Aug. 4, 1970 E. K. VON FANGE 3,522,608

TELESCOPING VHF-UHF ANTENNA FOR A TELEVISION RECEIVER

Filed Feb. 19, 1969 2 Sheets-Sheet 1

FIG.1.

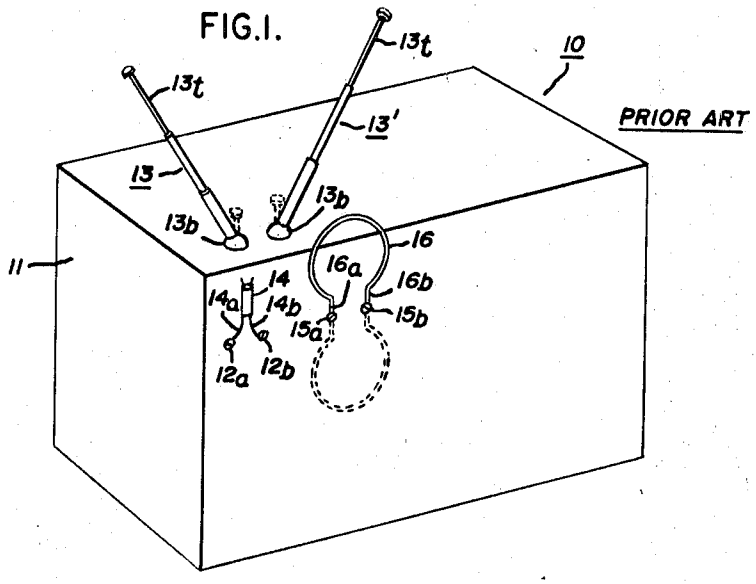


FIG.2.

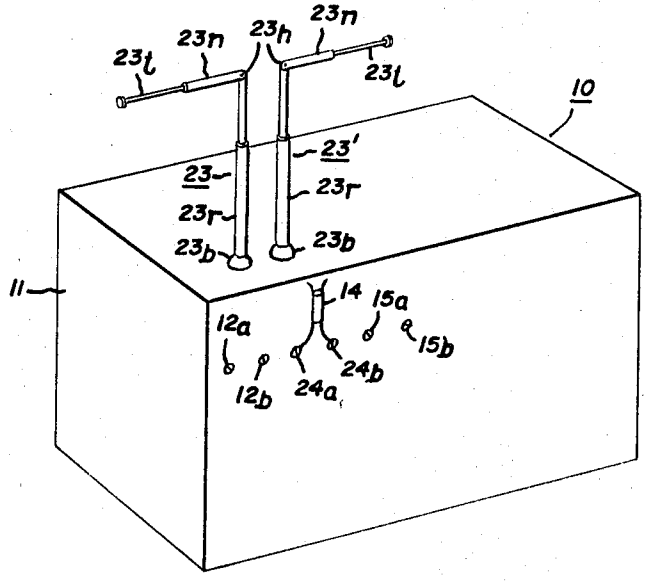
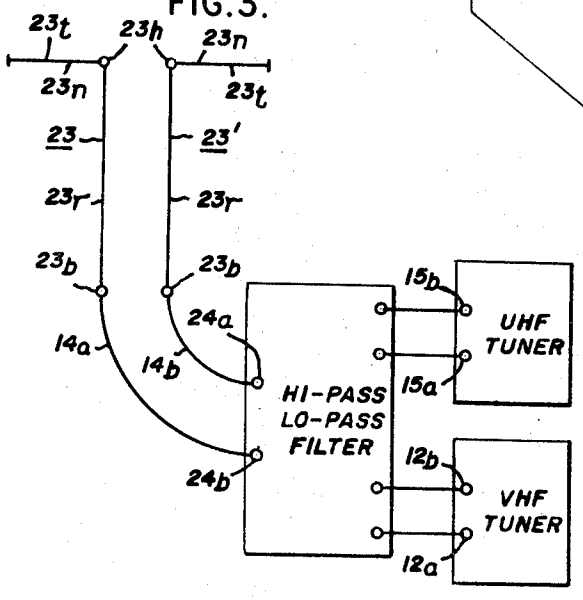


FIG.3.



