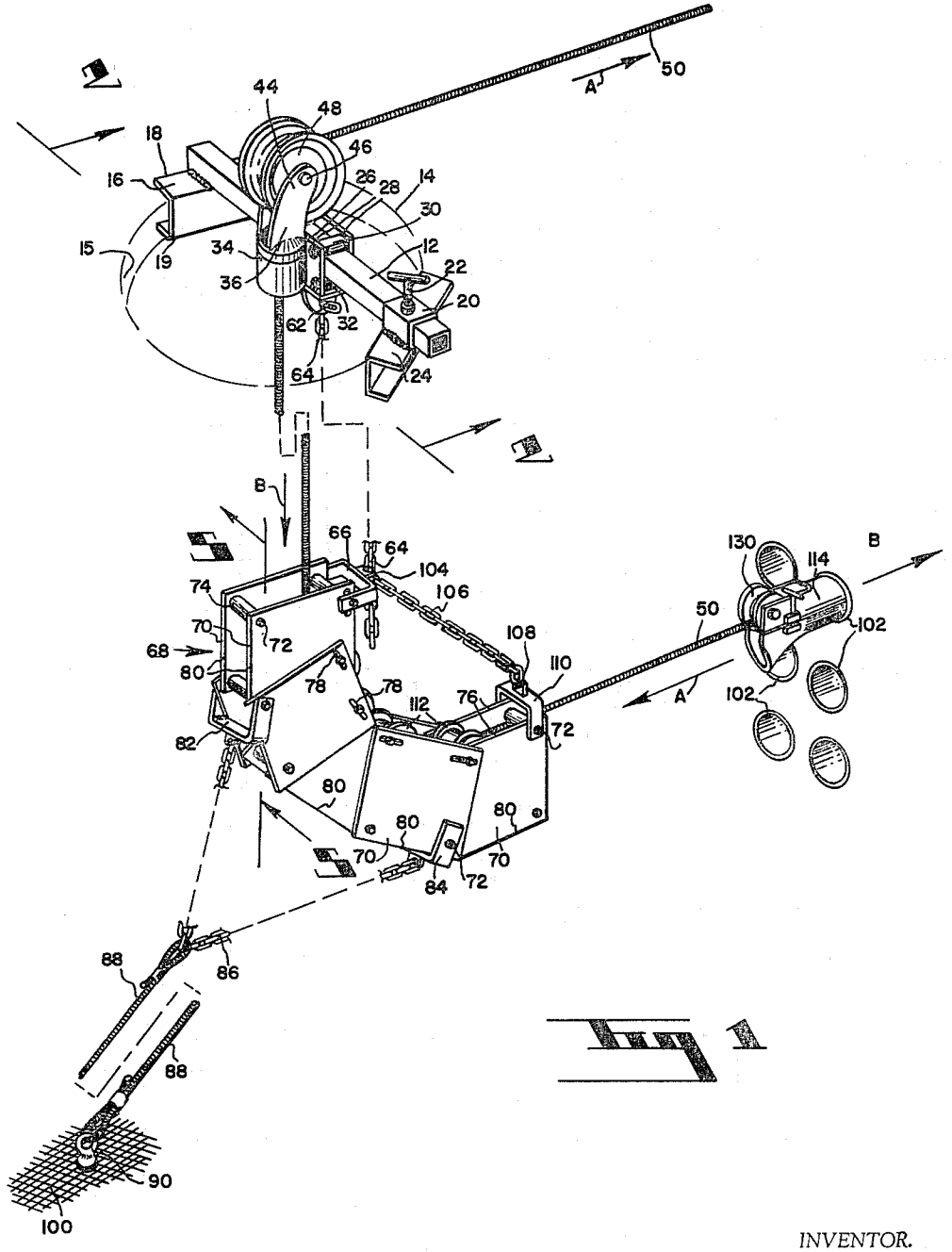



FIG. 1

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CABLE FEED MECHANISM

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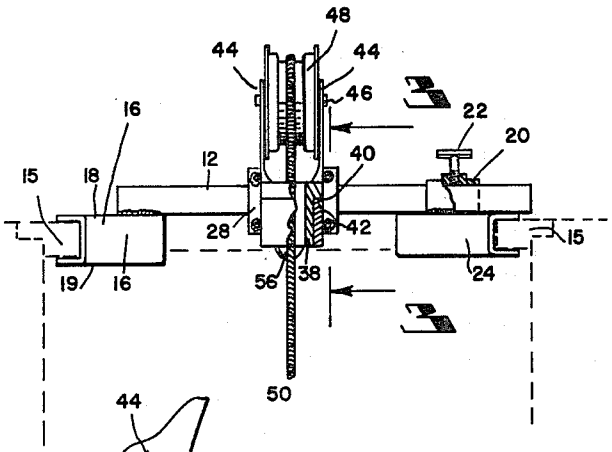



