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[54] POLE GUIDE

15 Claims, 6 Drawing Figs.

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 212/55, 214/141, 214/147 AS

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 11, 3, 141, 147 AS; 212/55 R

[56]

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ABSTRACT: A pole guide is used on a beam assembly having a fixed beam, an extension, and a pullout extension telescopically mounted with respect to one another. The pole guide is mounted on the extension adjacent its upper end, and includes tongs adapted to clamp and hold a pole. The pullout extension includes on its upper end a sheave which is movable from a retracted position wherein it is adjacent the pole guide to an extended position wherein it is spaced from the pole guide.

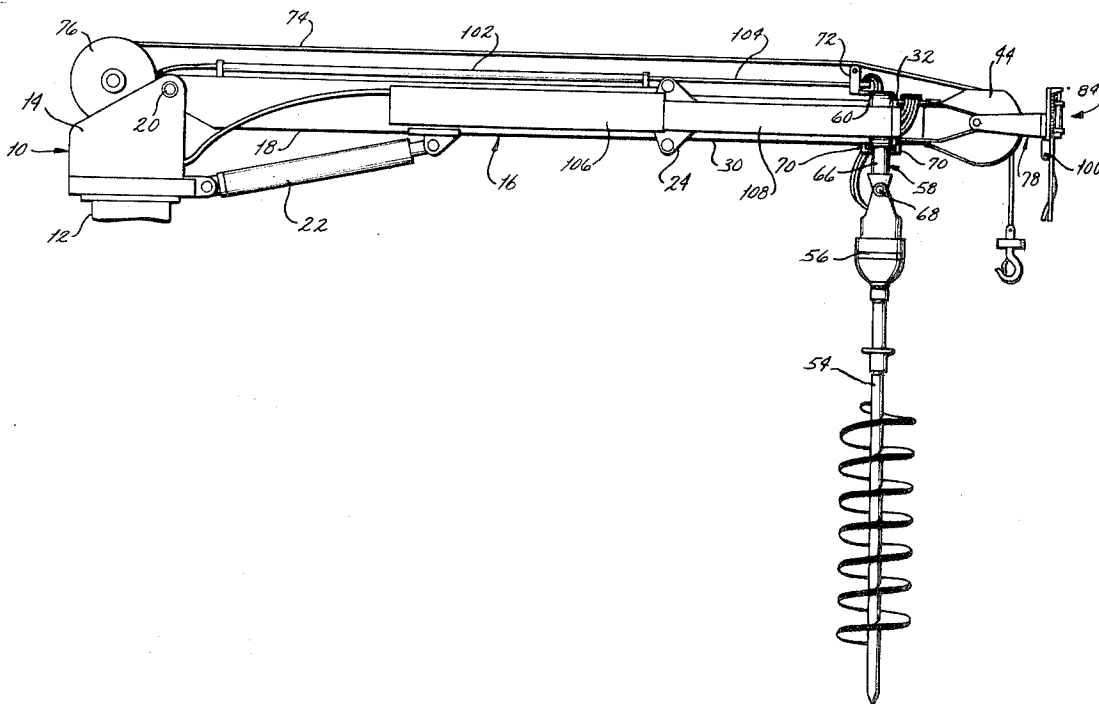


FIG. 2

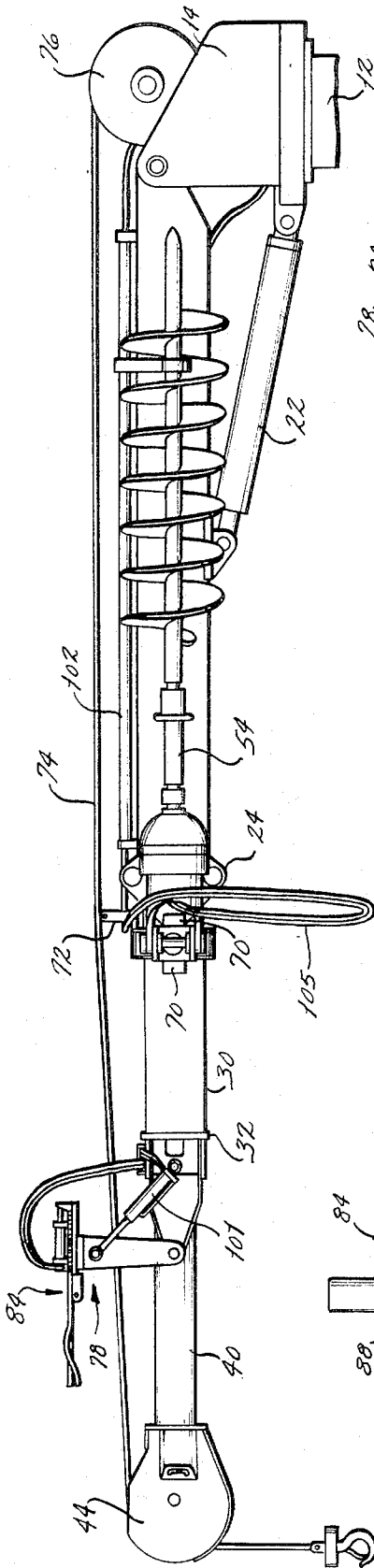


FIG. 3

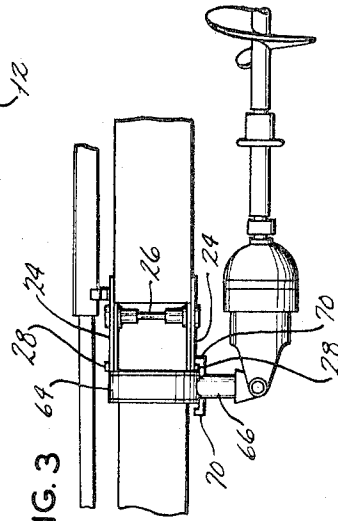
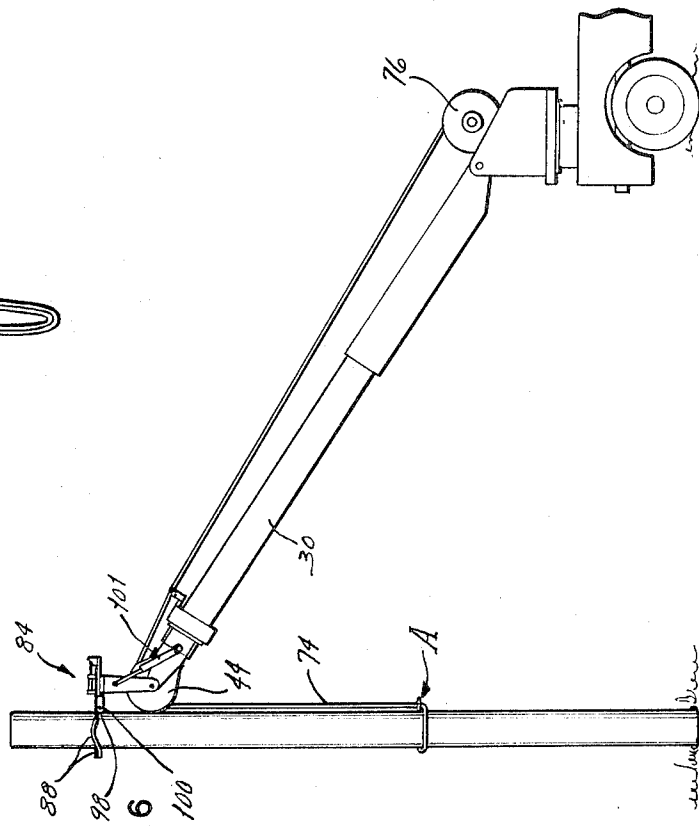


