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(54) A telescopic pole, particularly for holding TV antennas in the field.

(57) The telescopic pole comprises a set of similar tubular elements (50, 52, 54, ..., 56) having decreasing cross-sections and lengths, closed at the bottom and each provided with a pair of turning, idle rollers (62, 64) journaled at their tops on opposite walls. Each tubular element is contained within the next bigger one, in such a way that successive tubular elements are alternately arranged with axes orthogonal to each other, and the entire set of tubular elements is contained within a tubular frame (22). Each tubular element has a flexible ribbon (66) attached at its ends to the tops of opposite walls not journaling the rollers, and each ribbon passes over the rollers of the next inward tubular element and under the closed end of the further tubular element. Lifting means (36-48) are provided for lifting the most external of said tubular elements with respect to the tubular frame.

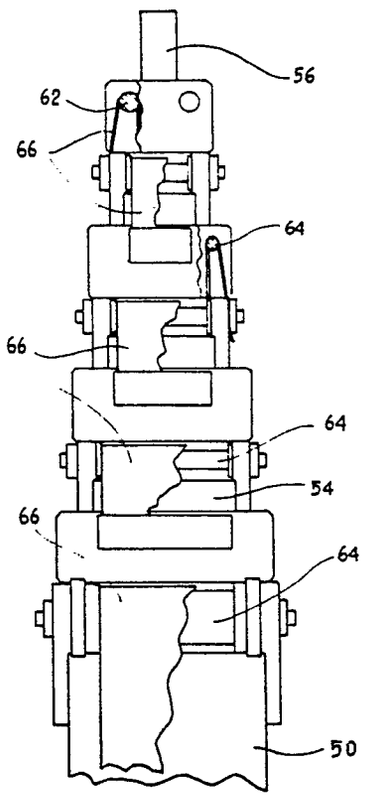

Fig. 4

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A telescopic role, particularly for holding TV antennas in the field

This invention is concerned with a telescopic pole, particularly for holding antennas for electromagnetic signals at a considerable height from the ground, and more particularly antennas for measuring television signals in the field. However, the invention could foreseeably find other applications, whenever it is required to temporarily position objects at a height of a few tens of meters from the ground.

As known, in carrying out measurings of electromagnetic signals in the field, particularly television signals, the pick-up antenna is required to be positioned at a considerable height from the ground, e.g. at 10 to 20 meters height, in order to prevent any ground effect from attenuating the signal or affecting the measure in any way. This was achieved in the past by using existing landmarks such as towers, buildings and the like, with considerable inconvenience and delay for transfer and assembly of the instruments in the desired location. Moreover, the landmark was not always available, and it was not always possible to obtain the right of accessing it.

The main object of the invention is therefore to provide a preferably revolving telescopic pole, particularly for measuring electromagnetic signals in the field, more particularly for measuring television signals, which can be installed aboard a vehicle to be taken to the site and be quickly raised in a self-contained structure, thus dispensing with the need for existing buildings or structures.

The above object is achieved by the invention, together with other objects and advantages such as will appear from the following description, with a telescopic pole, particularly for holding TV antennas in the field, characterized in that it comprises a set of similar tubular elements having decreasing cross-sections and lengths, closed at the bottom and each provided with a pair of turning, idle rollers journaled at their tops on opposite walls, each tubular element being contained within the next bigger one, in such a way that successive tubular elements are alternately arranged with axes orthogonal to each other, and the entire set of tubular elements being contained within a tubular frame, each tubular element having a flexible ribbon attached at its ends to the tops of opposite walls not journaling the rollers, each ribbon passing over the rollers of the next inward tubular element and under the closed end of the further tubular element, with lifting means for lifting the most external of said tubular elements with respect to the tubular frame.

The invention will now be described in more detail with reference to a preferred embodiment, shown in the attached drawings, which are given by way of illustration and not of limitation, and in which:

Fig. 1 is a front view, in elevation, of a telescopic pole according to the preferred embodiment of the invention, in collapsed condition, and installed on a partly shown motor van;

Fig. 2 is a back view, in elevation, of the telescopi pole of Fig. 1, in collapsed condition;

Fig. 3 is a view in transverse cross-section, across line III-III of Fig. 1, on an enlarged scale;

Fig. 4 is an elevation view, partly broken, of the terminal portion of the telescopic unit of the pole of Fig. 1; and

Fig. 5 is a view in vertical cross-section, of three adjacent tubular elements belonging to the telescopic pole of Figg. 1 to 4.

