Dec. 30, 1969 S. SIMONS 3,487,415

COMBINATION UHF-VHF TELEVISION RECEIVING ANTENNA

Filed June 6, 1967

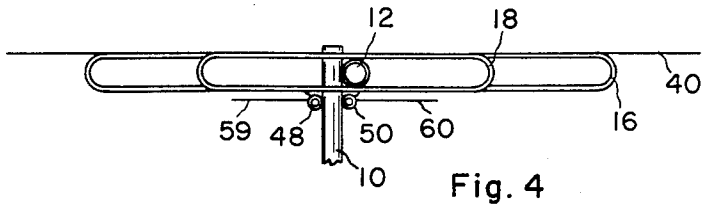


Fig. 4

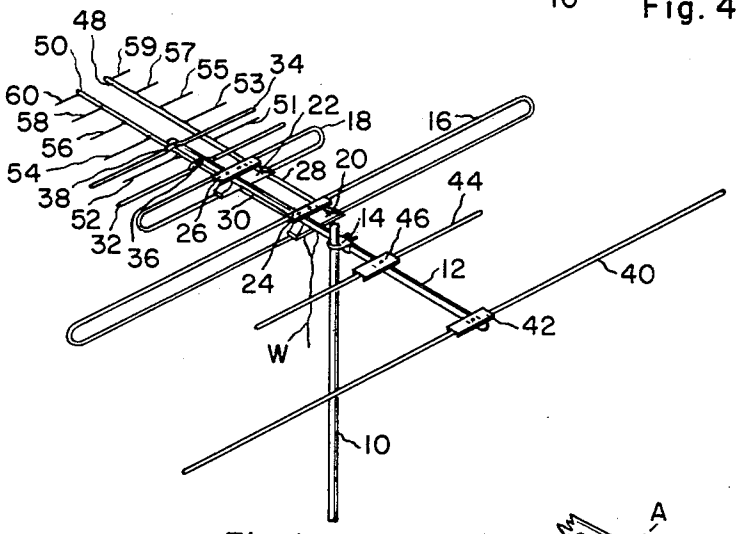


Fig. 1

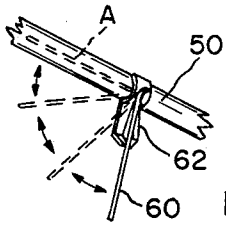


Fig. 2

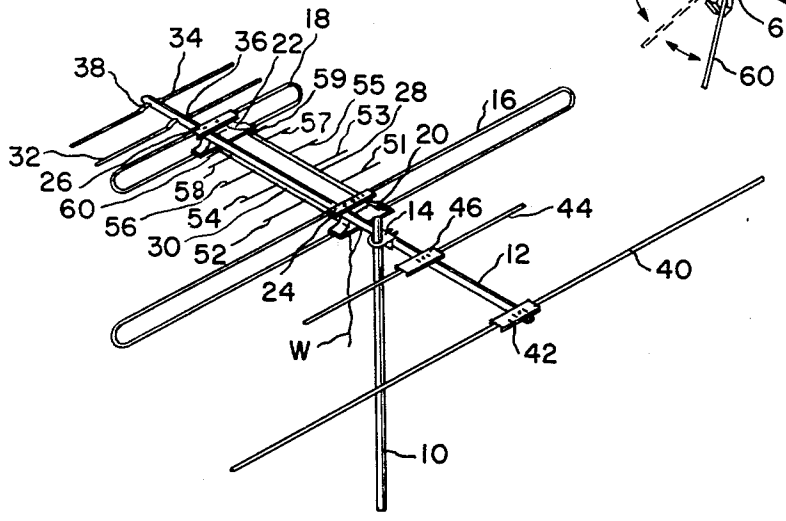


Fig. 3

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COMBINATION UHF-VHF TELEVISION RECEIVING ANTENNA

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U.S. Cl. 343—814 7 Claims

ABSTRACT OF THE DISCLOSURE

A combination UHF-VHF TV receiving antenna which is physically small yet operates exceedingly efficiently, and which has adjustability features to achieve the optimum in operating characteristics on both VHF and UHF channels. A separate low band VHF dipole, a high band VHF dipole and a plurality of VHF dipoles are connected to a common linear transmission line with tuned sections to decouple the inactive dipoles from the active one.

The design of any combined UHF and VHF TV receiving antenna is complex because of the wide range of frequencies to be covered. The low band VHF is from 54 mHz. to 88 mHz. The high band VHF is in the range from 174 mHz. to 216 mHz. On the other hand, the UHF channels operate from 470 mHz. to 890 mHz.

