

United States Patent

Millerbernd

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[54] HIGH LEVEL LIGHT PALE INCLUDING MEANS FOR LOWERING LIGHTS FOR SERVICING

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[52] U.S. Cl. **240/65, 248/320**

[51] Int. Cl. **F21v 21/36**

[58] Field of Search 240/3, 52, 63-71;
52/28, 40, 173, 300, 720, 721, 751, 111, 648;
248/320, 321, 322; 174/40, 43, 44, 45

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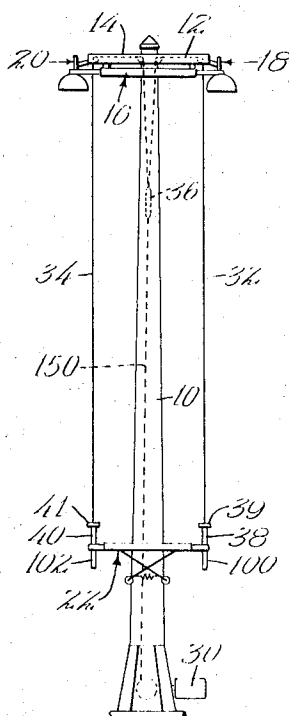
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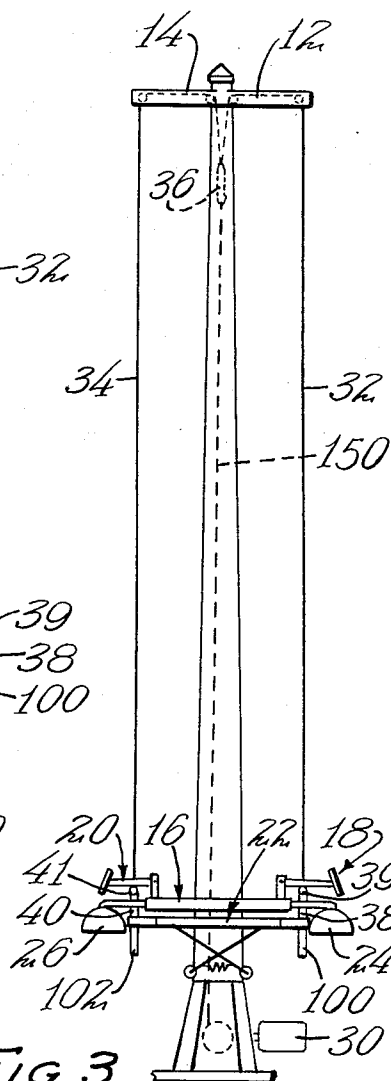
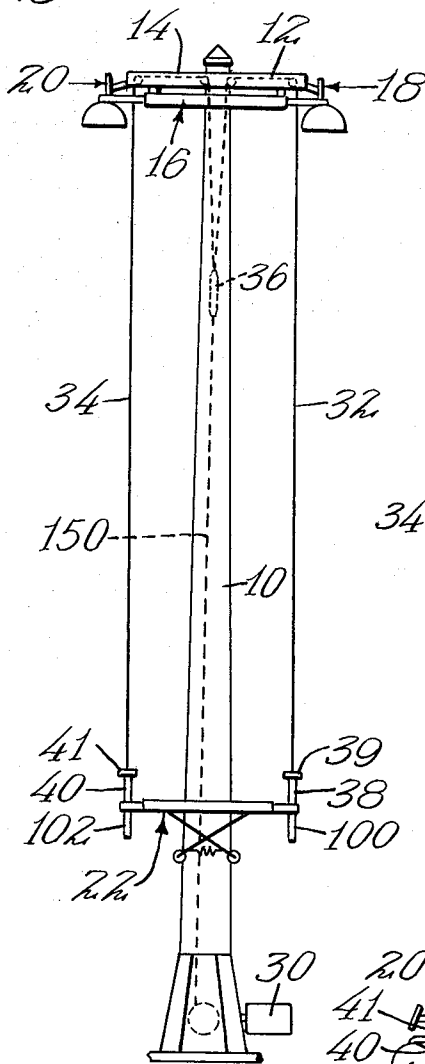
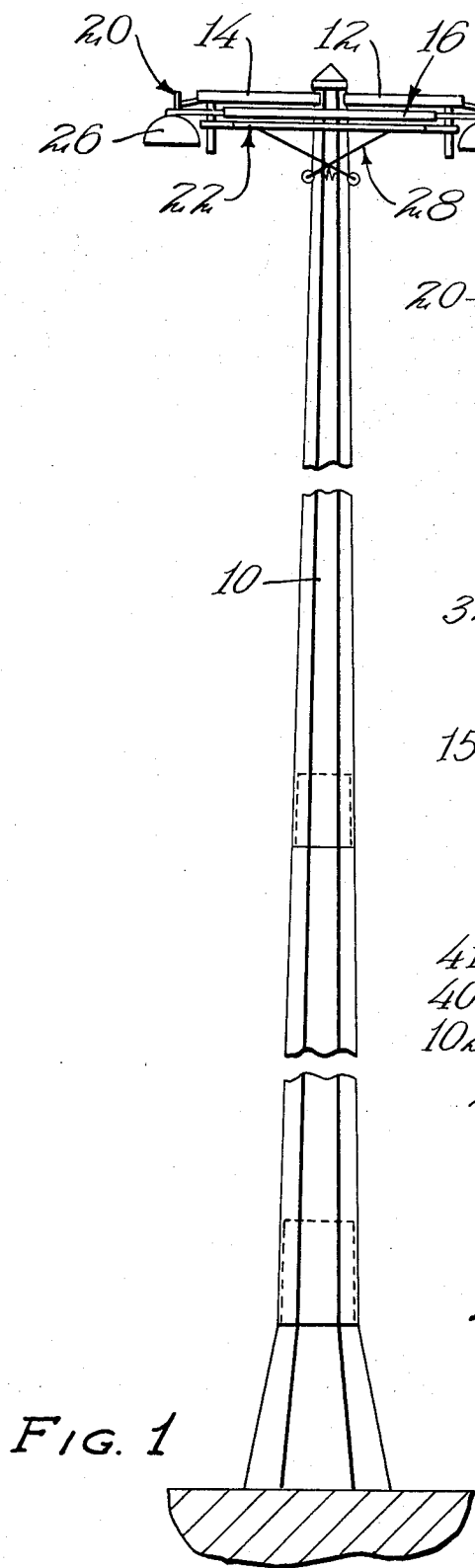
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[57] ABSTRACT