FIG. 2

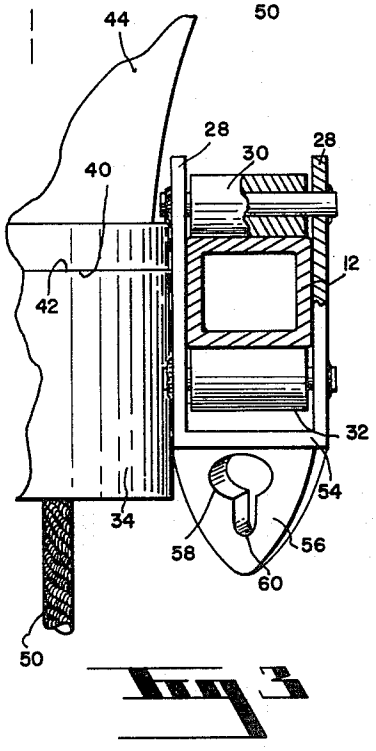



FIG. 3

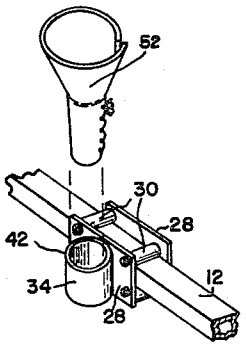



FIG. 4

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CABLE FEED MECHANISM

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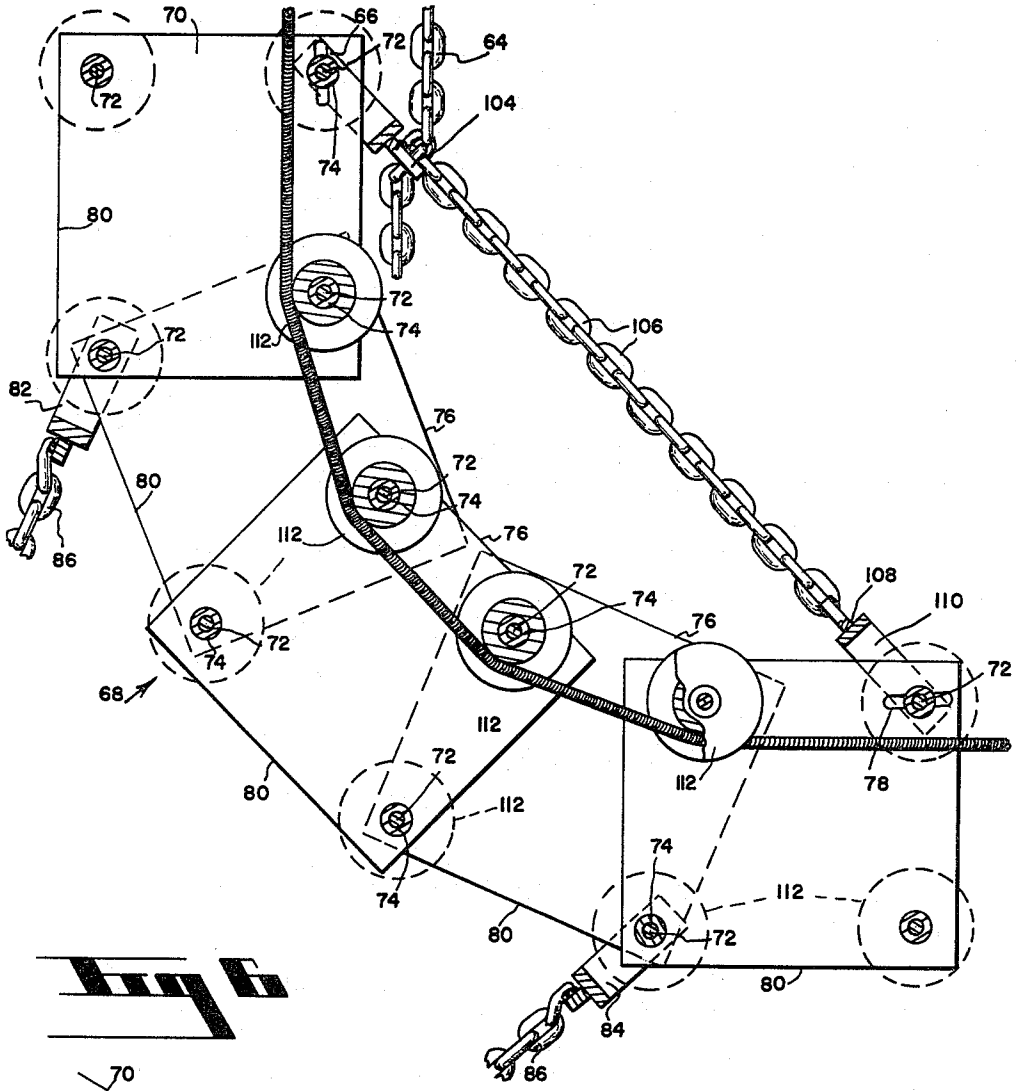