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FIG.4A.

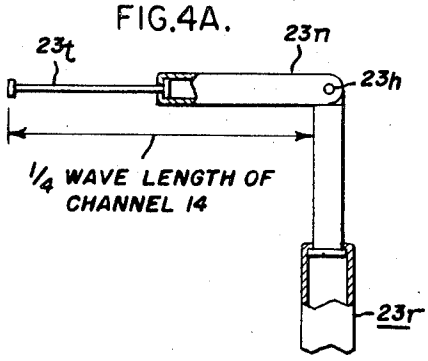


FIG.4B.

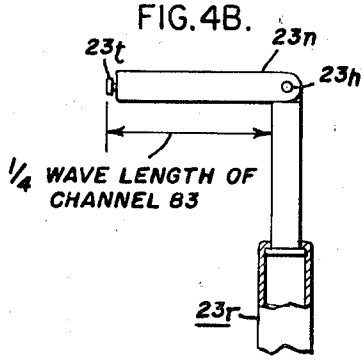


FIG.4C.

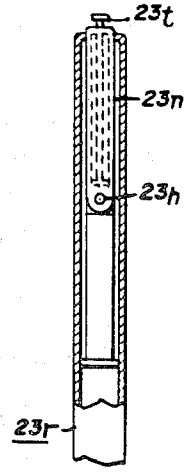


FIG.5.

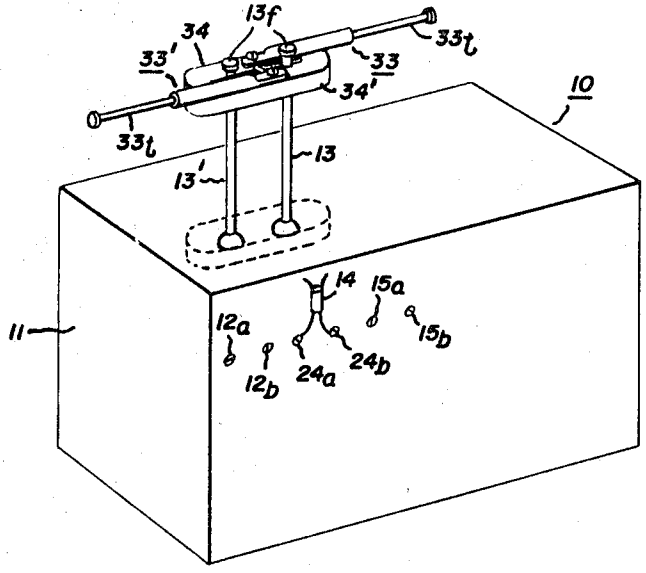
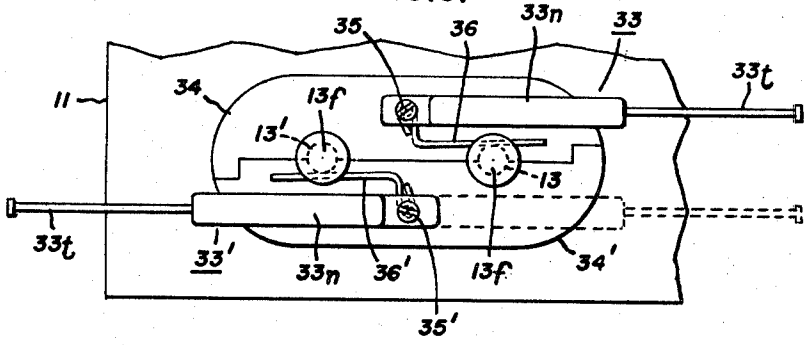


FIG.6.