Apparatus to service an unusually high light pole is disclosed. The lights on the pole are supported by a ring having latches capable of engaging support members at the top of the pole. The lights are lowered by moving a retriever ring up the pole to disengage the latches and carry the support ring to the bottom. Motive power is supplied by an electric motor which is connected to the retriever ring by three steel cables traveling up the inside of the pole and over pulleys at the top of the pole.

9 Claims, 13 Drawing Figures





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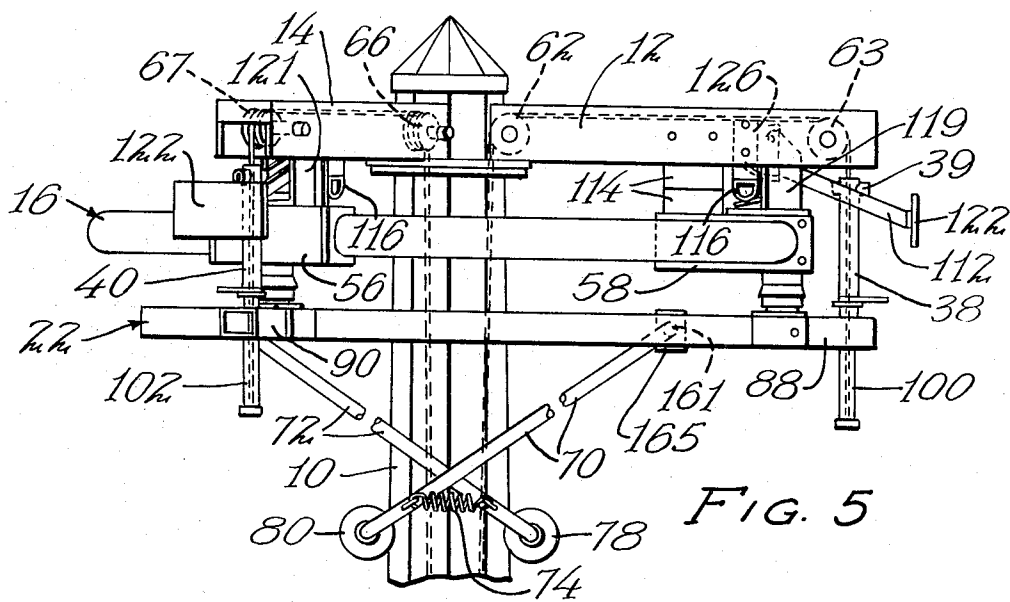