Fig. 6

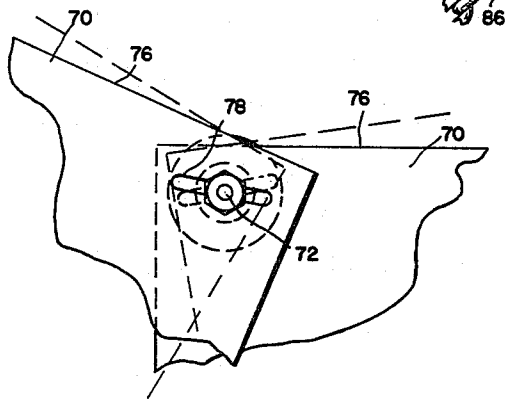



Fig. 5

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CABLE FEED MECHANISM

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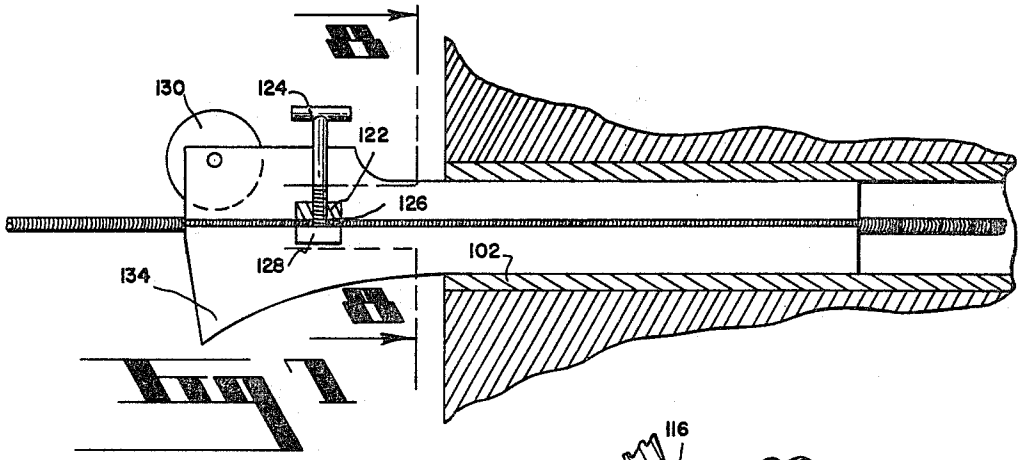



Fig. 7

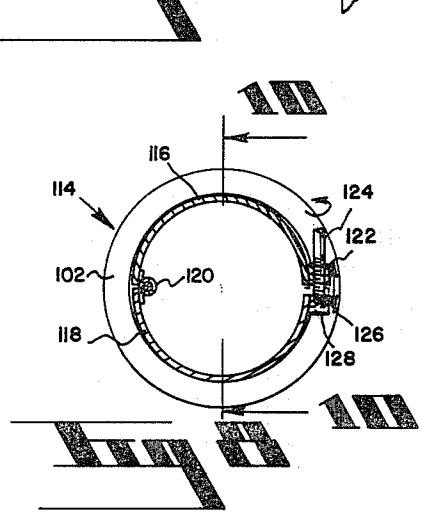



Fig. 8

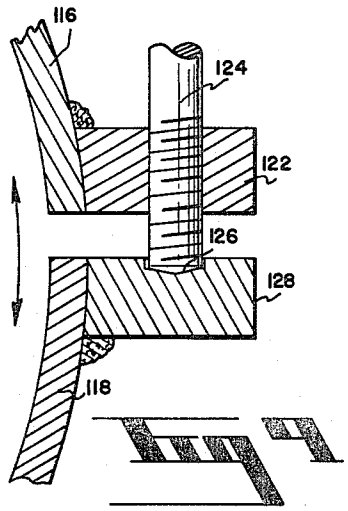



Fig. 9

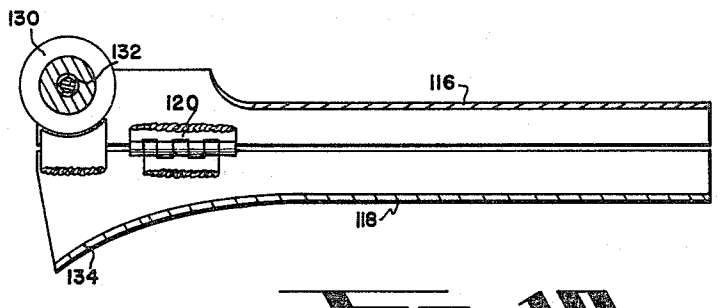



Fig. 10

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3,218,033

# CABLE FEED MECHANISM

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10 Claims. (Cl. 254—134.3)

This invention relates to a cable feed mechanism, and, more particularly, for use in feeding cable from a reel on the surface of the ground downwardly through manholes and into underground conduits.