With reference to Figg. 1 to 3, 10 and 12 indicate the floor and the roof, respectively, of a conventional motor van. Under the floor 10 is attached a cage 14, in alignment with an opening in the floor. A trap 15 in roof 12 is vertically aligned with cage 14, the trap being closed by a removable door 16. A cylindrical barrel 18 extends downwardly from the roof, coaxially with trap 15 and with cage 14.

In the bottom of cage 14 is centrally held a thrust bearing 19, forming a pivot for the bottom end of a tubular frame 22, of square cross-section, vertically extending through barrel 18 and into the trap 15. In tubular frame 22 a disc 24 is attached coaxially, near the bottom edge of barrel 18. Around the periphery of disc 24, four evenly spaced, free rollers 26 stand with axes parallel to tubular frame 22, and are arranged for rolling against the inner surface of barrel 18, thus keeping tubular frame 22 in vertical position and freely revolving.

Disc 24 has a peripheral groove which accommodates a transmission belt 28 driven by a driving pulley 30, which is driven in its turn by a reversible electric motor 32 mounted on barrel 18. By operating motor 32, it is thus possible to change at will the rotation angle of tubular frame 22.

A vertical plate 34 is mounted on tubular frame 22, carrying an electric motor 36 with an associated reduction gear 38. A toothed gear 40 with horizontal axis is keyed on reduction gear 38, which drives in its turn two satellite toothed wheels 42, 44, carrying integrally respective winder spools 46, 48, extending on the back of vertical plate 34, and whose purpose will be described below.

With reference to Figg. 4 and 5, a set of similar tubular elements 50, 52, 54, ..., 56 are contained within tubular frame 22, which are also square and have progressively decreasing cross-sections and

lengths, one within the other in sequence. Each tubular element is closed at the bottom and is open at the top, where it carries two vertical parallel plates such as 58, 60, which are attached on two opposite walls. Two symmetrical, idle rollers such as 62, 64 are journaled between plates 58, 60 with horizontal axes. The arrangement of plates 58, 60, and therefore also of rollers 62, 64, is shifted of 90° around the pole axis as one goes from each tubular element to the next, i. e. the rollers of two adjacent tubular elements are orthogonal to each other, and consequently the rollers of alternate tubular elements are parallel to each other.

To each tubular element a flexible ribbon such as 66 is associated, which passes under the closed bottom end of the tubular element, over the respective idle rollers of the outwardly adjacent tubular element, and is attached with its opposite ends to the top of the outwardly next tubular element, as seen most clearly in Fig. 5, where only one ribbon is symbolically shown in broken line for the sake of clarity. The alternate arrangement of the rollers allows the above ribbon connections to take place without interference.

Tubular frame 22 also has two idle rollers, and ribbon 68, which is associated with the most outward tubular element, passes over these rollers and is directed to the winder spools at the foot of the tubular frame.

When motor 36 is started, both ends of ribbon 68 are wound on winder spools 46, 48, and ribbon 68 therefore lifts the most outward tubular element. Consequently, the idle rollers of the adjacent tubular element push against the next ribbon, whose ends are attached to the top of the tubular frame. Therefore this ribbon, as will be best understood by looking at Fig. 5, will also pull the next tubular element upwards, and the lifting motion will be propagated down to the last tubular element 56.

For operation, an antenna or other desired object (not shown in the Figures) is attached to the top of the most internal tubular element. The vehicle in which the telescopic pole is installed is made rigid in horizontal position with respect to the ground by means of jacks, not shown and beyond the scope of the invention. Motor 36 is the operated to raise the pole as described above. The antenna may be connected to a cable 70 passing through a hole 72 in disc 24 and is wound to a spool 74 rotatably mounted on plate 34 and driven by the same lifting motor 36 through a friction clutch 76 known per se, so that spool 74 unwinds the cable as the pole extends, and winds up the cable as the pole is collapsed. A distributor member 78, also known per se, is driven by the same friction clutch, through a screw not shown, to evenly distribute the cable on spool 74.

The pole can be revolved around its vertical axis, for azimuthal orienting of the antenna, both in its extended and its collapsed condition, by operating motor 32, or by hand.

The vehicle will usually accommodate instrumentation connected to cable 70, and possibly adapted to control motors 32 and 36.