FIG. 5

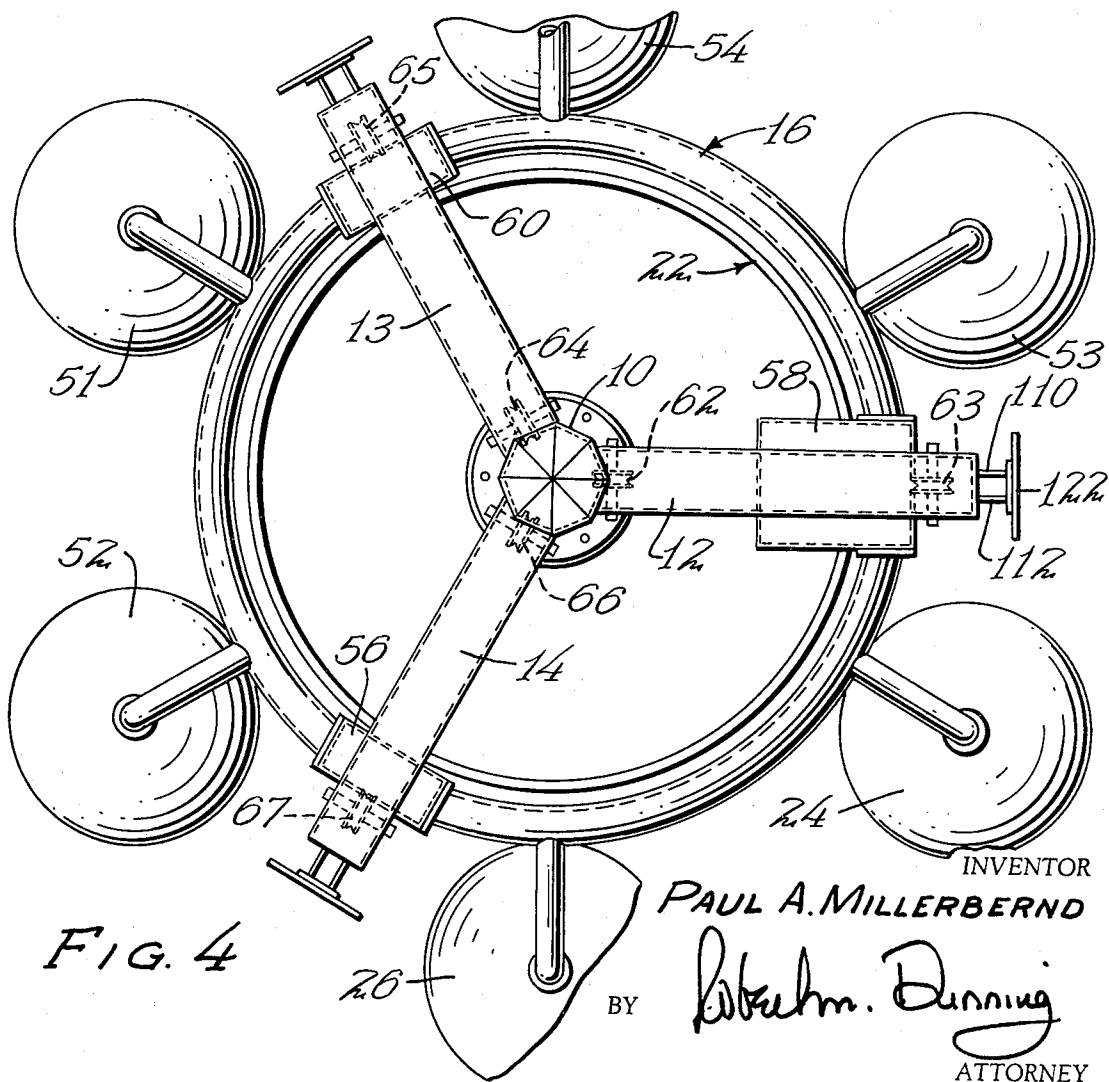


FIG. 4

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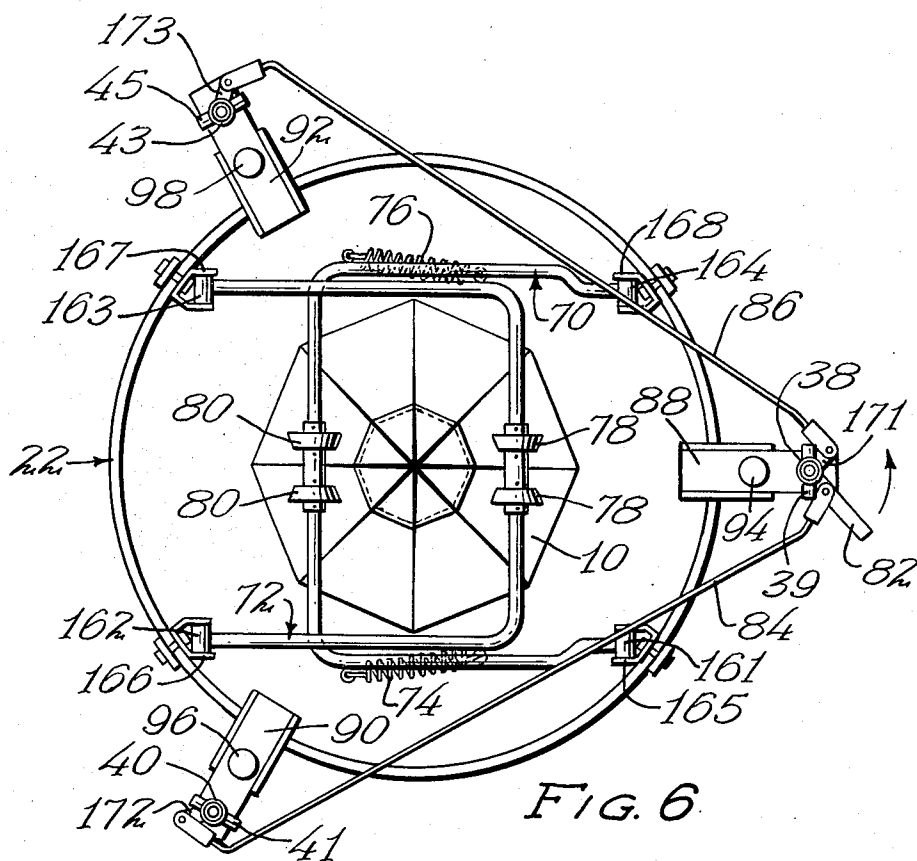