It has been a problem accurately and properly to feed cable from a reel on the surface of the ground downwardly through a manhole and into horizontally disposed underground conduit, and particularly, for such use to accomplish the feeding of great lengths of cable with maximum accuracy and a minimum of friction and cable distortion.

Additionally, it has been a problem to feed cable from a reel on the surface of the ground downwardly and into horizontally disposed conduit underground due to the difficulties of directing the cable accurately and due to the necessity of having adjustable equipment at a manhole entrance and for accomplishing a substantially 90 degree transition of the cable and to accomplish alignment thereof with such underground conduit.

Accordingly, it is an object of the present invention to provide a very simple, efficient and readily useful cable feed mechanism which is particularly adapted for use in feeding cable from reels on the surface of the ground downwardly through manholes and into conduit disposed horizontally below the surface of the ground.

Another object of the invention is to provide a very simple cable feed mechanism for use in guiding cable from a reel on the surface to underground conduit which employs a novel assembly of pulleys suspended in a substantially arcuate row from a sheave trolley mounted on a track spanning a manhole cover whereby the entire cable feed mechanism of the invention may readily and easily be installed in any conventional manhole into which underground conduit extends.

Another object of the invention is to provide a very novel means for pulling a fish line and winch cable through substantially 90 degrees from a position above the ground and through a manhole and underground conduit extending thereinto preliminary to the feeding of cable attached to said winch cable.

Another object of the invention is to provide a cable feed mechanism having very novel guide pulley swivel and trolley mechanism which is readily and easily mounted on the rim of a manhole, and to which trolley an adjustable assembly of sheaves provides a long radius guide mechanism disposed to accomplish a 90 degree transition of cable guiding from the vertical to the horizontal.

Another object of the invention is to provide a very novel cable feed mechanism having a trolley supported pulley swivel adapted to be connected with a manhole rim from which trolley is suspended a novel assembly of cable guide pulleys and means for anchoring the assembly in a manhole so that the entire cable guide mechanism automatically aligns the cable through 90 degree transitions from a reel above ground and into an underground conduit.

Another object of the invention is to provide a novel cable feed mechanism which is very accurate and has means disposed to operate with a minimum amount of friction and cable distortion.

Another object of the invention is to provide a cable feed mechanism which may be very simply and quickly disposed in a manhole for feeding cable from a reel above ground to a conduit below ground.

Another object of the invention is to provide a very



novel funnel sheave and cable guide mechanism which is insertable in a conventional underground conduit for guiding cable thereinto.

Another object of the invention is to provide a cable feed mechanism having a novel means for lubricating cable as it is fed from a reel above ground and into a conduit underground.

Further objects and advantages of the invention may be apparent from the following specification, appended claims, and accompanying drawings in which:

FIGURE 1 is a perspective view of a cable feed mechanism in accordance with the present invention and showing such mechanism disposed in a manhole location to guide cable from a reel or other source above ground and into a cable containing conduit underground;

FIGURE 2 is a view taken from the line 2—2 of FIGURE 1 showing by broken lines a rim section of a manhole;

FIGURE 3 is an enlarged fragmentary sectional view taken from the line 3—3 of FIGURE 2;

FIGURE 4 is a perspective view of a cable greasing device used in connection with the cable feed mechanism of the invention;

FIGURE 5 is an enlarged sectional view taken from the line 5—5 of FIGURE 1;

FIGURE 6 is an enlarged fragmentary side elevational view of adjustably connection mechanism for cable sheave supporting plate structures of the invention;

FIGURE 7 is an enlarged fragmentary sectional view of an end of an underground conduit showing a cable sheave funnel and guide structure of the invention inserted therein and guiding the cable into the conduit;

FIGURE 8 is an enlarged transverse sectional view taken from the line 8—8 of FIGURE 7;

FIGURE 9 is an enlarged fragmentary sectional view taken on the same plane as FIGURE 8, and showing details of the cable guide expansion mechanism disclosed in FIGURE 8; and

FIGURE 10 is a reduced axial sectional view of the structure shown in FIGURE 8 and taken from line 10—10 thereof.

The cable feed mechanism of the present invention comprises a trolley bar 12 which may be disposed horizontally at the surface of the ground and in spanning relationship with a manhole 14 after the conventional cover thereof has been removed. Conventional manholes in streets or other areas generally are provided with a metal ring 16, as shown in FIGURE 2 of the drawings, which surround the manhole and provide a solid supporting structure for the trolley bar 12.