FIG. 6



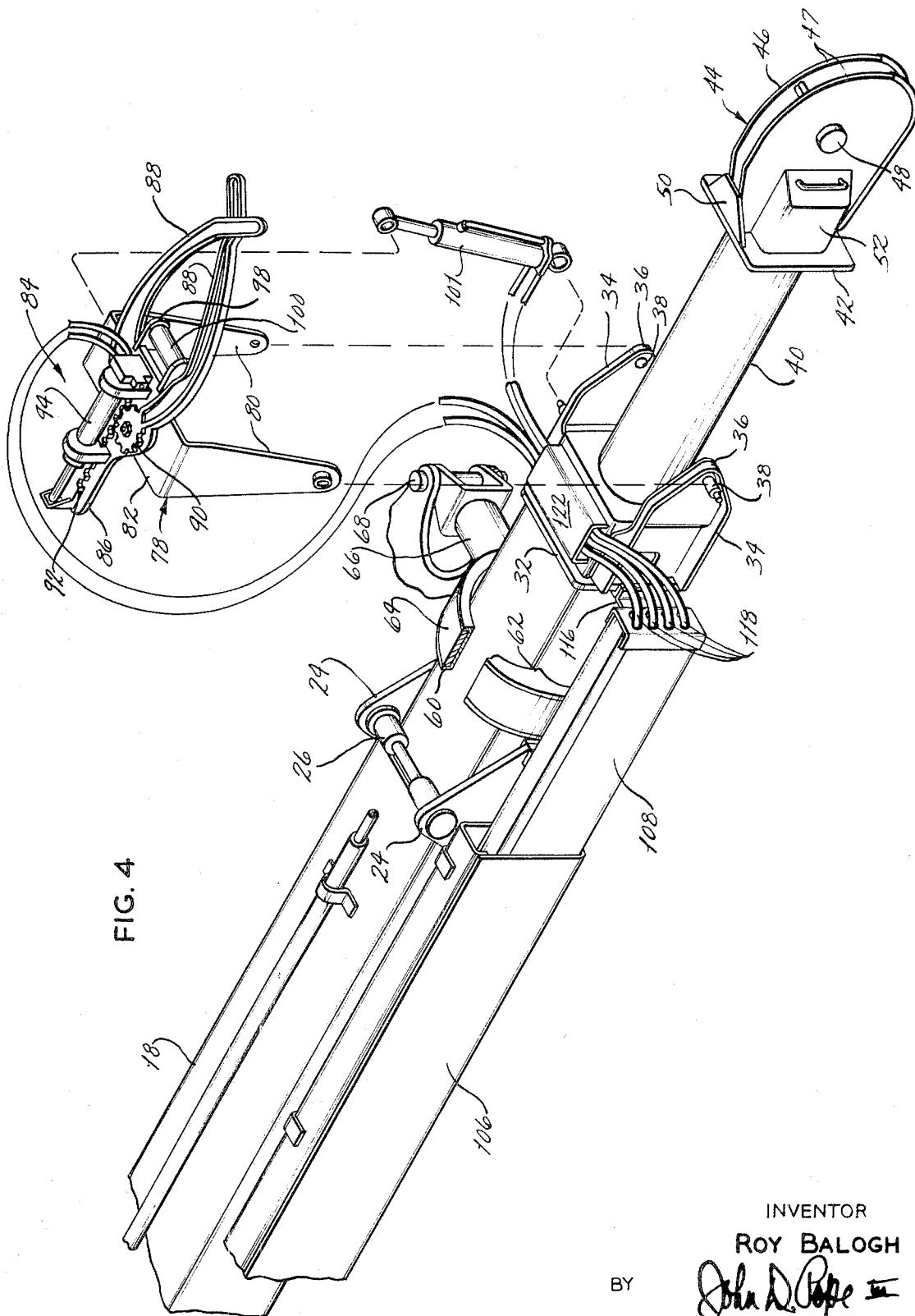