From the above disclosure it can be seen that the pole has an extremely compact and lightweight structure, in which the means for propagating the motion from one tubular element to the next comprise in practice only the flexible ribbons. Consequently, the telescopic pole, while being lightweight and compact enough for installation in a vehicle such as a motor van, is nonetheless able to reach considerable heights when extended, e. g. 20 to 30 meters from ground, and to be azimuthally oriented even while extended, by very simple means. Furhter, the pole, due to its high symmetry, maintains an extremely linear and vertical attitude, provided that the stability of the supporting vehicle has been assured.

A preferred embodiment of the invention has been described, but it is understood that the invention also encompasses equivalent changes and modifications, obvious for the person skilled in the art, falling within the inventive concept. For instance, for applications where the azimuthal oientation is not required, the frame can be rigidly fixed to the supporting structure; or the winder spools at the foot of the frame can be driven by different means, equivalent to those shown; also, the cable winder spools could be dispensed with, e. g. in applications different from an antenna for electromagnetic measures; the number and lengths of tubular elements may vary according to circumstances. All of these and other modifications should be regarded as falling within the scope of the invention.

Claims

1. A telescopic pole, particularly for holding TV antennas in the field, characterized in that it comprises a set of similar tubular elements (50, 52, 54, ..., 56) having decreasing cross-sections and lengths, closed at the bottom and each provided with a pair of turning, idle rollers (62, 64) journaled at their tops on opposite walls, each tubular element being contained within the next bigger one, in such a way that successive tubular elements are alternately arranged with axes orthogonal to each other, and the entire set of tubular elements being contained within a tubular frame (22), each tubular element having a flexible ribbon (66) attached at its ends to the tops of opposite walls not journaling the rollers, each ribbon passing over the rollers of the next inward tubular element and under the

closed end of the further tubular element, with lifting means (36-48) for lifting the most external of said tubular elements with respect to the tubular frame.

2. The telescopic pole of claim 1, characterized in that each of said tubular elements is square in cross-section.

3. The telescopic pole of claim 1 or 2, characterized in that said lifting means (36-48) comprise a further flexible ribbon (68) passing under the most external tubular element, over two rotatable rollers journaled at the top of two opposite side walls of the tubular frame, and with its ends attached to winder means (46, 48) mounted on opposite sides of the tubular frame.

4. The telescopic pole of claim 1, 2 or 3, characterized in that said tubular frame is rotatably supported in a vertical position.

5. The telescopic pole of claim 4, characterized in that said tubular frame is rotatably rests on a thrust bearing (19), and is laterally guided by idle rollers 26) running on the internal surface of a cylindrical barrel (18) coaxial with the thrust bearing.