Fixed to the trolley bar 12 at one end thereof is a channel 16 which is disposed at an angle to the axis of the trolley bar 12, so that the open legs of the channel 16 straddle the upper and lower surfaces of the ring 15. Thus, an upper leg 18 of the channel 16 is disposed above the ring 15, and a lower leg 20 of the channel 16 is disposed below the ring 15.

The bar 12 at its oppposite end is surrounded by a sliding sleeve 20 having a set screw 22 screw threaded therein and engageable with the trolley bar 12 to fix it in position together with another channel member 24 welded to the sleeve 20 and similar to the channel 16. The channel 24 engages the ring 15 in a similar manner to that hereinbefore described in connection with the channel 16.

The channel 24 is thus slidably mounted to permit installation and removal of the trolley part 12 is connection with manhole surrounding ring 15. The opposed channels 16 and 24 therefore serve as very rigid and strong support for the trolley bar 12.

Movably mounted on the trolley bar 12 is a trolley mechanism 26 comprising a pair of plates 28 disposed at

opposite sides of the trolley bar 12. Rotatably mounted between these plates 28 are rollers 30 which bear upon the upper surface of the trolley bar 12 and rollers 32 which bear upon the lower surface of the trolley bar 12. It will be seen that there are two of the rollers 30 spaced apart and two of the rollers 32 horizontally spaced apart to provide stability of the trolley mechanism 26 as it is moved longitudinally of the trolley bar 12.

Fixed to one of the plates 28 is a circular in cross section hollow sleeve 34 which provides a vertical axis bearing for a caster sheave 36. This caster sheave 36 is provided with a hollow cylindrical bearing 38 disposed to pivot about a vertical axis in the sleeve 34. A shoulder 40 of the member 38 bears on the upper end 42 of the sleeve 34 to lend support to the caster sheave 36. Secured to the member 38 are forks 44 carrying a sheave axle which rotatably supports a sheave 48. The axle 46 is offset relative to the axis of the hollow cylindrical member 38 and the sleeve 34 so that the sheave 48 automatically aligns with a cable 50 which is under tension and engaging the sheave 48.

The sleeve 34 is also disposed to support a leather funnel 52 for feeding cable and for lubricating the same during the feeding operation, as will be hereinafter described in detail.

As shown in FIGURE 3 of the drawings, the trolley bar 12 is rectangular in cross section and intimately engaged at its upper side with the rollers 30, and intimately engaged at its lower side by the rollers 32.

Welded or otherwise interconnecting the plates 28 is a bottom plate 54 having a suspension eye plate 56 extending downwardly therefrom. This suspension eye plate 56 is provided with an aperture 58 through which link chain may be readily drawn and communicating with the aperture 58 and extending downwardly therefrom is a slot 60 adapted to intimately engage the cross section of a chain link and to provide an abutment for an adjacent chain link so that chain may be longitudinally adjustably secured in the slot 60, as desired, and as will be hereinafter described.

Engaged with the slot 60 is a link 62 of a chain 64 which is connected to a clevis 66 of a multiple sheave supporting and adjusting assembly 68, shown best in FIGURES 1 and 6 of the drawings.

The assembly 68 comprises a plurality of pairs of plates 70. These plates 70 are secured together in spaced relationship to each other by bolts 72 extending through hollow spaces 74 which hold the plates in spaced relationship to each other.

The plates 70 are substantially rectangular and are provided with openings in areas thereof near their four corners through which the bolts 72 extend. Some of the openings adjacent edges 76 of these plates are elongated slotted openings 78 and in the these areas the plates 70 are adjustably overlapped relative to each other and the bolts 72 extend through overlapped portions of the plates and through the slotted openings 78 so that the assembly of plates 70 may be disposed in a substantially arcuate arrangement.

The bolts 72 adjacent edges 80 of the plates 70 form pivotal connections for the plates in overlapping relationship with each other, and the plates are pivotally adjusted about the pins or bolts 72 adjacent the edges 80.

Clevises 82 and 84 are pivotally connected to some of the bolts 72 at the pivotal jointers of some of the plates 70, and connected to the clevises 82 and 84 is a chain 86 to which an anchor cable 88 is connected. This cable 88 is secured to an eye or other fixture 90 anchored to a floor 100 of a manhole in the side wall of which open ends 102 of underground conduits communicate. These underground conduits are disposed below the surface of the ground and considerably below the manhole ring 15.

A chain fixture 104 similar in construction to the member 56 is connected to the clevis 66. This chain connection 104 is provide with an eye similar to the eye 58 and a slot similar to the slot 60 shown in FIGURE 3, so that a chain 106 may be adjustably engaged therewith while the opposite end of the chain is fixed at 108 to a clevis 110 secured to a bolt 72 at an inner edge 76 of the lowermost pair of plates 70, as shown in FIGURE 1 of the drawings.