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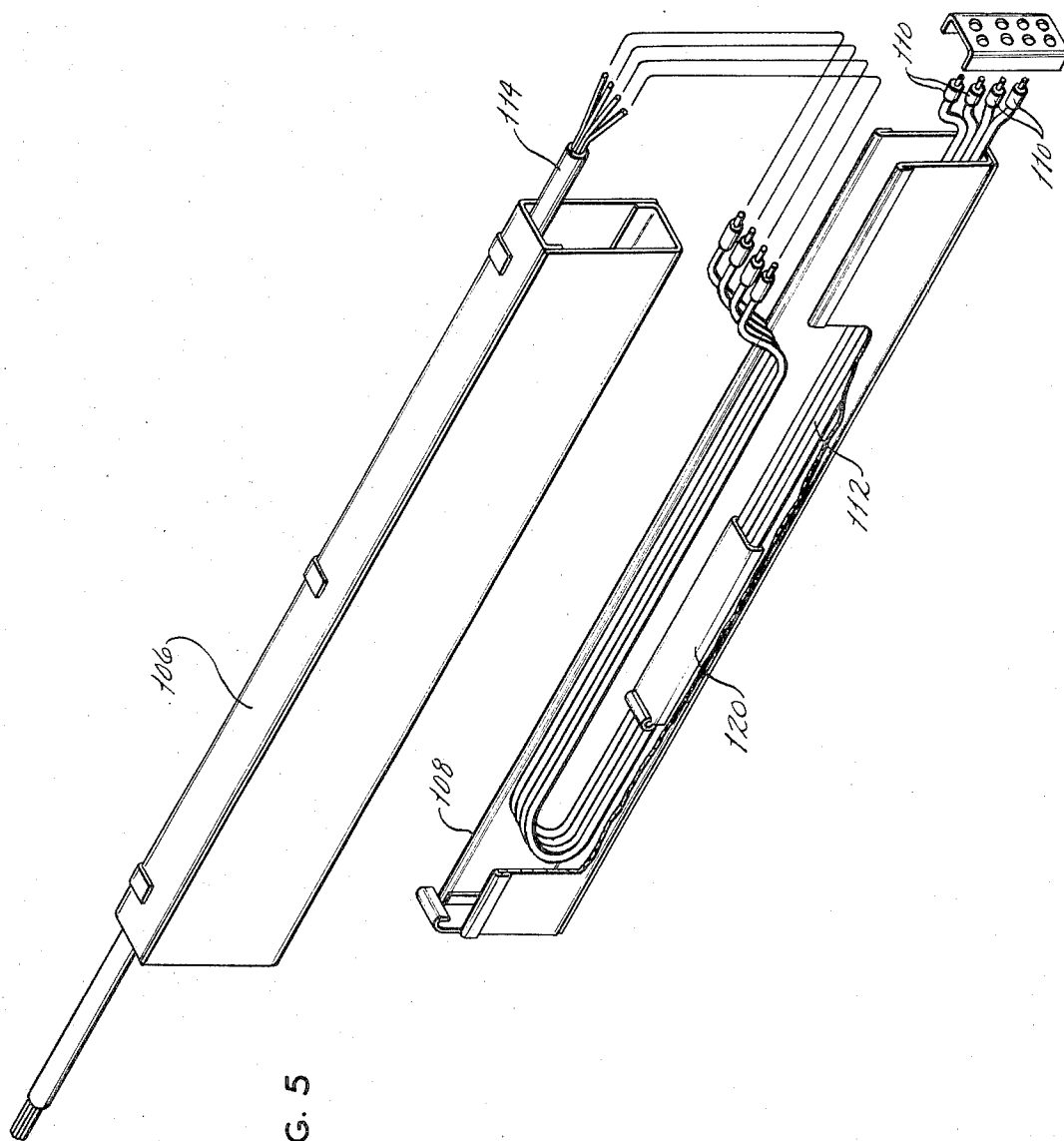