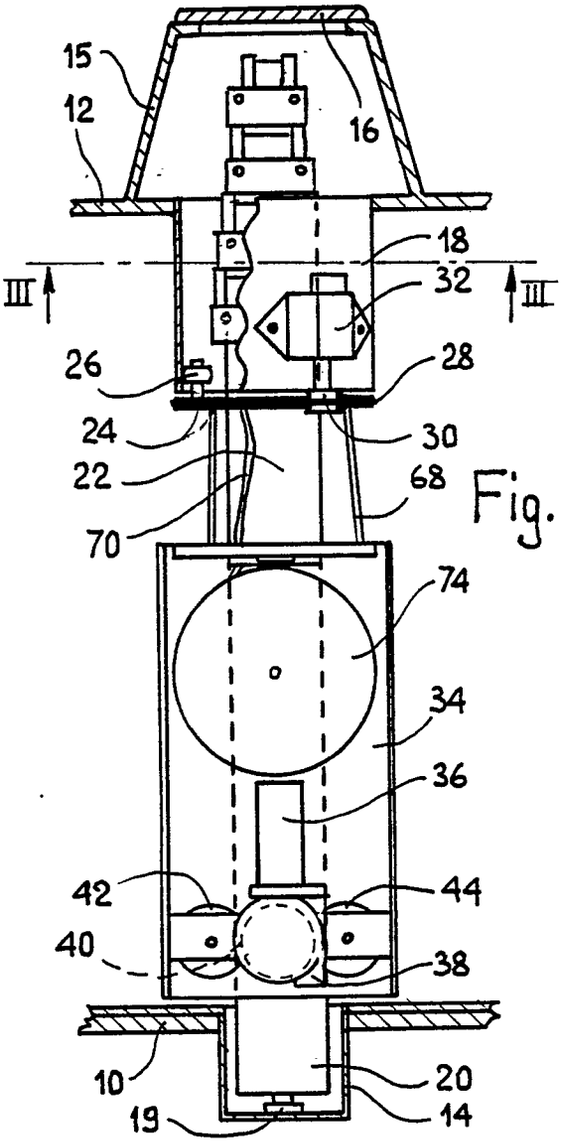

Fig. 1

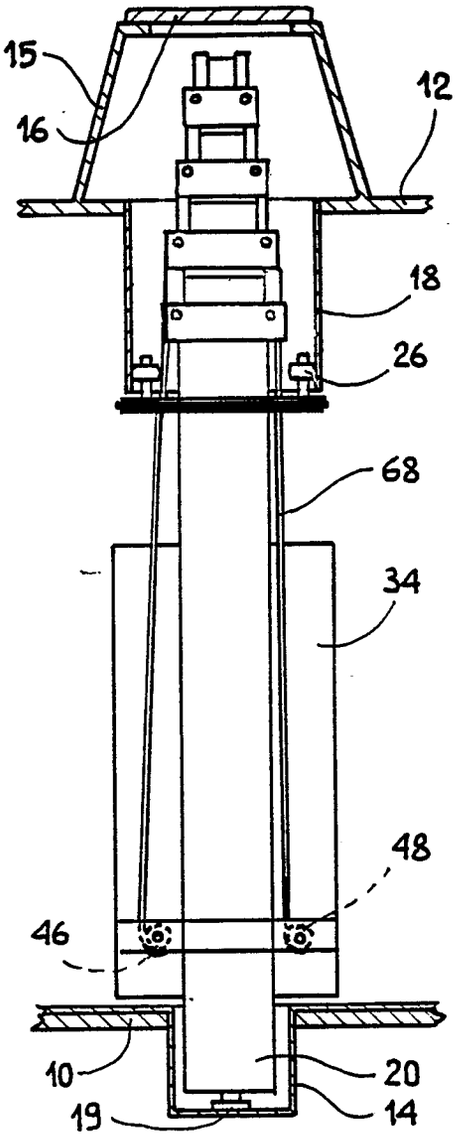

Fig. 2

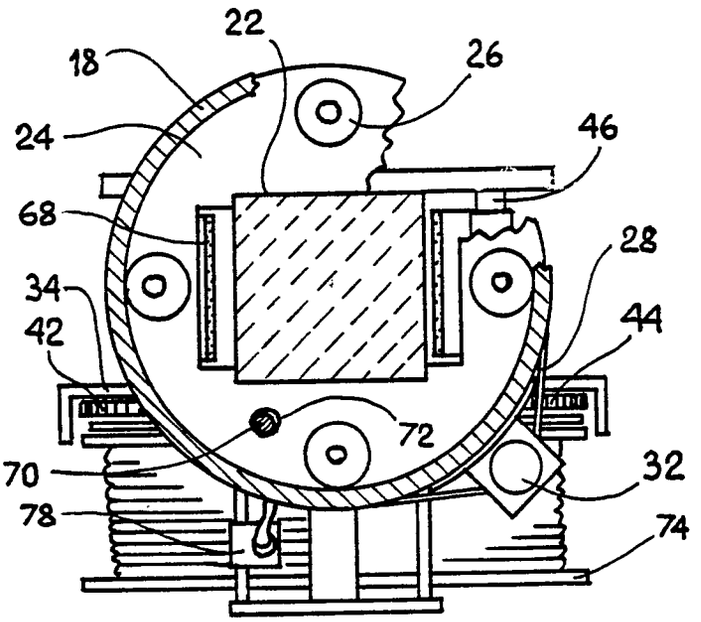