FIG. 6

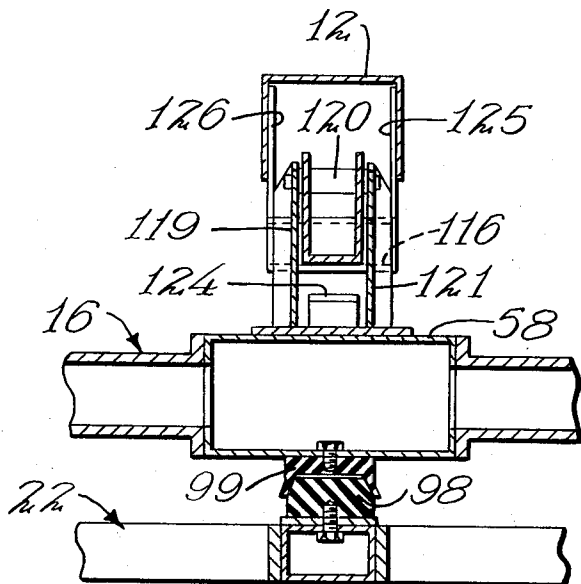
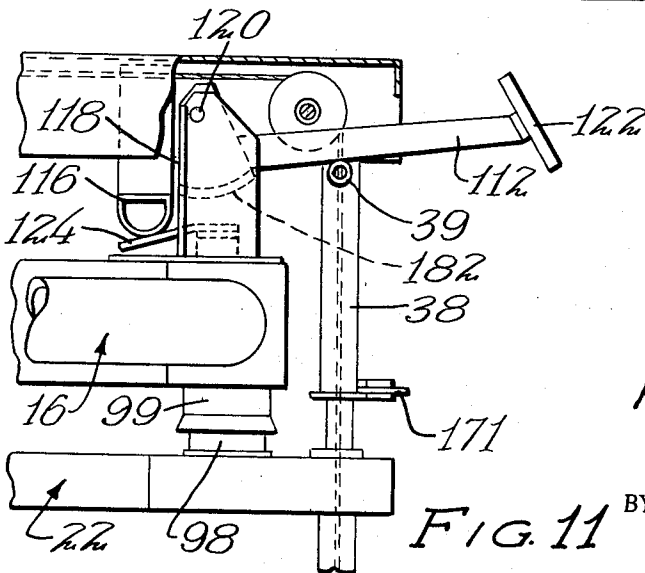
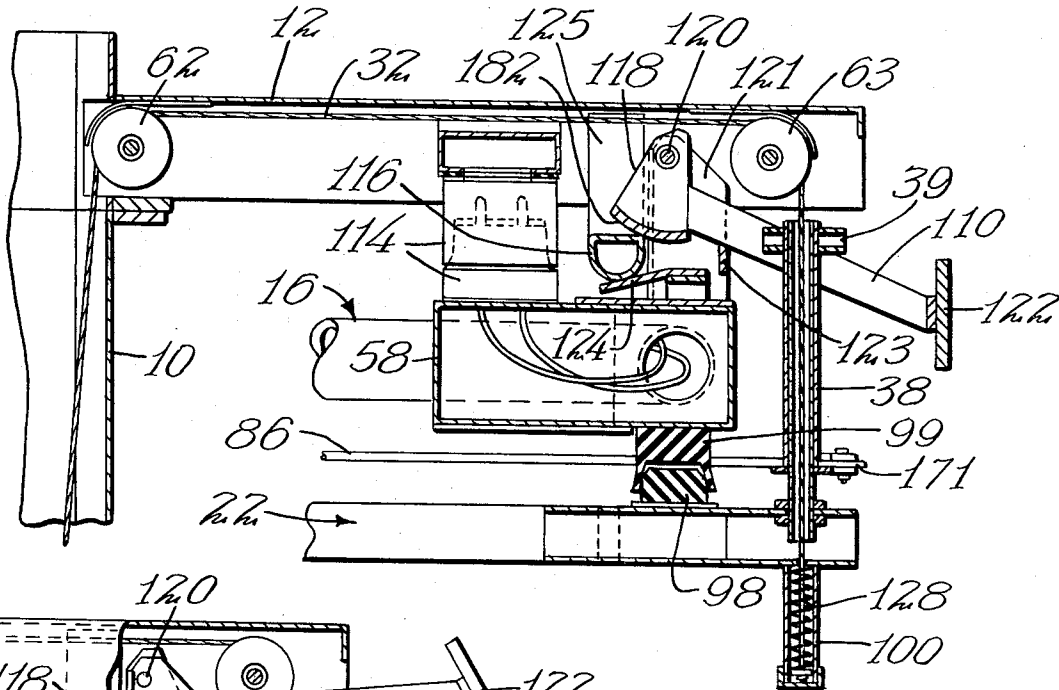
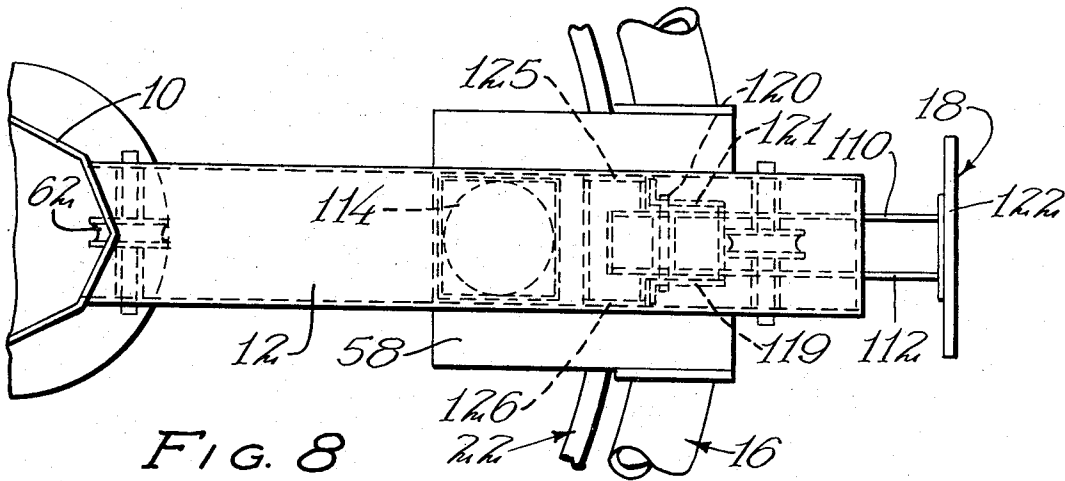