FIG. 5

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POLE GUIDE

This invention relates to derricks and more specifically to a pole guide mounted on a derrick for steadying poles while they are being set in the ground.

Utility companies often use mobile derricks while erecting and working on telephone and electric lines. One type of derrick used for this purpose includes a plurality of beams telescopically mounted with respect to one another. This telescopic beam assembly includes a bottom member, a middle member, and an upper member which are sometimes referred to as the fixed beam, the extension, and the pullout extension, respectively. Mounted on the beam assembly for use therewith are an auger for digging holes in the ground, a cable and sheave for lifting miscellaneous objects, and a pole guide for steadying poles while they are being set in the ground.

In derricks presently used, the sheave and the pole guide are mounted on the extreme upper end of the extension pullout. The pole guide is located adjacent the sheave so that it will be in the proper position for steadying the pole during the pole-setting operation. The sheave and cable support the weight of the pole, and the pole guide loosely embraces and steadies the pole while it is being set. The fact that the pole guide is mounted on the extension pullout creates difficulties during the performance of other operations however. An example of such an operation is the hoisting of a transformer to the top of a pole. Because transformers are usually bulky, it is desirable to move the sheave away from the pole guide so that the pole guide will not interfere with the hoisting operation. In present derricks the sheave cannot be moved away from the pole guide.

