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TELESCOPING ANTENNA MAST

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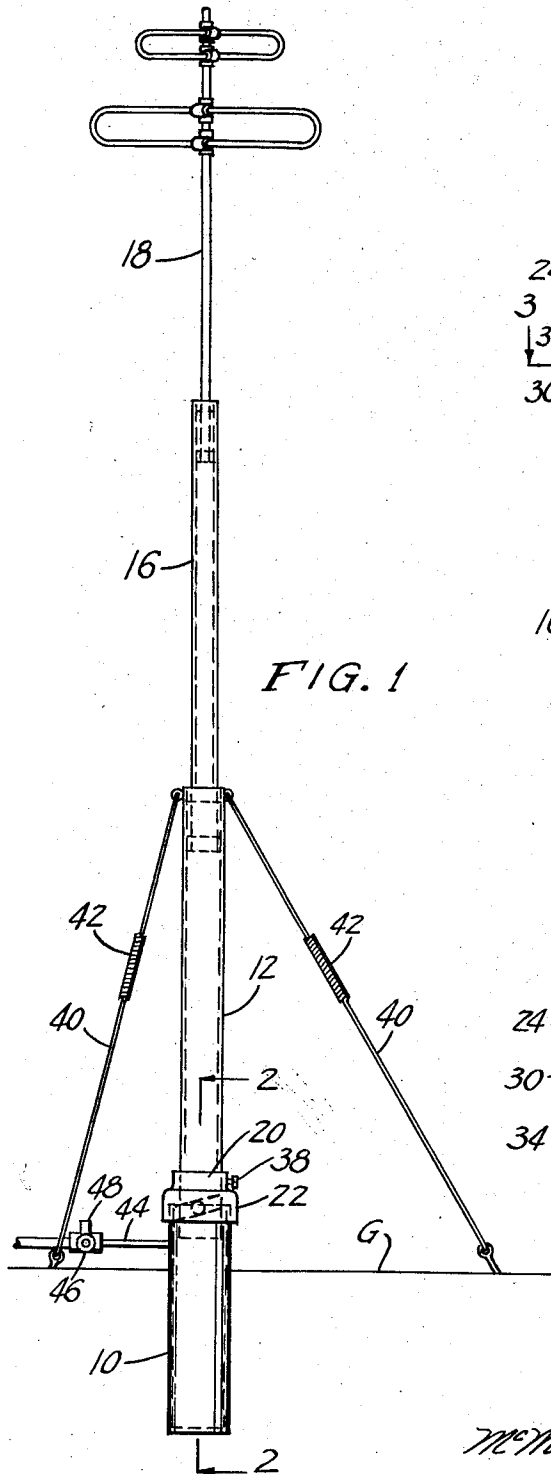


FIG. 1

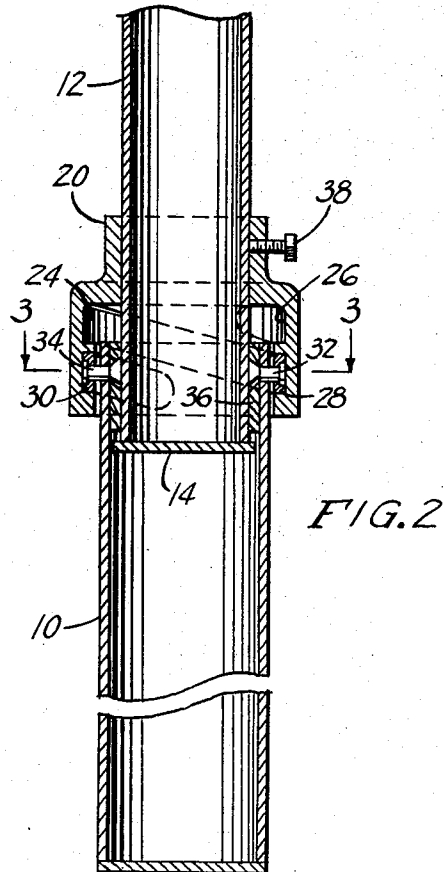


FIG. 2

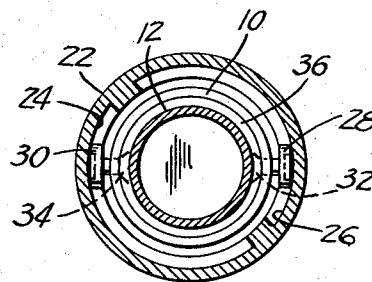


FIG. 3

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TELESCOPING ANTENNA MAST

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6 Claims. (Cl. 189—26)

This invention relates to antenna masts, and more particularly has reference to a mast of the telescoping type, so designed as to be extensible, and subsequently rotatably adjustable, by fluid pressure.