FIG. 13

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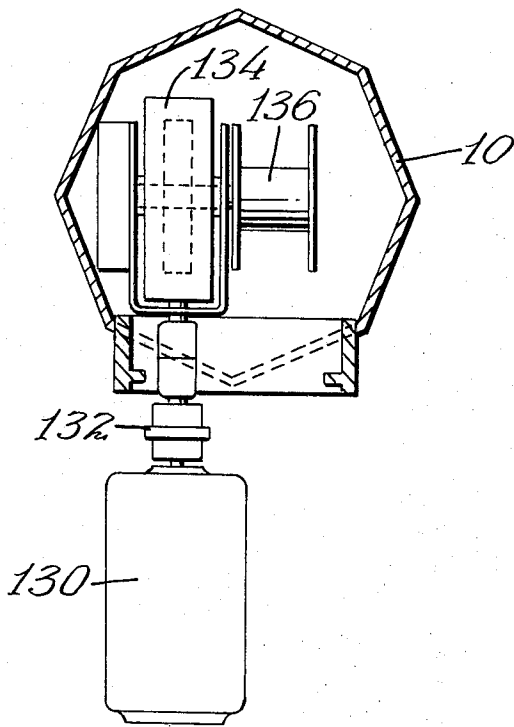


FIG. 9

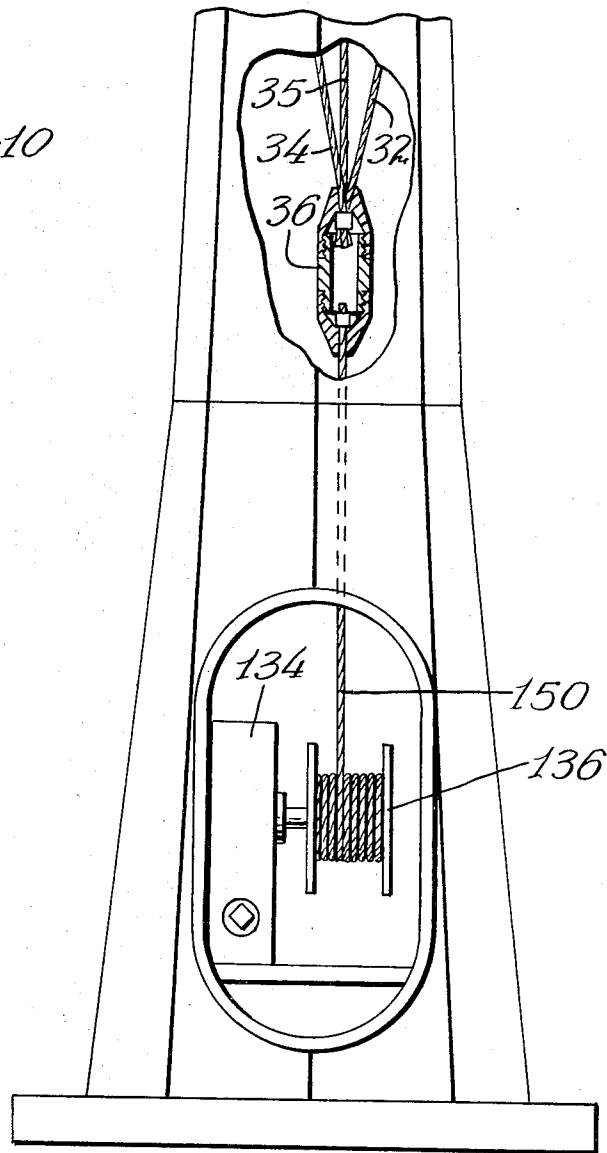


FIG. 10

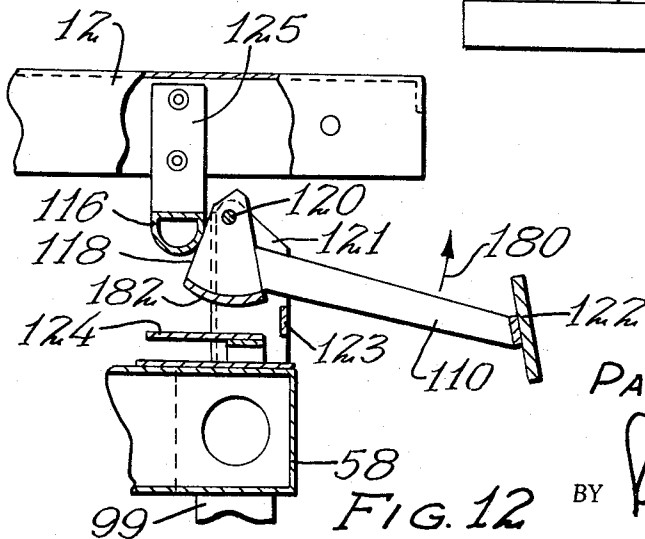


FIG. 12

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HIGH LEVEL LIGHT PALE INCLUDING MEANS FOR LOWERING LIGHTS FOR SERVICING