The sheave is often used in the vicinity of live conductors, and because of this the pullout extension is sometimes constructed of an insulative material, thereby insulating the sheave from the lower part of the beam assembly. The pole guide is connected to hydraulic lines leading from the base of the beam assembly, and these lines create a line of electrical conduction between the pole guide and the ground. Because it is adjacent the sheave and is not well insulated from the ground, the pole guide creates a safety hazard when the sheave is used in the vicinity of live conductors.

Another disadvantage of having the pole guide on the upper end of the pullout extension is that hydraulic conduits must be provided for delivering hydraulic fluid to the pole guide whenever the pullout extension moves. These conduits make the derrick more expensive to manufacture and add to its weight.

The pole guide of this invention is mounted on the upper end of the extension, and the sheave is mounted on the upper end of the pullout extension. When the pullout extension is retracted, the sheave is adjacent the pole guide. In this position the sheave and the pole guide can cooperate for setting poles. The sheave and cable lift and hold the pole, and the pole guide loosely embraces and steadies it. For operations which require only the use of the sheave, however, the pullout extension with the sheave thereon may be extended independently of the pole guide so that the sheave is spaced from the pole guide.

Hydraulic conduits lead from the base of the beam assembly to the pole guide, and they include means which are adapted to extend in unison with the middle beam. However, since the pole guide does not extend with the pullout extension, the hydraulic conduits need not be as long or as heavy as in previous devices.

Among the several objects of the present invention may be noted the provision of a pole guide mounted on a derrick which supports a sheave, the sheave being movable from a position adjacent the pole guide to a position spaced from the pole guide; the provision of a pole guide which can swing around the outer arcuate surface of the sheave when the sheave is in its retracted position; the provision of a pole guide which pivots about an axis which is approximately coincident with the center of curvature of the sheave; the provision of a pole guide which is mounted on a beam different from the beam carrying the sheave; the provision of a pole guide which

is mounted on the extension of the beam assembly, thereby eliminating need for delivering hydraulic fluid to the upper end of the pullout extension; the provision of a pole guide having hydraulic conduits which extend in unison with the extension of the beam assembly; the provision of a pole guide having hydraulic conduits which can be shorter and lighter in weight than in previous devices; and the provision of a pole guide which is economical to manufacture and durable in use. Other objects and features will be in part apparent and in part pointed out hereinafter.

The invention accordingly comprises the constructions hereinafter described, the scope of the invention being indicated in the following claims.

In the accompanying drawings, in which one of various possible embodiments of the invention is illustrated,

FIG. 1 is an elevational view of a beam assembly having the pole guide mounted thereon;

FIG. 2 is an elevational view of the opposite side of the beam assembly illustrated in FIG. 1;

FIG. 3 is a partial top view of the beam assembly illustrated in FIG. 2;

FIG. 4 is an exploded isometric view of the pole guide of this invention;

FIG. 5 is an isometric view, partially cut away, of the means for extending the hydraulic lines during extension of the pole guide; and

FIG. 6 is an elevational view illustrating the use of the pole guide to steady a pole.

Corresponding reference characters indicate corresponding parts throughout the several views of the drawings.

Numerals 10 designates a derrick including a mast 12, a turret 14, and a beam assembly 16. Beam assembly 16 includes a lower or fixed beam 18 which is pivotally mounted to turret 14 about a hinge 20. A hydraulic cylinder 22 is pivotally mounted at its opposite ends to turret 14 and lower beam 18 so that extension and retraction of cylinder 22 causes lower beam 18 to swing about its horizontal axis at hinge 20. Mounted on the opposite lateral sides of the extreme upper end of lower beam 18 are two triangular side plates 24. Extending between sideplates 24 are two roller bearings 26 (FIG. 4) which roll about a horizontal axis. Extending outwardly from the outer side of one of the sideplates 24 is a lip 28 (FIG. 3).

Lower beam 18 is hollow and telescopically receives a middle beam or extension 30 which rolls on roller bearings 26 as it slides in and out of lower beam 18. The upper end of middle beam 30 is provided with a flange 32. Mounted on opposite sides of the extreme upper end of middle beam 30 are a pair of ear plates 34 which extend beyond the extreme upper end of middle beam 30 and terminate at triangular points 36. A pair of outwardly extending hinge pins 38 are provided on the outwardly presented surfaces of points 36.