By way of background, certain difficulties arise in connection with conventional telescoping antenna mast constructions. One of these difficulties stems from the fact that a conventional mast often is difficult to lower once it has been extended and mounted in position, thus making repairs and maintenance difficult. Further, heretofore, the rotatable adjustment of television antennas and the like has been effected mainly by electric motor control means, which are somewhat expensive and are not, at all times, reliable in operation. Further, the time required in extending or lowering the mast, or in rotatably adjusting the same, is often excessive in conventional construction, and additional expense is involved in the fact that heretofore, telescoping masts have of necessity been, in many instances, of square, triangular, or other non-circular cross section, which construction is more expensive than circularly cross sectioned mast structures.

Broadly speaking, the main object of the present invention is to obviate the several disadvantages or difficulties which have existed, by providing a mast when will have none of the undesirable features specified above.

A more specific object is to provide, in a mast construction as stated, means particularly adapted to effect the extension, retraction, and rotation of the mast by means of fluid pressure, such as, for example, that afforded by a city water supply.

Other objects will appear from the following description, the claims appended thereto, and from the annexed drawing, in which like reference characters designate like parts throughout the several views, and wherein:

Figure 1 is a side elevational view of an antenna mast formed according to the present invention, extended for use;

Figure 2 is an enlarged sectional view on line 2—2 of Figure 1; and

Figure 3 is a transverse sectional view on line 3—3 of Figure 2.

The mast constituting the present invention includes a tubular base section 10, anchored in the ground G, as for example, by being embedded in concrete. The base section can be embedded in the ground at any desired depth, or alternatively, can be disposed at or above ground level, in which instance it would be mounted on a suitable support structure. The manner in which the base section is mounted in a vertical, stationary position is not critical to the invention, and it is mainly important that it be stationarily supported, in a strong, secure manner that will assure against its becoming loose or tilting, or being pulled completely out of position.

A main extension section 12 is adapted to telescope in the open upper end of the base section 10, said main extension section having a closed bottom provided by an end wall 14. Additional sections can be extended above the main extension section 12, as at 16, 18, but again, this is

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not critical to the invention, and the section 12 may constitute the only extension section in the mast.

Loose upon the extension section 12 is a sleeve 20, integrally formed with a depending bell end 22 spaced outwardly from the base section 10, and having threads 24, 26. The thread grooves are of rectangular cross section, and are extended parallel to one another, with the lower ends of the grooves being disposed 180 degrees apart, and the upper ends of the grooves also being disposed diametrically opposite one another. Each groove extends through 360 degrees within the bell end 22.

Rolling in the respective grooves 24, 26 are flat, disc shaped rollers 28, 30, rotatably mounted upon diametrically opposed pins 32, 34 respectively projecting radially, outwardly from the base section 10, through openings formed in the base section adjacent the upper ends thereof. At their inner ends, the pins have flared heads, embedded in correspondingly flared openings formed in a cylindrical sealing sleeve 36 engaged tightly against the inner surface of the base section 10 at the upper end of the base section.

Threadedly engaged in the upper end portion of sleeve 20 is a set screw 38 adapted to bind against the extension section 12.

Guy wires 40, which can be triangularly or otherwise spaced, are anchored at one end to the ground G, and intermediate their ends have springs 42 to permit extension of the guide wires by resilient stressing of the same. At their upper ends, the wires are secured to eyes carried by the upper end of the extension section 12.

Communicating with the interior of the base section 10 is a pipe 44 through which fluid is adapted to be supplied under pressure, and intermediate the ends of said pipe there is provided a valve 46 which in the present instance is illustrated as being manually operated. However, the valve can be electrically or otherwise operated, either at the location of the base section or from a remote location. A drain tube 48 is provided in the pipe 44 at the location of the valve, and if desired, the valve can be a two way valve so as to communicate the base section 10 either with a source of fluid under pressure, or with the drain pipe, depending on whether fluid is to be supplied to or drawn from the base section.