Fig. 3

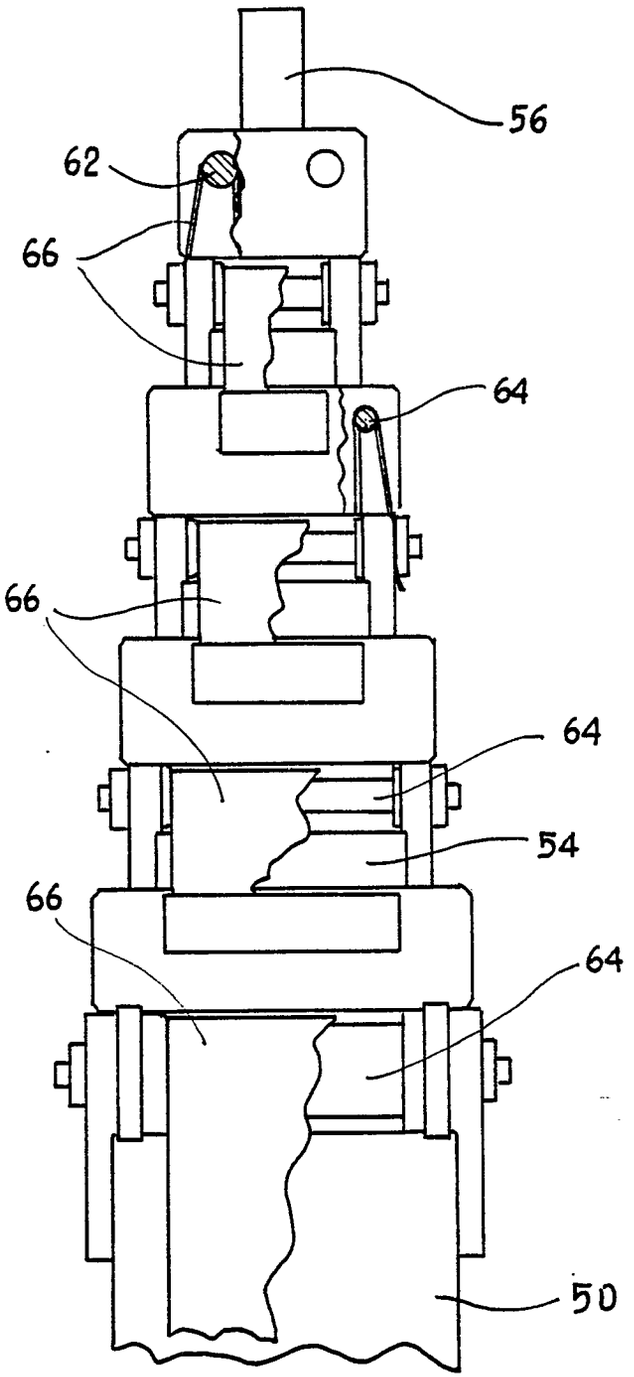

Fig. 4

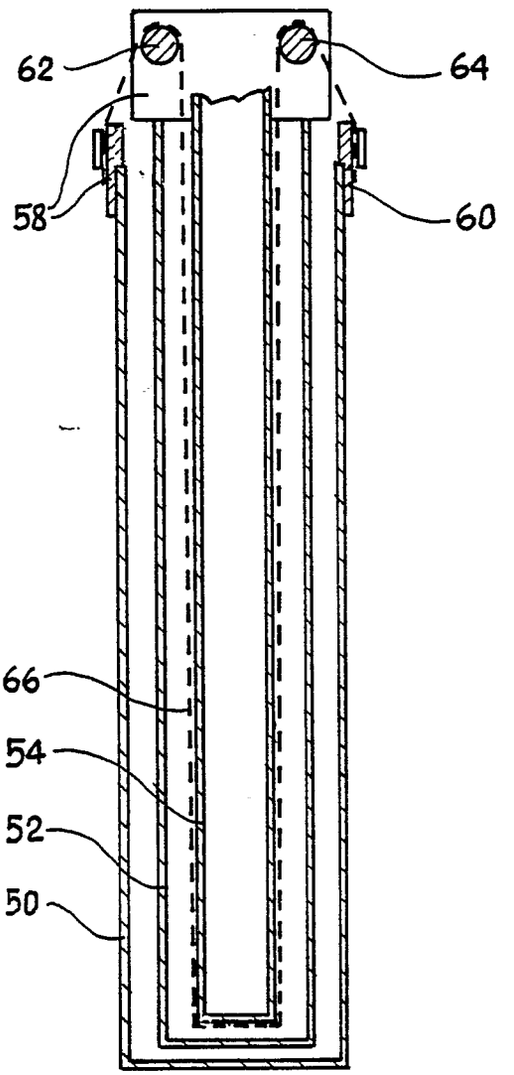

Fig. 5