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TELESCOPING VHF–UHF ANTENNA FOR A TELEVISION RECEIVER

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Int. Cl. H01q 1/24
U.S. Cl. 343—702 8 Claims

ABSTRACT OF THE DISCLOSURE

Improved indoor antenna means for a television receiver having a VHF tuner and a UHF tuner. The antenna means includes at least one telescopic VHF antenna pole having a lower section swivelled on the receiver top and an upper section movable along the pole long axis between a storage position adjacent to and extended positions spaced at various distances from the receiver. The loop-type UHF antenna that has been conventionally mounted on the receiver back is eliminated and replaced by at least one UHF antenna pole mountable on the VHF antenna pole for movement therewith and transverse extension therefrom. Thus, the swivelled, telescopic VHF antenna pole can also serve as adjustable support means for positioning the UHF antenna pole in a far greater variety of locations relative to the receiver than previously available with conventional UHF loop antenna, and, hence, the need to reposition the receiver to locate the indoor UHF antenna means in the region of maximum strength of the UHF signal sought to be tuned can be eliminated or greatly reduced.

BACKGROUND OF THE INVENTION

This invention relates generally to antenna means and, more particularly, to improved indoor antenna means for a television receiver having a VHF tuner and a UHF tuner.

Commercial television signals are telecast in the frequency spectra normally characterized as "very high frequency" and "ultra high frequency," respectively. These spectra are commonly referred to in abbreviated form as "VHF" and "UHF." The VHF spectrum extends between 54 to 216 megacycles, and the UHF spectrum extends from 470 to 890 megacycles.

In adapting television receivers for receiving both VHF (Channels 2 to 13) and UHF (Channels 14 to 83) stations, two separate tuners and antennas are usually used, with one tuner-antenna system being particularly designed for VHF reception and the other for UHF reception.

Typically, the indoor VHF antenna means is of the telescopic pole variety including one pole (monopole) or two poles ("rabbit ears") mounted on the receiver. Each telescopic VHF antenna pole usually includes a lower section, which is swivelled on the receiver top both for 360° rotary movement about the vertical axis and for angular movement between a vertical and near horizontal positions, and an upper section that is movable along the pole long axis between a retracted position adjacent to and extended positions spaced various distances from the receiver. On the other hand, the indoor UHF antenna means typically comprises a UHF loop antenna that is mounted on the back of the receiver.

While the wide range of adjustment relative to the receiver that is provided by the swivelled, telescopic pole-type construction usually permits location of the conventional indoor VHF antenna in the region of maximum signal strength without requiring repositioning of the receiver, it is frequently necessary to reposition the receiver

in order to so locate the less flexible conventional UHF loop antenna.

Furthermore, it would also be advantageous to convenience of operation and economy of manufacture if the conventional separate indoor antenna means could be combined into integrated antenna means which would function as a common indoor antenna means for both the VHF and UHF tuners.

As will become more evident as this description proceeds, the present invention provides improved indoor antenna means for a television receiver that is greatly simplified in comparison with the means heretofore available and which eliminates or greatly reduces the need for repositioning of the receiver to locate the UHF antenna means in the region of maximum strength of the signal sought to be tuned.

SUMMARY OF THE INVENTION

In accordance with one aspect of the present invention, it has been found that the aforedescribed deficiencies of previously known indoor antenna means can be overcome by eliminating the loop-type UHF antenna that is conventionally mounted on the back of the receiver and replacing it with at least one UHF antenna pole that can be mounted on the VHF antenna pole for movement therewith and transverse extension therefrom, such that the swivelled, telescopic VHF antenna pole can serve as adjustable support means for positioning the UHF antenna pole in a wide range of locations relative to the top, front, back and sides of the receiver. Thus, the need for repositioning the receiver in order to locate the UHF antenna means in the region of the maximum strength of the signal sought to be tuned can be eliminated or greatly reduced.

In accordance with another aspect of the present invention, the otherwise conventional swivelled, telescopic pole-type VHF antenna means is electrically connected to both the VHF and the UHF tuners such that the VHF antenna means can perform its normal function as receiving antenna for VHF signals and can also serve as a transmission conduit for carrying UHF signals from the novel pole-type UHF antenna means to the UHF tuner.

In accordance with yet another aspect of the present invention, integrated VHF–UHF indoor antenna means is provided by hinging the upper telescopic sections of the pole or poles of the otherwise conventional pole-type VHF antenna means for pivotal movement about an axis transverse to the VHF pole long axis with hinge means that can be telescoped along with the pole sections. Thus, the integrated VHF–UHF antenna means of the present invention can be moved between a storage position similar to that of the conventional pole-type VHF antenna means and extended positions in which the pole lower sections extend upwardly from the receiver to function either as VHF antenna means or as adjustable support means and transmission conduit means for the pole upper sections that can be pivoted about the hinge means to extend generally horizontally above the receiver to serve as pole-type UHF antenna means.