In use, the main extension section 12 would normally be fully telescoped within the base section 10, with the sleeve 20 loose upon the extension section. Then, the two way valve is operated to close the drain 48 and permit fluid to be supplied under pressure into the base section. The fluid under pressure can be gaseous or liquid, whichever is desired, and the pressure would be such as to cause the extension section 12 to be forced upwardly to the center position thereof shown in Figure 1, or to any other intermediate, selected extended position. When the extension section has been forced upwardly out of the base section to the desired extent, the set screw 38 is turned home against the extension section to fixedly connect the sleeve to the extension section. Instead of a set screw, a split clamp can be employed, or any other means adapted to effect the quick connection of the sleeve to the extension section, following extension of the section 12 to the desired extent. At this time, rollers 28, 30 are at the lower extremities of the threads 24, 26.

When the section 12 is forced upwardly out of the base section 10, the guy wires will be drawn taut, and when the sleeve is clamped to the extension section, the extension of the mast will have been completed.

Subsequently, the section 12, and hence the sections 16 and 18 carried thereby, is rotatably adjustable to any extent, through a full 360 degree cycle. This is done by permitting additional fluid to be forced under pressure into the base section 10. When this additional fluid under pressure is supplied to the base section, additional

pressure will be directed against the end wall 14 of the extension section 12, tending to force the extension section upwardly. However, sleeve 20 is now fixed to the extension section, and accordingly, the extension section will be rotated responsive to the supply of additional fluid pressure to the base section. As soon as the section 12 has been rotated to its desired extent, the fluid under pressure is cut off.

To rotate the extension section in an opposite direction, fluid is drained out of the base section 10 as necessary, and by gravitation, said main extension section 12 will rotate in an opposite direction, until the rollers are again at the lower ends of the thread grooves. Subsequently, if it is desired to lower the extension section, it is merely necessary to loosen the set screw 38, while permitting the fluid under pressure to drain out of the base section 10, and under these circumstances, the extension section 12 will drop down within the base section, without rotating.

It is believed sufficiently obvious as not to require special illustration that if desired, the rollers might be mounted on the bell end 22 of sleeve 20, with the thread grooves being formed in the upper end of the base section 10, this arrangement being opposite to that shown in Figure 2. The same results, of course, would be obtained under these circumstances, and apart from this reversal of the grooves and rollers on the sleeve 20 and base section 10, the construction will be identical to that shown previously herein.

It will be seen that the construction is such as to facilitate the extension or retraction of the antenna mast, and further, the construction now permits rotatable adjustment of the antenna mast by the same fluid pressure which is especially used to extend the mast to the desired height. Thus, a simpler construction is provided than would be required under ordinary circumstances, wherein the rotatable adjustment is effected by an electric motor, while the extension of the mast is effected manually or by other means separate from the controls used for rotatable adjustment purposes. Still further, the mast is of circular cross section, thus again reducing the cost, without detracting from its efficiency in operation or the speed and ease with which the mast can be extended or retracted.

It is believed apparent that the invention is not necessarily confined to the specific use or uses thereof described above, since it may be utilized for any purpose to which it may be suited. Nor is the invention to be necessarily limited to the specific construction illustrated and described, since such construction is only intended to be illustrative of the principles, it being considered that the invention comprehends any minor change in construction that may be permitted within the scope of the appended claims.

What is claimed is:

1. An extensible mast comprising a hollow base section; means for supplying fluid under pressure to said base section; an extension section telescoped in the base section and constituting a piston extensible from the base section responsive to the supply of fluid under pressure to the base section; a sleeve slidably mounted upon the extension section and including means for fixedly connecting the sleeve to the extension section in selected positions to which the extension section is extended relative to the base section; and a permanently engaged threaded connection between the sleeve and base section, for effecting rotatable adjustment of the extension section responsive to the supplying of fluid under pressure to the base section with the sleeve secured to the extension section.

2. An extensible mast comprising a hollow base section; means for supplying fluid under pressure to said base section; an extension section telescoped in the base section and constituting a piston extensible from the base section responsive to the supply of fluid under pressure

to the base section; a sleeve slidably mounted upon the extension section and including means for fixedly connecting the sleeve to the extension section in selected positions to which the extension section is extended relative to the base section; and a permanently engaged threaded connection between the sleeve and base section, for effecting rotatable adjustment of the extension section responsive to the supplying of fluid under pressure to the base section with the sleeve secured to the extension section, said threaded connection comprising pins projecting radially, outwardly from the base section and thread grooves formed on the sleeve and receiving said pins.