It is an object of the present invention to construct a TV receiving antenna that operates efficiently in both the VHF and UHF bands yet is small in size for decreased wind resistance, and is consequently economical to manufacture.

Another object of the present invention is the construction of a tapered UHF unit consisting of wire elements which thereby effectively cover the full UHF band.

A further object of the present invention is to provide adjustment features on the antenna to ensure the best possible reception on both VHF and UHF channels.

The above and other features, objects and advantages of the present invention will be fully understood from the following description considered in connection with the accompanying illustrative drawings.

FIG. 1 is a perspective view of my combined VHF-UHF television receiving antenna constructed in accordance with the teachings of the present invention.

FIG. 2 is a perspective view of one of UHF wire elements disclosing the movement of the wire element from the extended position to the folded-back position.

FIG. 3 is a perspective view of a modification of the TV receiving antenna illustrated in FIG. 1.

FIG. 4 is a front elevational view of the antenna illustrated in FIG. 1.

Referring to the drawings, the present television receiving antenna comprises a vertical mast **10** upon which is mounted a horizontal boom **12**. Both the mast and the boom are preferably constructed of aluminum tubing. A U-bolt clamping bracket assembly **14** rigidly fixes the boom **12** to the mast **10**. Secured to the boom **12** is a low band VHF folded dipole **16** and spaced therefrom a high band folded dipole **18**. Both dipoles **16** and **18** are supported on one side of the boom **12** by means of metal brackets **24** and **26** respectively. In addition, both dipoles **16** and **18** are further supported and insulated from the other side of the boom **12** by means of insulators **20** and **22** respectively. Connectors **28** and **30** are parallel-

spaced and connect the low band VHF dipole **16** with the high band VHF dipole **18**. Directors **32** and **34** mounted forward of dipole **18** are supported by metal brackets **36** and **38** respectively. In addition, low band VHF reflector **40** is supported on the boom **12** by a metal bracket **42** while high band VHF reflector **44** is supported on the boom **12** by metal bracket **46**.

It should be noted that conductors **48** and **50** are extensions of connectors **28** and **30** and project forwardly toward the front of the antenna.

The dipoles, reflectors, directors, connectors and conductors are preferably constructed of aluminum tubing of between ⅜ inch and ½ inch outside diameter.

Mounted on the parallel-spaced conductors **48** and **50** are UHF elements **51** through **60** respectively which are preferably constructed of ⅛ inch diameter aluminum wire. The UHF elements are tapered from the front to the rear to thereby ensure full coverage of the UHF band. The five UHF dipoles are resonant at various points on the UHF band. This staggered tuning permits the UHF system to respond efficiently to all the channels in the UHF frequency range of 470 mHz. to 890 mHz. FIG. 2 discloses a UHF wire element in its normal extended position whereby it is seated in the spring-like split bracket **62**. The UHF wire element **60** may be folded back to the position A, as shown in dotted lines in FIG. 2, for shipping purposes.

The lead-in wire W connects into the antenna at the insulated bracket **20** at the junction of the low band VHF dipole **16** and the connectors **28** and **30**.

It should be noted that the present novel combination UHF and VHF TV receiving antenna operates effectively on all bands. Thus, when operating on the low VHF band, the high VHF band dipole **18** together with the connectors **28** and **30** add up to an equal ¼ wavelength resonant section of short circuited transmission line which has the characteristic of exhibiting a high impedance at its open end. Therefore, the high band VHF dipole **18** will have a negligible loading effect on the operative low band VHF dipole **16**, the latter intercepting the signal. Moreover, any reactance introduced by conductors **48** and **50** together with the UHF elements **51–60** can be compensated for by adjusting the lengths of connectors **28** and **30** by means of movement of the positions of the high band dipole **18**. Low band directivity and gain is enhanced by means of reflector **40**.

When operating on the high VHF band connectors **28** and **30** are ¼ wavelength long and make the low VHF band dipole **16** appear at **18** as a high impedance because of the inverting properties of the ¼ wavelength section constituted of connectors **28** and **30**. Similarly, the low VHF band dipole **16** together with the connectors **28** and **30** may be adjusted in length to provide the optimum impedance across **18** to enhance the performance at the high VHF band. Thus, conductors **48** and **50** together with the reactance of UHF elements **51–60** are of such a length as to simulate a ½ wavelength open section of transmission line and will therefore exhibit high impedance at **18** to thereby result in negligible loading effects. Furthermore, any undesirable reactance can be compensated for by a slight readjustment of connectors **28** and **30**. In addition, high band directivity and gain are further increased by utilizing directors **32** and **34** and reflector **44**.