BRIEF DESCRIPTION OF THE DRAWING

The present invention is illustrated in the accompanying drawings wherein:

FIG. 1 is a rear elevational perspective view of a portable television recevier employing typical prior-art antenna means with antennae extended positions shown in full lines and antennae storage positions shown in shadow lines;

FIG. 2 is a view similar to FIG. 1 but showing the receiver equipped with a first form of the improved antenna means of the present invention;

FIG. 3 is a simplified schematic illustration of the electrical circuit of the form of the invention shown in FIG. 2;

FIGS. 4A–C are greatly enlarged elevational cross-sectional views showing details of a presently preferred form of hinge structure employed in the invention form of FIG. 2, with FIG. 4A showing the outermost sections of the pole-like antenna arranged to receive UHF channel 14, FIG. 4B showing them arranged to receive UHF channel 83, and FIG. 4C showing them arranged to be telescoped along with the hinge means and lower pole sections into the storage position;

FIG. 5 is a view similar to FIGS. 1 and 2 but showing an alternative form of the present invention substituted for the prior-art means of FIG. 1; and

FIG. 6 is a fragmentary top view of FIG. 5.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings, and particularly to FIG. 1 thereof, there is illustrated a typical portable television receiver **10** having a generally rectangular box-like outer cabinet **11** housing a VHF tuner and a UHF tuner (not shown). The VHF tuner is provided with a pair of electrical terminals **12***a* and **12***b* which extend from the back of the cabinet **11** for connection either with remotely located "outdoor" VHF antenna means (not shown) or with "indoor" VHF antenna means. As shown in FIG. 1, the indoor VHF antenna means is conventional and comprises a pair of electrically conductive poles or "rabbit ears" **13** and **13'** mounted on the top of the receiver cabinet **11** and respectively electrically connected to the VHF tuner terminals **12***a* and **12***b* by wires **14***a* and **14***b* of a standard 300 ohm impedance ribbon conductor **14**. The two VHF antenna poles **13** and **13'** are substantially identical to one another; each being formed of a plurality of telescopic tubular sections including a lowermost or base section **13***b* and an uppermost section **13***t*. The base section **13***b* is swivelled on the top of the receiver cabinet **11** in a well-known manner for 360° rotary movement about the vertical axis and for angular movement between the vertical and near horizontal positions. The uppermost section **13***t* can be moved along the pole long axis between a storage position (shadow lines), wherein its upper end lies adjacent the top of the receiver cabinet **11**, and a wide variety of extended positions (such as the extended position shown in full lines), wherein its upper end is spaced from the top of the cabinet. Thus, the conventional indoor VHF antenna poles **13** and **13'** can be retracted into the storage position when not in use and can be extended and swivelled through a wide range of locations relative to the top, front, rear and sides of the cabinet **11**. Hence, it is rarely necessary to reposition the receiver **10** in order to locate these conventional VHF antenna means **13** and **13'** within the region of maximum strength of the signal sought to be tuned by the VHF tuner.

As further illustrated in FIG. 1, the UHF tuner is provided with a pair of electrical terminals **15***a* and **15***b* which extend from the back of the receiver cabinet **11** for electrical connection either with remotely located "outdoor" UHF antenna means (not shown) or with "indoor" UHF antenna means. As shown in FIG. 1, the indoor UHF antenna means is conventional and comprises an electrically conductive open loop antenna **16** of substantially fixed dimension which has its opposite terminal ends **16***a* and **16***b* respectively electrically connected to the UHF tuner terminals **15***a* and **15***b* on the back of the receiver cabinet **11** and horizontally hinged for 180° pivotal movement through a variety of positions ranging between a storage position (shadow lines), in which the UHF loop **16** extends downwardly and substantially flush against the back of the cabinet (shadow lines) and an uppermost extended position (full lines). Thus, the conventional UHF antenna loop **16** can only be adjusted relative to the back of the receiver cabinet and cannot be

located in the areas in front of or on either side of the cabinet **11** without repositioning of the receiver **10**. Hence, it is frequently necessary to reposition the receiver **10** in order to locate the conventional UHF antenna loop **16** within the region of maximum strength of the UHF signal sought to be tuned by the UHF tuner.