3. An extensible mast comprising a hollow base section; means for supplying fluid under pressure to said base section; an extension section telescoped in the base section and constituting a piston extensible from the base section responsive to the supplying fluid under pressure to the base section; a sleeve slidably mounted upon the extension section and including means for fixedly connecting the sleeve to the extension section in selected positions to which the extension section is extended relative to the base section; and a permanently engaged threaded connection between the sleeve and base section, for effecting rotatable adjustment of the extension section responsive to the supplying of fluid under pressure to the base section with the sleeve secured to the extension section, said threaded connections comprising pins projecting radially, outwardly from the base section, rollers on the outer ends of the pins, and thread grooves formed on the inner surface of the sleeve and receiving said rollers.

4. An extensible mast comprising a hollow base section; means for supplying fluid under pressure to said base section; an extension section telescoped in the base section and constituting a piston extensible from the base section responsive to the supply of fluid under pressure to the base section; a sleeve slidably mounted upon the extension section and including means for fixedly connecting the sleeve to the extension section in selected positions to which the extension section is extended relative to the base section; and a permanently engaged threaded connection between the sleeve and base section, for effecting rotatable adjustment of the extension section responsive to the supplying of fluid under pressure to the base section with the sleeve secured to the extension section, said threaded connections comprising pins projecting radially, outwardly from the base section, said pins being permanently engaged in the base section against retraction in a radial direction from their outwardly projecting positions, rollers on the outer ends of the pins, and thread grooves formed on the inner surface of the sleeve and receiving said rollers, there being a pair of said pins and a pair of grooves receiving the pins, the grooves having their upper and lower ends diametrically opposed, said pins being diametrically opposed correspondingly to the grooves for disposition of a roller in each of the grooves.

5. An extensible antenna mast comprising a tubular base section of circular cross section adapted to be embedded in a stationary position in a support, said base section being formed open at its upper end; an extension section of circular cross section telescoping within the open upper end of the base section, said extension section being closed at its lower end to form the same as a piston; means for supplying fluid under pressure to the base section below the closed lower end of the extension section, thus to, in response to the supplying of fluid under pressure to the base section, extend the extension section out of the base section to a predetermined extent; sealing means interposed between the base and extension sections; a sleeve loose upon the extension section and formed with a depending, bell end receiving the upper end of the base section, said bell end of the sleeve having internal, diametrically opposed thread grooves; means for fixedly securing the sleeve to the extension section is selected posi-

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tions to which the extension section is forced outwardly from the base sections; and a pair of diametrically opposed, radially, outwardly projecting pins carried by the base section adjacent the open upper end thereof, said pins being permanently engaged in the base section against retraction in a radial direction from their outwardly projecting positions, said pins including rollers at their outer ends engaging in the respective grooves, thus to effect rotatable adjustment of the extension section with the sleeve fixedly secured thereto, responsive to the supplying of fluid under pressure to the base section, said extension section being extendable without rotation of the same responsive to the supplying of fluid pressure to the base section, when said sleeve is loose upon the extension section.

6. A telescoping antenna mast comprising a hollow, upright, upwardly opening, stationary, cylindrical base section, an upright, elongated extension section slidably telescoped at its lower end in the base section; means communicating with the base section through which fluid under pressure may be directed, for forcing the extension section upwardly within the base section; a sleeve circumposed about the extension section at one end of the sleeve and about the base section at the other end of the sleeve, the sleeve being rotatable relative to both the extension section and the base section, the extension section being

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longitudinally slidable in the sleeve; a threaded connection between the base section and the sleeve; means on the sleeve for releasably connecting the same fixedly to the extension section in any position to which the extension section is telescopically adjusted relative to the base section, whereby to conjointly rotate the sleeve and extension section responsive to direction of fluid under pressure to the base section in any position of telescopic adjustment of the extension section with the sleeve and extension section fixedly connected, while providing for movement of the extension section longitudinally of the base section without being rotated whenever fluid under pressure is supplied to the base section while the sleeve and extension section are not fixedly connected; and means on the extension section for supporting an antenna.

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