Rotatably mounted on the ala bushing 74 adjacent the edges 76 of the plates 70 are cable guide sheaves or rollers over which cable 50 may be engaged, as shown in FIGURE 6 of the drawings.

These cable guide sheaves or rollers are designated 112 and may be located on the bushing 74 adjacent the edges 76 of the plates, or may be located on the bushings 74 adjacent edges 80 of the plates 70, all as indicated by solid and broken lines, respectively.

The assembly 68 thus provides a support for a plurality of cable guide sheaves or pulleys, and serves to function as a long radius roller guide means for guiding cable throughout a transition of substantially 90 degrees, as shown in FIGURES 1 and 6 of the drawings. However, it will be apparent to those skilled in the art that this guide assembly 68 may be so constructed and adjusted that it may serve for guiding cable through transitions of more or less than 90 degrees, if desired.

It will be appreciated that the arc formed generally by the assembly of the sheaves or rollers 112 may be adjusted by adjusting the length of the chain 106 with respect to the fixture 104 and the clevises 66 and 110. Accordingly, if the chain 106 is adjusted to provide a longer length thereof between the clevises 66 and 110, the radius of the assembly of the pulleys 112 will be longer, and consequently such radius will be shorter if the chain 106 is shortened betwen the clevises 66 and 110.

The support of the assembly 68 by the chain 64 permits the assembly 68 to pivot into alignment with the axis of the sleeve 34 and the cable 88 holds the assembly 68 in spaced relation to the ends of the underground conduits 102, and the trolley mechanism 26 automatically moves longitudinally of the trolley bar 12 in accordance with the tension of the cable 50 with respect to a winch drum or other means connected thereto.

An expanding cylindrical cable guide 114 is fitted internally of one of the conduits 102, as shown in FIGURE 1 of the drawings, to guide cable into and out of the conduit 102 depending upon the particular feeding operation being accomplished.

This guide 114 is a hollow cylindrical guide providing a guide roller and flare funnel structure to guide cable into open ends of the conduits 102. These open ends of the conduits 102 are sometimes provided with sharp edges and may tend to scuff or cut the external sheaths of cables such as the multiple conductor cables used for telephone service, or the like. Accordingly, the guide 114 serves to protect cable entering the conduits 102.

As shown in FIGURES 7 to 10, inclusive, of the drawings, this guide 114 is circular in cross section and is constructed of a pair of semi-circular in cross section portions 116 and 118, connected by a hinge 120.

Connected to the semi-circular in cross section portion 116 is an internally screw threaded nut 122 in which a screw threaded T-bolt 124 is screw threadedly adjustable. This T-bolt is provided with an end 126 bearing upon a lug 128 welded or otherwise fixed to the semi-circular in cross section portion 118, so that when the T-bolt 124 is tightened the semi-circular in cross section portions 116 and 118 are forced apart, as indicated by arrows in FIGURE 9 of the drawings, thereby expanding the guide diametrically and gripping the internal bore 128 of the respective conduit 102.

Rotatably mounted in opposed side wall portions of the semi-circular in cross section portion 116 is a cable guide roller 130. This roller 130 is a conventional cable guide roller mounted on an axle 132, which extends through opposite sides of extended portions of the semi-circular in cross section portion 116.

The semi-circular in cross section portion 118 of the guide 114 is provided with a curved flared portion 134,

thereby providing a substantially gradual curved entrance to the open end of the conduit **102** when a cable is disposed in the guide **114** of the invention.

In operation the cable feed mechanism of the invention may function as follows. Initially, a fish cable in one of the conduits **104** is drawn therethrough in the direction of an arrow A in FIGURE 1 of the drawings over the pulleys **112** of the assembly **68** and upwardly over the pulley **48** to a power winch. The fish cable **50** is thus drawn in the direction of the arrow A to pull a high tension winch cable through the conduit **108** and upwardly over the sheave assembly **68** and the sheave **48**. When the fish cable is completely withdrawn and an end of the high tension winch cable is pulled over the pulley **48**, a multi-conductor telephone cable or other cable may be attached to the high tension winch cable and fed down through the greased funnel **52** and the sleeve **34**. At such time the multi-conductor telephone cable is fed from a reel directly over the sleeve **34** or in close proximity thereto, so that grease may be put into the funnel **52** and caused to feed over the surface of the multi-conductor telephone cable as it passes downwardly in a direction of an arrow B in FIGURE 1 of the drawings, and through a respective conduit **102** in the direction of the arrow B. During this phase of the operation the high tension winch cable is pulled by a winch communicating with an opposite end of the conduit **102**. The high tension winch cable, thus pulling the multi-conductor telephone cable in the direction of the arrow B through the respective conduit **102** thus to finally accomplish the disposition of a multi-conductor telephone cable in the conduit **102** so that it may be disposed to function as communication equipment.