In accordance with the present invention, it has been found that the aforementioned deficiencies of conventional indoor antenna means can be overcome or greatly mitigated by eliminating the conventional UHF loop antenna **16** and replacing it with novel pole-type UHF antenna means that can be mounted on conventional top-swivelled, telescopic pole-type VHF antenna means, similar to the VHF antenna poles **13** and **13'**, such that these extremely flexible VHF antenna means can also serve as adjustable support means for positioning the novel pole-type UHF antenna means in a far wider range of locations relative to the receiver **10** than previously possible with the conventional back-mounted UHF loop antenna **16** and, thus, eliminate or greatly reduce the need to reposition the receiver **10** in order to locate the UHF antenna means in the region of maximum strength of the signal sought to be tuned by the UHF tuner.

FIGS. 2–6 illustrate two presently preferred forms of the means provided by the present invention for achieving the desired improvements in indoor antenna means, with FIGS. 2–4 showing a first form in which the novel pole-type UHF antenna means is integrally hinged to the otherwise conventional pole-type VHF antenna means and with FIGS. 5 and 6 showing another form in which means are provided for detachably mounting the novel pole-like UHF antenna means on the otherwise conventional pole-type VHF antenna.

In the form of the present invention illustrated in FIGS. 2–4, the conventional UHF antenna loop **16** is wholly eliminated and the conventional VHF antenna poles **13** and **13'** are replaced by a pair of integrated VHF–UHF antenna poles **23** and **23'**. As shown, these integrated VHF–UHF antenna poles **23** and **23'** are generally similar to the conventional VHF antenna poles **13** and **13'** in that each is formed by a plurality of telescopic tubular sections including a base or lower section **23***b* that is swivelled on the top of a receiver cabinet **11**. However, in accordance with this form of the present invention, each of the integrated VHF–UHF antenna poles **23** and **23'** is provided with hinge means **23***h* which permits its uppermost **23***t* and next uppermost **23***n* telescopic sections to be pivoted to extend transverse to the pole long axis and circuit means are provided for connecting the integrated antenna poles **23** and **23'** to both the VHF and UHF tuners.

As shown schematically in FIG. 3, the integrated VHF–UHF poles **23** and **23'** are electrically connected to both the VHF and UHF tuners through passive switch means which comprises a well-known form of high-pass, low-pass filter that has a pair of terminals **24***a* and **24***b* which extend from the back of the receiver cabinet **11** and are respectively connected to the wires **14***a* and **14***b* of a standard 300 ohm impedance ribbon conductor **14** that are, in turn, connected to the base sections **23***b* of the integrated antenna poles **23** and **23'**. The well-known filter, shown in block in FIG. 3, is internally connected to the terminals **12***a*, **12***b*, and **15***a*, **15***b* of the VHF and UHF tuners respectively.

With this arrangement, normal operation in the VHF spectrum or band is substantially unaffected and the hinged upper sections **23***t* and **23***n* of the integrated VHF–UHF antenna poles **23** and **23'** can be pivoted at right angles (solid lines FIG. 2) to the remaining lower sections **23***r* thereof to form a UHF band dipole antenna. The remaining lower portions **23***r* of the integrated VHF–UHF antenna poles **23** and **23'** are utilized in conjunction with the ribbon conductor **14** as a substantially 300 ohm-impedance transmission line to feed the UHF signals through the filter and into the UHF tuner. Thus, the

remaining lower portions **23***r* of the integrated VHF–UHF antenna poles **23** and **23'** can be swivelled about their base sections **23***b* and/or telescoped along the pole long axis to bring their integrally hinged UHF antenna pole-forming upper sections **23***t* and **23***n* into the region of maximum signal strength.