BACKGROUND OF THE INVENTION

In the lighting art poles are being made taller and taller so as to take advantage of more powerful lights and to light larger areas. In highway intersections, particularly, it has been found advantageous to use a few very tall poles rather than a great number of smaller poles positioned immediately adjacent to the roadway which cause a safety hazard. However, poles in the art today reach heights of 150 feet which makes servicing the lights extremely difficult, dangerous, and costly. Consequently, a number of schemes have been devised to lower the lights to the ground for servicing.

Most of the prior art schemes involve suspending the lights by means of steel cables which pass up the inside of the pole and over pulleys so that the lights may be lowered to the ground, when desired, by simply winding out a sufficient length of cable. However, such systems have been found to have numerous disadvantages. Lights that simply hang from steel cables tend to be blown around and sway violently in the wind. This causes the cables to wear at various points and the lights to be damaged by continuous, violent movement. Over an extended period of time the steel cables tend to stretch, thus, lowering the lights and making the situation even worse. Since electrical connections must be made to the lights it is also necessary to run electrical wires up the inside of the pole and over pulleys which also must be wound out as the light is lowered from its position. When the electrical wires move inside the poles, the insulation is often damaged by the steel cables which are also moving inside the same pole. In addition, before the light can be lowered from the top of the pole extra lengths of electrical cable must be attached to the bottom ends of the wires in order to supply power to test the lights at the bottom of the pole since the normal length of wire is pulled to the top of the pole. To combat this problem prior art poles need to be internally partitioned to segregate the electrical cable from the support cables. This additional partition makes the pole much heavier requiring a larger base portion and an overall increase in the dimensions of the pole so as to provide adequate support to the heavier pole. Another prior art encumbrance involves the necessity to use either a counterweight or retriever cable connected to the electric wires to insure that they come back down the inside of the pole without fouling when the lights are raised to the top. The present invention avoids all of the above mentioned difficulties by the provision of a unique latching system which relieves the tension on the support cables and eliminates the necessity to move the electrical cord through the pole as the lights are raised or lowered.

SUMMARY OF THE INVENTION

Briefly, the present invention contemplates mounting all of the lights on a movable ring which has a plurality of latch mechanisms on it adapted to engage radially extending members at the top of the pole. In order to bring the light supporting ring to the ground a retriever ring is mounted about the pole on a guide means adapted to ride the length of the pole. Steel cables traveling up the inside of the pole and over pulleys are used to raise and lower the retriever ring which, upon reaching the top of the pole, operates to support the light supporting ring and release the latching mechanisms so that the light support ring may be lowered to the ground. The latching mechanisms are carefully designed so as to align the light support ring exactly with the radially extending members at the top of the pole thus allowing electrical connections to be made by means of a plug type connector at the top of the pole. The plug eliminates the necessity for moving the electrical cords through the pole and also obviates the need for extra lengths of power cable which move up and down inside the pole as the lights are lowered and raised. It may thus be seen that it is an object of my invention to provide an improved light pole having a more reliable light servicing apparatus. It is another ob-

ject of my invention to provide a light pole wherein the lights are detachably mounted in such a way as to permit electrical connections to be automatically made at the top of the pole. Further objects and advantages will become apparent to those skilled in the art upon consideration of the following description and drawings.

BRIEF DESCRIPTION OF THE DRAWING

FIGS. 1, 2 and 3 show diagrammatically the light pole of the present invention in three different stages which demonstrate schematically the process and mechanism for lowering the lights to the ground.

FIG. 4 is a plan view of the top of the pole showing the radially extending support members and the light supporting ring.

FIG. 5 is a side view of the apparatus of FIG. 4 which additionally includes the antisway stabilizer guide which travels along the pole.

FIG. 6 is a top plan view of just the retriever ring and the anti-sway stabilizer guide.

FIG. 7 is a longitudinal sectional view of the latching mechanism taken along line 7—7 in FIG. 8.

FIG. 8 is a top plan detail view of the latching mechanism used to connect the light support ring to the radially extending support members.

FIGS. 9 and 10 are detail views showing respectively top and side views of a possible power winch mechanism which could be used to raise the lights to the top of the pole including the general configuration of the streamlined cable connector in section.

FIG. 11 is a partially cut away non-sectioned view of the apparatus of FIG. 7 showing the latching mechanism in the release position.

FIG. 12 is a detail view of the apparatus of FIG. 11 showing the latching mechanism entering the latched position.