The cable feed mechanism of the present invention thus serves dual purposes in that it provides means for guiding the fish cable to a power winch for pulling a high tension winch cable through an underground conduit **102**, and upwardly over the pulley **48**, and then it also provides means for feeding a multi-conductor telephone cable downwardly and inwardly through the conduit **102** when pulled by a high tension winch cable connected to a winch at the opposite end of the respective conduit **102**.

During all of these operations tension of the cable **50**, whether it be a fish cable, high tension winch cable, or multi-conductor telephone cable, is guided by the sheave **48**, the sheave rollers **112**, and the sheave **130** together with the cable guide **114**.

In some instances the assembly **68** may be adjusted so that the cable **130** is not heavily loaded, however, loading of the assembly **68** such that it is in a certain elevation may cause the cable **52** to load the sheave **130**.

It will be obvious to those skilled in the art that various modifications of the present invention may be resorted to in a manner limited only by a just interpretation of the following claims.

I claim.

1. In a cable feed mechanism the combination of: a trolley bar; a trolley freely movably supported on said bar; means for securing said trolley bar to a manhole ring; a cable guide secured to said trolley for feeding cable in a substantially vertical alignment; an assembly of sheaves suspended from said trolley and below said cable guide, said assembly of sheaves being arranged in a substantially arcuate disposition relative to each other; means for laterally supporting and flexibly anchoring said assembly in suspended relation below said trolley whereby the lowermost of said sheaves may hold a cable substantially in alignment with a substantially horizontally disposed underground conduit; and means rollably and movably mounting said trolley on said trolley bar to traverse said trolley bar in a direction laterally of a manhole for automatic alignment of a cable under tension passing downwardly through the manhole.

2. In a cable feed mechanism the combination of: a trolley bar; a trolley freely movably supported on said bar; means for securing said trolley bar to a manhole ring; a cable guide secured to said trolley for feeding cable in a substantially vertical alignment; an assembly of sheaves suspended from said trolley and below said cable guide, said assembly of sheaves being arranged in a substantially arcuate disposition relative to each other; means for laterally supporting and flexibly anchoring said assembly in suspended relation below said trolley whereby the lowermost of said sheaves may hold a cable substantially in alignment with a substantially horizontally disposed underground conduit; said first mentioned cable guide comprising a pivoted pulley pivoted on a vertical axis and having a hollow sleeve rotatably mounted in said cable guide on a vertical axis; and means rollably and movably mounting said trolley on said trolley bar to traverse said trolley bar in a direction laterally of a manhole for automatic alignment of a cable under tension extending through said manhole.

3. In a cable feed mechanism the combination of: a trolley bar; means for securing said trolley bar to a manhole ring; a cable guide secured to said trolley bar for feeding cable in a substantially vertical alignment; an assembly of sheaves suspended from said trolley and below said cable guide, said assembly of sheaves being arranged in a substantially arcuate disposition relative to each other; means for laterally supporting and flexibly anchoring said assembly in suspended relation below said trolley whereby the lowermost of said sheaves may hold a cable substantially in alignment with a substantially horizontally disposed underground conduit; a second cable guide adapted to be inserted in an underground conduit substantially in alignment with said lowermost sheave of said assembly, said guide having a pair of pivotally connected semi-circular in cross section portions; and means for expanding said portions relative to each other for gripping the internal bore of the conduit.

4. In a cable feed mechanism the combination of: a trolley bar; means for securing said trolley bar to a manhole ring; a cable guide secured to said trolley bar for feeding cable in a substantially vertical alignment; an assembly of sheaves suspended from said trolley and below said cable guide, said assembly of sheaves being arranged in a substantially arcuate disposition relative to each other; means for laterally supporting and flexibly anchoring said assembly in suspended relation below said trolley whereby the lowermost of said sheaves may hold a cable substantially in alignment with a substantially horizontally disposed underground conduit; a second cable guide adapted to be inserted in an underground conduit substantially in alignment with said lowermost sheave of said assembly, said guide having a pair of pivotally connected semi-circular in cross section portions; and means for expanding said portions relative to each other for gripping the internal bore of the conduit; said last mentioned guide having a rotatable sheave in connection therewith and disposed to be outward of an open end of an underground conduit.