The hinge means **23***h* is preferably made of the "flush-type" (such as used in many drafting instruments) so as to be telescoped with the remaining lower telescopic pole sections **23***r* into a storage position adjacent the top of the receiver cabinet, as shown in shadow lines in FIG. 1. As shown in detail in FIGS. 4A–4C the two uppermost sections **23***t* and **23***n* of each of the integrated VHF–UHF antenna poles **23** and **23'** are attached by the hinge means **23***h* for pivotal movement to extend at a right angle to the long axis of the pole and are sized in length such that when fully extended (FIG. 4A) they are equal in total length to ¼-wave length of the channel 14 signal (approximately 6 inches), and when the upper-most section **23***t* is fully retracted within the next uppermost section **23***n*, the combined length (FIG. 4B) of these sections **23***t* and **23***n* is equal to ¼-wave length of the channel **83** signal (approximately 3 inches). Of course, these UHF antenna pole lengths can be adjusted to receive intermediate channel signals by inwardly or outwardly adjusting the projection of the uppermost section **23***t* from the next uppermost section **23***n*. As further illustrated in FIG. 4C, the flush construction of the hinge means **23***h* allows the hinged upper sections **23***t* and **23***n* of the integrated VHF–UHF poles **23** and **23'** to be pivoted parallel to the pole long axis and telescoped along with the hinge means **23***h* and the remaining telescopic sections **23***r* below them into the retracted or storage position.

Thus it can be seen that the form of the present invention shown in FIGS. 2–4 provides integrated VHF–UHF antenna means comprising adjustable pole-type UHF antenna means **23***t* and **23***n* that are directly hinged to more or less conventional telescopic pole-type VHF antenna means **23***r* which, in turn, can function as adjustable support means for positioning the UHF antenna means **23***t* and **23***n* in a wide range of locations relative to the top, front, rear and sides of the receiver such that these novel UHF antenna means can be more frequently located in the region of maximum signal strength sought to be tuned without requiring repositioning of the receiver **10** than has previously been the case when the conventional UHF antenna loop **16** was employed.

In the alternative form of the present invention, illustrated in FIGS. 5 and 6, the conventional UHF antenna loop **16** is eliminated and replaced by a pair of UHF antenna poles **33** and **33'** which are respectively carried by a pair of interlocking insulator blocks **34** and **34'** that can be detachably mounted on the conventional VHF antenna poles **13** and **13'**, which are retained but are electrically connected to both the VHF and UHF tuners through suitable circuit means such as the previously described high-pass, low-pass filter.

As best shown in FIG. 6, the two insulator blocks **34** and **34'** are substantially identical to one another and are each provided with mating surfaces having a pair of notches which are adapted to be aligned around the two conventional VHF antenna poles **13** and **13'**. The two holes thus formed by the aligned mating notches are of such a diameter as to clear the outside diameter of the lower or base portion **13***b* of each of the conventional antenna poles **13** and **13'**, while the ferrule **13***f* provided on the top of each of the conventional VHF antenna poles **13** and **13'** is of a diameter larger than the holes formed by the aligned notches so that blocks **34** and **34'** are trapped on the two conventional VHF antenna poles **13** and **13'**. Each of the two UHF antenna poles **33** and **33'** comprises a pair of hollow tubular telescopic sections including an outer section **33***t* and an inner section **33***n* pivoted on its insulator block **34** or **34'** by an axle **35** or **35'** that

is substantially parallel to the long axes of the conventional VHF antenna poles **13** and **13'** when the blocks are clipped thereto. When fully extended, the combined length of the inner and outer sections **33***n* and **33***t* of each of the UHF poles **33** and **33'** equals ¼-wave length of the channel 14 signal (approximately 6 inches), and, when the outer section **33***t* is fully telescoped within the inner **33***h*, their combined length equals ¼-wave length of the channel 83 signal (approximately 3 inches). Each of the UHF antenna poles **33** and **33'** is respectively electrically and mechanically connected by an electrically conductive leaf spring **36** or **36'** to the ferrule **13***f* at the top of the uppermost section **13***t* of one of the conventional VHF antenna poles **13** or **13'**.