An upper beam or pullout extension 40 is telescopically mounted for slidable extension and retraction within middle beam 30. A rectangular flange 42 is mounted on the extreme upper end of upper beam 40 and is adapted to engage the extreme upper end of middle beam 30 when upper beam 40 is in its retracted position. A sheave 44 is mounted to flange 42 at the extreme upper end of upper beam 40. Sheave 44 includes two parallel plates 46 which embrace a pulley (not shown) for rotation about an axle 48. Each plate 46 has a substantially circular edge 47 facing axially outwardly from the end of upper beam 40. Sheave 44 is rigidly secured to upper beam 40 by a gusset 50 and by a pair of side supports 52 mounted on opposite sides of plates 46. When upper beam 40 is in its retracted position, sheave 44 is embraced on its opposite sides by ear plates 34 of middle beam 30. In this position, hinge pins 38 coincide approximately with the center of curvature of circular edges 47. Hinge pins 38 and axle 48 also lie on approximately the same line when upper beam 40 is in its retracted position.

An auger 54 includes a hydraulic or pneumatically controlled drive motor 56 which is pivotally connected to a transfer mechanism 58 slidably mounted upon middle beam

30. Transfer mechanism 58 includes a circular collar guide 60 which surrounds and is slidably mounted on middle beam 30. Collar guide 60 includes inward protrusions 62 (FIG. 4) which embrace the lateral sides of middle beam 30 so as to prevent rotational movement of collar guide 60. A circular collar 64 is slidably mounted around the outside of collar guide 60 and is adapted to rotate freely thereon. A stem 66 extends radially outwardly from collar 64. Auger 54 is hinged to the extreme end of stem 66 by means of a pin 68. On opposite sides of the base of stem 66 are a pair of U-shaped fingers 70.

Referring to FIGS. 2 and 3, auger 54 is stored and carried alongside beam assembly 16 with collar 64 positioned so that stem 66 protrudes horizontally outwardly from one of the lateral sides of beam assembly 16. In this position the right-hand finger 70 (FIG. 3) hooks over lip 28 on sideplate 24 of lower beam 18, thereby preventing collar guide 60 from sliding axially away from the upper end of lower beam 18. To prepare the auger for operation, collar 64 is rotated 90° so that stem 66 protrudes downwardly from beam assembly 16. If this rotation is done when middle beam 30 is in its retracted position, the right-hand finger 70 (FIG. 1) will hook over flange 32 at the extreme upper end of middle beam 30. When middle beam 30 is extended as shown in FIG. 1, it carries transfer mechanism 58 and auger 54 with it. Thus transfer mechanism 58 provides means for connecting auger 54 alternatively to lower beam 18 or middle beam 30. Also rigidly connected to collar guide 60 and extending upwardly therefrom is a cable roller 72. A cable 74 is wound around a reel 76 at the base of beam assembly 16 and extends upwardly over cable roller 72 and sheave 44. Cable roller 72 supports cable 74 above beam assembly 16 to prevent its entanglement with any of the moving parts thereof.

A pole guide bracket 78 is mounted at the extreme upper end of middle beam 30 and includes two legs 80 and a top member 82 (FIG. 4). The extreme lower ends of legs 80 are hinged to pins 38 of ear plates 34 so that bracket 78 will swing about a horizontal axis. A pole guide 84 is mounted on top member 82 and includes a baseplate 86 rigidly secured thereto. A pair of tongs 88 include cogwheels 90 integrally formed at one of their ends. Cogwheels 90 are pivotally mounted to baseplate 86 so that tongs 88 swing towards one another in pincerlike fashion. Tongs 88 are slightly arcuate in shape and their tips cross when they are swung towards one another. Slidably mounted on baseplate 86 is a cog bar 92 which extends between cogwheels 90 and which includes cogs on its lateral edges engaging the cogs of cogwheels 90. Longitudinal movement of cog bar 92 causes cogwheels 90 to rotate in opposite directions so that tongs 88 will open and close. Rigidly mounted to baseplate 86 is a hydraulic cylinder 94 which is secured to cog bar 92 so that its extension and retraction will cause longitudinal movement of cog bar 92. Thus cylinder 94 controls the opening and closing of tongs 88. Mounted to baseplate 86 between tongs 88 is a pole brace 98 which includes a roller 100. Roller 100 is adapted to bear against the side of a pole when the pole is positioned between tongs 88.