When operating at UHF frequencies the VHF dipoles will be far removed from their resonance point and therefore will have a minimum loading effect on the UHF system. Moreover, any reactance encountered can be com-

pensated for by the adjustment of conductors **48** and **50** as well as UHF dipole elements **59** and **60**. In addition, it should be pointed out that the high VHF folded dipole **18** functions as a reflector for the UHF section thereby resulting in maximum high gain on all UHF channels.

A television antenna constructed in accordance with the teachings of this invention has the following dimensions:

UHF elements:	Inches
51 and **52**	5½
53 and **54**	4¾
55 and **56**	4
57 and **58**	3½
59 and **60**	3
High band directors **32** and **34** (end to end)	25
High band dipole **18** (end to end)	29
Low band dipole **16** (end to end)	80
High band reflector **44** (end to end)	33½
Low band reflector **40** (end to end)	109
Distance from low band reflector **40** to high band reflector **44**	22
Distance from high band reflector **44** to low band dipole **16**	11
Distance from low band dipole **16** to high band dipole **18**	12
Distance from high band dipole **18** to first director **34**	6
Distance from first director **34** to second director **32**	6
Distance from high band VHF dipole **18** to UHF elements **51** and **52**	6
Distance from UHF elements **51** and **52** to UHF elements **53** and **54**	4½
Distance from UHF elements **53** and **54** to UHF elements **55** and **56**	4
Distance from UHF elements **55** and **56** to UHF elements **57** and **58**	3½
Distance from UHF elements **57** and **58** to UHF elements **59** and **60**	3

FIG. 3 illustrates an alternate embodiment of the present invention in which the UHF elements **51–60** are mounted on the connectors **28** and **30** and thereby reduce the overall length of the antenna. The directors **32** and **34**, however, remain in the same relative positions on the antenna assembly.

I claim:

1. An antenna for receiving television signals on both VHF bands and UHF bands comprising a dipole driven element for receiving the low frequency VHF television band and another spaced dipole driven element for receiving the high frequency VHF television band, a pair of spaced connectors connecting said driven dipoles, said spaced connectors being about ¼ wavelength long at said high frequency VHF television band, a pair of spaced conductors being forward extensions of said connectors in front of said dipole for the high frequency television band, and a plurality of UHF dipoles mounted on said spaced conductors, said conductors together with said UHF dipoles being resonant as a ½ wavelength transmission line at the high frequency VHF television band.

2. An antenna for receiving television signals on both VHF bands and UHF bands as set forth in claim **1** wherein said dipole driven elements are folded dipoles, and said folded dipole for receiving said high frequency VHF television band functions as a reflector for said UHF dipoles.

3. An antenna for receiving television signals on both VHF bands and UHF bands as claimed in claim **1** wherein the lengths of said connectors may be changed to overcome any reactance introduced into the antenna by said conductors and UHF dipoles when operating on the the antenna at the high VHF television band.

4. An antenna for receiving television signals on both VHF and UHF bands as claimed in claim **1** wherein said low band VHF dipole and said connectors may be changed in length to provide the proper impedance value in the antenna and thereby enhance the performance of the high VHF television band.

5. An antenna for receiving television signals on both VHF and UHF bands as set forth in claim **1** wherein when operating at said UHF band any reactance therein can be compensated for by adjustment of the length of said conductors and at least two UHF dipole elements.

6. An antenna for receiving television signals on both VHF and UHF bands as set forth in claim **1** wherein said UHF system is constituted of a plurality of spaced dipoles arranged in a tapered pattern which are resonant at various points of the UHF band whereby said plurality of spaced dipoles respond efficiently to all the channels in said UHF system.

7. An antenna for receiving television signals on both VHF bands and UHF bands comprising a dipole driven element for receiving the low frequency VHF television band and another spaced dipole driven element for receiving the high frequency VHF television band, a pair of spaced connectors connecting said driven dipoles, said spaced connectors being about ¼ wavelength long at said high frequency VHF television band, a plurality of UHF dipoles arranged in a tapered pattern mounted on said spaced connectors between said dipole for receiving the low frequency VHF television band and said dipole for receiving said high frequency VHF television band.

References Cited

UNITED STATES PATENTS

2,975,423 3/1961 Wells ..... 343—817

ELI LIEBERMAN, Primary Examiner

U.S. Cl. X.R.

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