FIG. 13 is an end view of the latching mechanism of FIG. 8 showing the flared alignment guides.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In FIG. 1 a light pole 10 is diagrammatically shown so as to help demonstrate in a simplified way the operation of my invention. Two of the three outwardly or radially extending support members 12 and 14 are shown at the top of pole 10. Two of the six lights 24 and 26 are shown carried by a light support ring 16 which is latched to the outwardly extending members 12 and 14 by means of latch mechanisms 18 and 20. In the preferred embodiment a third radially extending support member and a third latching mechanism are used although these are not visible in FIG. 1. A retriever ring 22 is positioned immediately below support ring 16 and adapted to ride up and down pole 10 by means of a guide which is referred to in the specification generally as an anti-sway stabilizer 28. To bring the lights to the ground, a motor and winch assembly 30 (see FIGS. 2 and 3) is activated so as to reel out cables 32 and 34 which are joined by a streamlined connector 36 inside the pole. The shape of connector 36 is chosen to prevent fouling of the cables inside the pole. When retriever ring 22 reaches the ground a pair of latch releasing pins 38 and 40 are rotated about 90° from the position shown in FIG. 2. This causes pins 38 and 40 to engage and release latch mechanisms 18 and 20 when retriever ring 22 is again raised to the top of pole 10. This will be more clearly explained with reference to FIG. 11. With the latch mechanisms released, the support ring 16, along with lights 24 and 26, may be carried to the ground by retriever ring 22 as shown in FIG. 3. In FIG. 3 it may be seen that the outwardly extending arms on latching mechanisms 18 and 20 are resting on the cross pieces 39 and 41 of release pins 38 and 40 and travel to the ground with support ring 16. It may be seen in FIG. 8 that the outwardly extending arms on latching mechanisms 18 and 20 actually comprise a pair of parallel arms 110 and 112. In order to raise the lights and support ring to the top of the pole again, release pins 38 and 40 are again rotated 90° so that the cross pins 39 and 41 pass

between the parallel members comprising the outwardly extending arms 110 and 112 of latch mechanisms 18 and 20. When the retriever ring is raised, the latching mechanisms may once again engage the radially extending support arms 12 and 14 at the top of the pole so as to securely attach the support ring 16 to members 12 and 14 as will be explained in detail with respect to FIGS. 7 and 12.

FIG. 4 is a top plan view of the apparatus at the top of the light pole. A number of light fixtures 51, 52, 53, 54, 24, and 26 are suitably mounted to support ring 16 which is positioned just underneath outwardly extending members 12, 13, and 14 which are mounted to pole 10. In FIG. 4 it may be seen that ring 16 is formed in three sections and joined by three box members 56, 58, and 60. Box members 56, 58 and 60 form flat surfaces upon which the latching mechanisms may be mounted. It should be noted that box section 58 is substantially larger so as to support an electrical connector 114 and form an electrical junction box for the wires leading to the lights. Six pulleys numbered 62 through 67 inclusive are carried by suitable pins in members 12, 13, and 14. Three steel cables from inside pole 10 pass over these pulleys to support retriever ring 22. This structure may be better seen in FIG. 5.

In FIG. 5 the structure of FIG. 4 may be seen as viewed from the side. Any suitable anti-sway stabilizer guide may be used to locate retriever ring generally concentric about pole 10. In the preferred embodiment a pair of U-shaped members 70 and 72 are pivoted about pins 161, 162, 163, and 164 on brackets 165, 166, 167, and 168 carried on ring 22 so as to encircle pole 10. (Note also FIG. 6) Members 70 and 72 are urged against pole 10 by means of a pair of springs 74 and 76. Members 70 and 72 roll along pole 10 on a set of wheels 78 and 80. The configuration and operation of U-shaped members 70 and 72 may be better understood by reference to FIG. 6 which shows retriever ring 22 and the guide members as viewed from above in FIG. 5.

It may also be seen in FIG. 6 that all three of the latch release pins 38, 40, and 43 may be simultaneously rotated from the release position shown to the latching position with a single lever 82 which is connected to pin 38 directly and to pins 40 and 43 by means of a pair of connecting rods 84 and 86. Rods 84 and 86 extend between pivot pins mounted in levers 171, 172 and 173 connected to release pins 38, 40, and 43. Rod 84 connects levers 82 and 172 while rod 86 connects lever 171 to lever 173. Release pins 38, 40, and 43 are rotatably supported from ring 22 by means of three brackets numbered 88, 90, and 92. Also positioned on these brackets are three rubber cushions 94, 96 and 98. These rubber cushions engage cushion accepting extensions positioned on the underside of box members 58, 56, and 60 in ring 16 providing a cushioned support so that ring 16 and the lights fastened thereto may be carried up and down on retriever ring 22.

Returning to FIG. 5, it may be seen that the supporting cables travel over the pulleys and down through the center of the release pins 38, 40, and 43 to ring 22 engaging washers at the ends of springs contained in spring containers 100, 102, and 104. This may be best seen with reference to FIG. 7.

FIG. 7 and FIG. 8 show, respectively, side sectional and top plan views in detail of the latching mechanism. Referring simultaneously to both figures, it may be seen that light support ring 16 is carried on retriever ring 22 by a cushion 98 which engages an extension 99 on the bottom of box member 58. Since pin 38 and its respective cross portion 39 are rotated to the latching position, it passes between outwardly extending arms 110 and 112 of the latch mechanism. As retriever ring 22 brings light support ring 16 close to the top of the pole a plug type connector 114 is forced together as shown in FIG. 7 insuring proper electrical connections to the lights. As the unit continues upward, the underside of a striker bar 116 contacts the inclined edge 118 of the latching mechanism as shown in FIG. 12 causing arms 110 and 112 to pivot about a pin 120 as shown by arrow 180 in FIG. 12 raising a counter weight 122 slightly upwards. Pin 120 is carried by a pair of brackets 119