When upper beam 40 is retracted with respect to middle beam 30 (FIG. 1) sheave 44 is embraced by ear plates 34 of middle beam 30. Hinge pins 38 coincide approximately with the center of curvature of edges 47 of plates 46. Because of this arrangement pole guide 84 swings in a circular path which is substantially concentric to the curvature of edges 47. The distance between roller 100 and edges 47 of plates 46 remains substantially constant as pole guide 84 pivots on pins 38. A hydraulic cylinder 101 is pivotally connected at one of its ends to middle beam 30 (FIG. 2) and at the other of its ends to the extreme upper end of pole guide bracket 78 so that expansion and retraction of cylinder 101 will swing bracket 78 about pins 38.

For the pole-setting operation, upper beam 40 is moved to its retracted position. Cable 74 is looped around the pole at its center of balance. Reel 76 is actuated to cause cable 74 to lift the pole while the workmen steady it. As the pole is lifted, the

workmen tilt it to a vertical position about the fulcrum designated at point A (FIG. 6) which is the point where cable 74 is secured to the pole. In this position sheave 44 and pole guide 84 are adjacent the upper end of the pole, and pole guide 84 is positioned so that tongs 88 are approximately horizontal. The pole abuts against roller 100 and is loosely embraced by tongs 88, but its weight is borne substantially by cable 74. Pole guide 84 keeps the pole in a vertical position while the cable raises or lowers the pole. As the pole is raised or lowered it rolls against roller 100.

In order for the pole to be held in a vertical position it is necessary for roller 100 to be in vertical alignment with point A. In absence of this alignment the pole will tilt. The weight of the pole causes cable 74 to tend to remain vertical, thereby causing point A to be located directly below the leading edge of sheave 44. Roller 100 is positioned on pole guide 84 so that it is held in vertical alignment above the leading edge of sheave 44 whenever tongs 88 of pole guide 84 are horizontally disposed. As long as tongs 88 are horizontally disposed, roller 100 will be held directly above the leading edge of sheave 44 even though the angular disposition of beam assembly 16 may vary. This is true because pole guide 84 and roller 100 swing about an axis approximately coincident with the center of curvature of edges 47. Thus, movement of tongs 88 to their horizontal position causes roller 100 to be vertically aligned above the leading edge of sheave 44 and consequently above point A. This vertical alignment causes the pole to be held in a substantially vertical position.

If an occasion arises where it is advantageous to use the sheave independently of the pole guide, pole guide 84 is swung to its upper position (FIG. 2), thereby permitting the extension of upper beam 40 and sheave 44.

The hydraulic conduits for connection with auger 54 are provided by two telescoped conduits 102, 104, mounted on the top of lower beam 18. Conduit 104 is rigidly secured to collar guide 60 so that it will extend and retract in unison with collar guide 60 and auger 54. Hydraulic lines 105 connect the end of conduit 104 with auger 54.

The system for delivering hydraulic fluid to pole guide 84 includes a case 106 rigidly secured to the lateral side of lower beam 18, and an extensible slide 108 telescopically mounted in case 106. Referring to FIG. 5, slide 108 is U-shaped in cross section and includes a plurality of hydraulic connections 110 at one of its ends. Extending within slide 108 from hydraulic connections 110 are four hydraulic lines 112 which are doubled over once and which are connected to a multiline conduit 114 extending through case 106. When slide 108 is in its retracted position within case 106, hydraulic lines 112 are folded over as illustrated in FIG. 5. Extension of slide 108 from case 106 causes hydraulic lines 112 to unfold. A bracket 116 rigidly connects slide 108 to middle beam 30 so that extension of middle beam 30 from lower beam 18 causes extension of slide 108 from case 106. Leading from hydraulic connections 110 in slide 108 are four additional hydraulic lines 118 (FIG. 4) which are in connection with cylinders 94, 101. A holddown bracket 120 is provided within slide 108 to hold hydraulic lines 112 in position so that they do not become entangled, and likewise another holding bracket 122 is provided on the upper end of middle beam 30 to prevent the entanglement of hydraulic lines 118.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

I claim:

1. In combination first and second beams having inner and outer ends, said beams telescopically mounted with respect to one another, first work means including a pole guide mounted on the outer end of one of said beams, said pole guide including members adapted to embrace a pole, second work means including a sheave mounted on the outer end of the other said beam, said second beam being movable from a retracted position wherein the outer ends of said first and second beams are adjacent to an extended limit position wherein said outer ends

are spaced, the spacing between said outer ends substantially corresponding to the spacing between said work means.