With this alternative form of the present invention normal operation of the VHF antenna poles **13** and **13'** in the VHF band is substantially unaffected and the UHF antenna poles **33** and **33'** can be elevated along with the upper sections **13***t* of the conventional VHF antenna poles **13** and **13'** and pivoted at right angles thereto about the block axles **35** and **35'** (as shown in solid lines in FIG. 5) to form a UHF band dipole antenna. The VHF antenna poles **13** and **13'** are utilized in conjunction with the two electrically conductive leaf springs **36** and **36'** and the standard ribbon conductor **14** as a 300 ohm impedance transmission line to feed the UHF signals from the UHF antenna poles **33** and **33'** through the high-pass filter and into the UHF tuner. Thus, the conventional VHF antenna poles **13** and **13'** can be swivelled about their base sections **13***b* or telescoped along their pole axis to bring the detachably mounted UHF antenna pole means **33** and **33'** into the region of maximum signal strength. And, as in the case with the form shown in FIGS. 2–4, the lengths of these alternative "clip-on" UHF antenna poles **33** and **33'** can be adjusted to intermediate UHF channel signals by inwardly or outwardly adjusting the amount of projection of the outer section **33***t* from the inner section **33***n*.

As will be evident from the foregoing description certain aspects of the present invention are not limited to the particular details of construction of the forms illustrated, and it is contemplated that various other modifications or applications will occur to those skilled in the art. For example, active switch means, such as a manually operated switch, might be substituted for the illustrated high-pass, low-pass filter in the circuit means for connecting the pole-type VHF and UHF antenna means to both the VHF and UHF tuners. Or, the pole-type UHF antenna means might be directly electrically connected to the UHF tuner through circuit means which omit the pole-type VHF antenna means. It is therefore intended that the appended claims shall cover such modifications and applications as do not depart from the true spirit and scope of the present invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In a television receiver having a VHF tuner and a UHF tuner and indoor antenna means including at least one telescopic VHF antenna pole having a lower section swivelled on the top of the receiver and an upper section movable along the pole long axis between a storage position adjacent the top of the receiver and extended positions spaced from the receiver, an improvement comprising: at least one UHF antenna pole mounted and electrically connected to the upper portion of the VHF antenna pole for movement therewith and transverse extension therefrom at a level sufficiently high above the receiver such that the VHF antenna pole also functions as adjustable support and electrical conduit means for positioning said UHF antenna pole in a wide range of locations relative to the top, front, rear and sides of the receiver whereby optimum UHF signal reception may be achieved without repositioning the receiver.

2. The invention of claim **1** wherein said UHF antenna pole comprises a telescopic pole that can be varied

in length so as to match the wave length of a particular UHF signal sought to be received.

3. The invention of claim 1, further including hinge means for directly hinging said UHF antenna pole to the VHF antenna pole for movement between a first position parallel to the VHF antenna pole long axis and a second position substantially at a right angle to the VHF antenna pole long axis.

4. The invention of claim 3, wherein said UHF pole and said hinge means can be telescoped along with said VHF antenna pole into the storage position.

5. Improved indoor antenna means for a television receiver having a VHF tuner and a UHF tuner, comprising:

(a) VHF antenna means including at least one telescopic VHF antenna pole having
  (1) a lower section adapted to be swivelled on the top of a television receiver and
  (2) an upper section movable along the pole long axis between a storage position adjacent the top of the receiver and extended positions spaced from the receiver;
(b) UHF antenna means including at least one UHF antenna pole; and
(c) mounting means for mounting and electrically connecting said UHF antenna pole to said VHF antenna pole upper section for movement therewith and transverse extension therefrom at a level sufficiently high above the receiver such that the VHF antenna pole

also functions as adjustable support and electrical conduit means for positioning said UHF antenna pole in a wide range of locations relative to the top, front, rear and sides of the receiver whereby optimum UHF signal reception may be achieved without repositioning the receiver.

6. The invention of claim 5, wherein said UHF antenna pole is integrated with said VHF antenna pole by said mounting means.

7. The invention of claim 5, wherein said UHF antenna pole is detachably mounted on said VHF antenna pole by said mounting means.

8. The invention of claim 5, wherein said improved antenna means comprises a pair of said VHF antenna poles each having one of said UHF antenna poles mounted thereon by said mounting means.

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ELI LIEBERMAN, Primary Examiner

U.S. Cl. X.R.

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