5. In a cable feed mechanism the combination of: a trolley bar; means for securing said trolley bar to a manhole ring; a cable guide secured to said trolley bar for feeding cable in a substantially vertical alignment; an assembly of sheaves suspended from said trolley and below said cable guide, said assembly of sheaves being arranged in a substantially arcuate disposition relative to each other; means for laterally supporting and flexibly anchoring said assembly in suspended relation below said trolley whereby the lowermost of said sheaves may hold a cable substantially in alignment with a substantially horizontally disposed underground conduit; an expanding guide adapted to be disposed in an underground conduit adjacent an open end thereof and in substantial alignment with said lowermost sheave of said assembly, said expanding guide having flared portions adapted to provide a smooth entrance for cable being fed into an underground conduit.

6. In a cable feed mechanism the combination of: a

trolley bar; means for securing said trolley bar to a manhole ring; a cable guide secured to said trolley bar for feeding cable in a substantially vertical alignment; an assembly of sheaves suspended from said trolley and below said cable guide, said assembly of sheaves being arranged in a substantially arcuate disposition relative to each other; means for laterally supporting and flexibly anchoring said assembly in suspended relation below said trolley whereby the lowermost of said sheaves may hold a cable substantially in alignment with a substantially horizontally disposed underground conduit; said sheave assembly composed of a plurality of pairs of spaced plates, bushings disposed between said pairs; opposite edges of said pairs in overlapped relationship with each other; slided portions of said plates in which bolts extend therethrough to provide adjustment of said plates relative to each other permitting said plates to be angularly adjusted relative to each other; said sheaves rotatably mounted between said plates; plates at opposite ends of said assembly of pairs of plates connected together; and means adjustably holding said plates at opposite ends of said assembly to maintain adjustment of said plurality of sheaves in an arcuate disposition relative to each other.

7. In a cable feed mechanism the combination of: a plurality of pairs of plates, each pair of plates having bolts extending therethrough in spaced relationship to each other, sleeves surrounding said bolts and disposed between each of said pairs of plates, thereby holding them in spaced relationship to each other; said pairs of plates disposed in overlapping relationship to each other and pivoted on said bolts adjacent first edges of said pairs of plates; slotted openings extending through said plates at said overlapping portions of said pairs of plates, some of said bolts extending through said slotted openings whereby the plates are pivotally mounted and connected together by said bolts adjacent said first edges of said pairs of plates and are slidably and movably adjustable relative to each other by slidable movement of said bolts in said slotted openings of said plates so that said plurality of said pairs of plates may be relatively adjusted about said bolts at said slotted openings to accomplish a substantially arcuate assembly of said pairs of plates; and cable guide sheaves mounted between said pairs of plates and capable of being arranged in an arcuate row relative to each other for guiding cable thereover.

8. In a cable feed mechanism the combination of: a trolley bar; means for securing said trolley bar to a manhole ring; a cable guide secured to said trolley bar for feeding cable in a substantially vertical alignment; an assembly of sheaves suspended from said trolley and below said cable guide, said assembly of sheaves being arranged in a substantially arcuate disposition relative to each other; means for laterally supporting and flexibly anchoring said assembly in suspended relation below said trolley whereby the lowermost of said sheaves may hold a cable substantially in alignment with a substantially horizontally disposed underground conduit; channel fixtures supporting said trolley bar and disposed to engage a manhole ring, said channel members having legs disposed and directed toward opposite ends of said trolley bar; one of said channel members adjustably fixed on said trolley bar and slidable longitudinally thereof to permit installation and removal of said trolley bar relative to a manhole ring.

9. In a cable feed mechanism the combination of: a trolley bar; means for securing said trolley bar to a manhole ring; a cable guide secured to said trolley bar for feeding cable in a substantially vertical alignment; an assembly of sheaves suspended from said trolley and below said cable guide, said assembly of sheaves being arranged in a substantially arcuate disposition relative to each other; means for laterally supporting and flexibly anchoring said assembly in suspended relation below said trolley whereby the lowermost of said sheaves may hold a cable substantially in alignment with a substantially horizontally disposed underground conduit; a greasing funnel disposed in said first mentioned cable guide and disposed to contain grease surrounding a cable moving through said guide for lubricating the same before the cable passes over said sheave assembly.

10. In a cable guide mechanism the combination of: a plurality of pairs of plates, each pair of plates having bolts extending therethrough in spaced relation to each other, thereby holding them in spaced relation to each other; said pairs of plates disposed in overlapping relationship to each other and pivoted on said bolts adjacent first edges of said pairs of plates; slotted openings extending through said plates at said overlapping portions of said pairs of plates, some of said bolts extending through said slotted openings whereby said plates are pivotally mounted and connected together by said bolts adjacent said first edges of said pairs of plates and are slidably and movably adjustable relative to each other by slidable movement of said bolts in said slotted openings of said plates so that said plurality of pairs of plates may be relatively adjusted about said bolts at said slotted openings to accomplish a substantially arcuate assembly of said pairs of plates; and cable guide sheaves rotatably mounted between said pairs of plates and capable of being arranged in an arcuate row relative to each other for guiding cable thereon.

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