and 121 which brackets are connected to box member 58 (see FIG. 13). As the support ring 16 continues to rise still further, striker bar 116 pushes down a small piece of spring steel 124 as shown in FIG. 7 so as to provide a firm engagement. When the latching mechanism on ring 16 rises high enough to clear the top edge of striker bar 116 the counterweight 122 rotates the latch about pin 120 over the top of striker bar 116. This locks the striker bar 116 between the underside 182 of the latching mechanism and spring 124 so as to lock light support ring 16 tightly to member 13. Striker bar 116 is carried between a pair of brackets 125 and 126 which are spaced far enough apart to allow the entry of the latching mechanism. Reference to FIG. 13 will show that the top of brackets 119 and 121 are beveled inward so as to guide themselves into member 13 in the proper centered position. Consequently, as the latching mechanism rises into place, ring 16 is mechanically aligned by the beveled edges of brackets 119 and 121 thus insuring proper engagement of the electrical connector plug 114. Since the weight of the support ring 16 is carried totally by the latching mechanism there is no strain on the support cable 35. It should be noted that the arms 110 and 112 when not latched or supported by crosspiece 39 rest on a member 123 which extends between the legs of bracket 119 and bracket 121.

The sectional view of FIG. 7 demonstrates clearly how cable 32 passes down through the center of release pin 38 to a spring 128 inside tube 100. Spring mounts are used at the end of each of the three support cables so as to allow ring 22 to conform to any slight variances in the lengths of the three different support cables and additionally to cushion the sudden shock which would otherwise occur when the rings reach the radially extending support members. It may be seen in FIG. 7 that the electrical connections from connector 114 pass through terminal box 58 and into light support ring 16 where they travel to the various respective lights supported thereon.

It should be noted that connector 114 comprises a male type plug connector on ring 16 which engages a female type receiver connector on member 13. This choice of design is advantageous in that the male plug may be of the adjustable type well known to those in the art so as to permit adjustment thereof when ring 16 is lowered to the ground. In this way the connector contacts can be properly tensioned whenever the lights are serviced.

To lower light support ring 16, retriever ring 22 is brought to the bottom of the pole as described earlier and lever 82 is used to rotate each of the release pins 38, 40, and 43 ninety degrees so that the cross pieces 39, 41, and 45 engage the parallel extending arms on the latching mechanisms. When the retriever ring is returned to the top of the pole, cross pieces 39, 41, and 45 raise the respective weights at the end of the latching mechanisms as shown in FIG. 11 so as to rotate arms 110 and 112 about pin 120 and pull surface 182 off the striker bar 116. This allows light support ring 16 to fall back onto the cushions on ring 22 so that the entire light structure may be lowered to the ground.

Referring simultaneously to FIGS. 9 and 10 the operation of the power winch mechanism at the bottom of the pole may be understood. A reversible electric motor 130 delivers power through a torque limiting mechanism 132 to a gear box 134 and a spool 136. A steel cable 150 is wound on spool 136 to the three cables 32, 34, and 35 which pass over the pulleys at the top of the pole. Streamlined connector 36 is shown in section to more clearly illustrate the design thereof.

I claim:

1. Apparatus of the class described comprising in combination:
 - a pole having outwardly extending support members generally at the top thereof;
 - light supporting means adapted to support a plurality of lights;
 - a first electrical connector on said light supporting means adapted to engage detachably a second electrical connector on one of said outwardly extending members;

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latching means on said light supporting means operable to engage said outwardly extending support members; carrier means adapted to ride on said pole and carry said light supporting means up and down the pole said carrier means having a release means thereon operable to disengage said latching means; and moving means operable to move said carrier means up and down said pole.

2. The apparatus of claim 1 in which said light supporting means comprises an annular member generally surrounding said pole.

3. The apparatus of claim 2 in which said latching means comprises pivoting latch members adapted to slide above striker bars mounted on said outwardly extending members as a result of pivoting movement.

4. The apparatus of claim 3 in which said carrier means comprises an annular member generally surrounding said pole with said release means comprising upwardly extending rotatable release pins each having a laterally extending member at its upper end, whereby said laterally extending member will engage said pivoting latch members when said pins are rotated to a first position to permit unlatching of said

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light supporting means from said extending support members, but will clear said pivoting latch members when said pins are rotated to a second position to permit relatching.

5. The apparatus of claim 4 in which said moving means is connected to said annular carrier by a plurality of cables extending from said moving means through said pole, over pulleys in said outwardly extending members, and to said carrier.

6. The apparatus of claim 5 in which said cables are connected to said carrier through springs adapted to compensate for differences in the lengths of the cables.

7. The apparatus of claim 6 including compressive spring means between said light supporting means and said outwardly extending support members which operate to insure a tight engagement by said latch members.

8. The apparatus of claim 7 in which said first connector on said light supporting means comprises a male type plug adapted to engage said second connector which comprises a female type plug.

9. The apparatus of claim 8 including connecting means between said release pins so that all pins may be simultaneously rotated between said first and second positions.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,670,159 Dated June 13, 1972

Inventor(s) Paul A. Millerbernd

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

On the cover sheet [54] "PALE" should read -- POLE --.
Column 1, line 1, "pale" should read -- pole --.

Signed and sealed this 7th day of November 1972.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents

UNITED STATES PATENT OFFICE
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