2. The combination of claim 1 wherein said pole guide is mounted to said first beam.

3. The combination of claim 1 wherein said pole guide is movably mounted to said first beam.

4. The combination of claim 1 wherein third work means including drilling auger means are mounted on one of said beams.

5. The combination of claim 4 wherein said drilling auger means are pivotally mounted on said one of said beams for rotational movement thereon.

6. The combination of claim 4 wherein said drilling auger means includes a mounting portion on said one of said beams and an auger portion pivotally secured to said mounting portion such that said auger is pivotally movable toward and away from said one of said beams.

7. In combination first and second beams telescopically mounted with respect to one another and a pole guide mounted on said first beam adjacent its upper end, said pole guide including members adapted to loosely embrace a pole, said second beam being movable from a retracted position wherein its upper end is adjacent said pole guide to an extended position wherein its upper end is spaced from said pole guide, said pole guide being movably mounted to said first beam, and wherein said pole guide is movable to a position wherein it blocks the extension of said second beam when said second beam is in its retracted position.

8. In combination first and second beams telescopically mounted with respect to one another and a pole guide mounted on said first beam adjacent its upper end, said pole guide including members adapted to loosely embrace a pole, said second beam being movable from a retracted position wherein its upper end is adjacent said pole guide to an extended position wherein its upper end is spaced from said pole guide, and wherein a rotatable member is mounted on said second beam and said pole guide is pivotally mounted on said first beam, the pivotal axes of said rotatable member and said pole guide coinciding approximately when said second beam is in its retracted position.

9. In combination first and second beams telescopically mounted with respect to one another and a pole guide mounted on said first beam adjacent its upper end, said pole guide including members adapted to loosely embrace a pole, said second beam being movable from a retracted position wherein its upper end is adjacent said pole guide to an ex-

tended position wherein its upper end is spaced from said pole guide, and wherein a member having an arcuate surface is mounted on said upper end of said second beam, said pole guide being pivotally mounted about a pivotal axis which coincides approximately with the center of a circle defined by said arcuate surface when said second beam is in its retracted position.

10. In combination first and second beams telescopically mounted with respect to one another and a pole guide mounted on said first beam adjacent its upper end, said pole guide including members adapted to loosely embrace a pole, said second beam being movable from a retracted position wherein its upper end is adjacent said pole guide to an extended position wherein its upper end is spaced from said pole guide, and wherein said pole guide is mounted on two ears extending beyond the upper end of said first beam, said ears facing the lateral sides of the upper end of said second beam when said second beam is in its retracted position.

11. The combination of claim 10 wherein said pole guide is rigidly attached to a bracket and said bracket is pivotally connected to said ears.

12. In combination a fixed beam; an extension member adapted to extend from said fixed beam; a pullout extension adapted to extend from said extension member; and a pole guide mounted on said extension member and including movable members adapted to loosely embrace a pole.

13. The combination of claim 12 wherein hydraulic liners run from said fixed beam to said pole guide, retention means being provided for supporting said hydraulic lines, said retention means including a movable member secured to said extension member and a stationary member rigidly mounted to said fixed beam.

14. The combination of claim 13 wherein said movable member and said stationary member are telescopically mounted with respect to one another.

15. The combination of claim 12 wherein a sheave having a cable passing thereover is mounted on the upper end of said pullout extension, said cable extending over said sheave and having a vertically disposed portion extending downward therefrom; said pole guide being movably mounted on said extension for swinging movement about said sheave when said pullout extension is in its retracted position; said pole guide including a roller, the relative position of said roller and said movable members being such that said roller is aligned above said vertically disposed portion of said cable whenever said movable members are horizontally disposed.

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