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J. BERGER ET AL

3,403,404

PORTABLE ANTENNA ASSEMBLY

Filed April 29, 1966

3 Sheets-Sheet 1

FIG. 1.

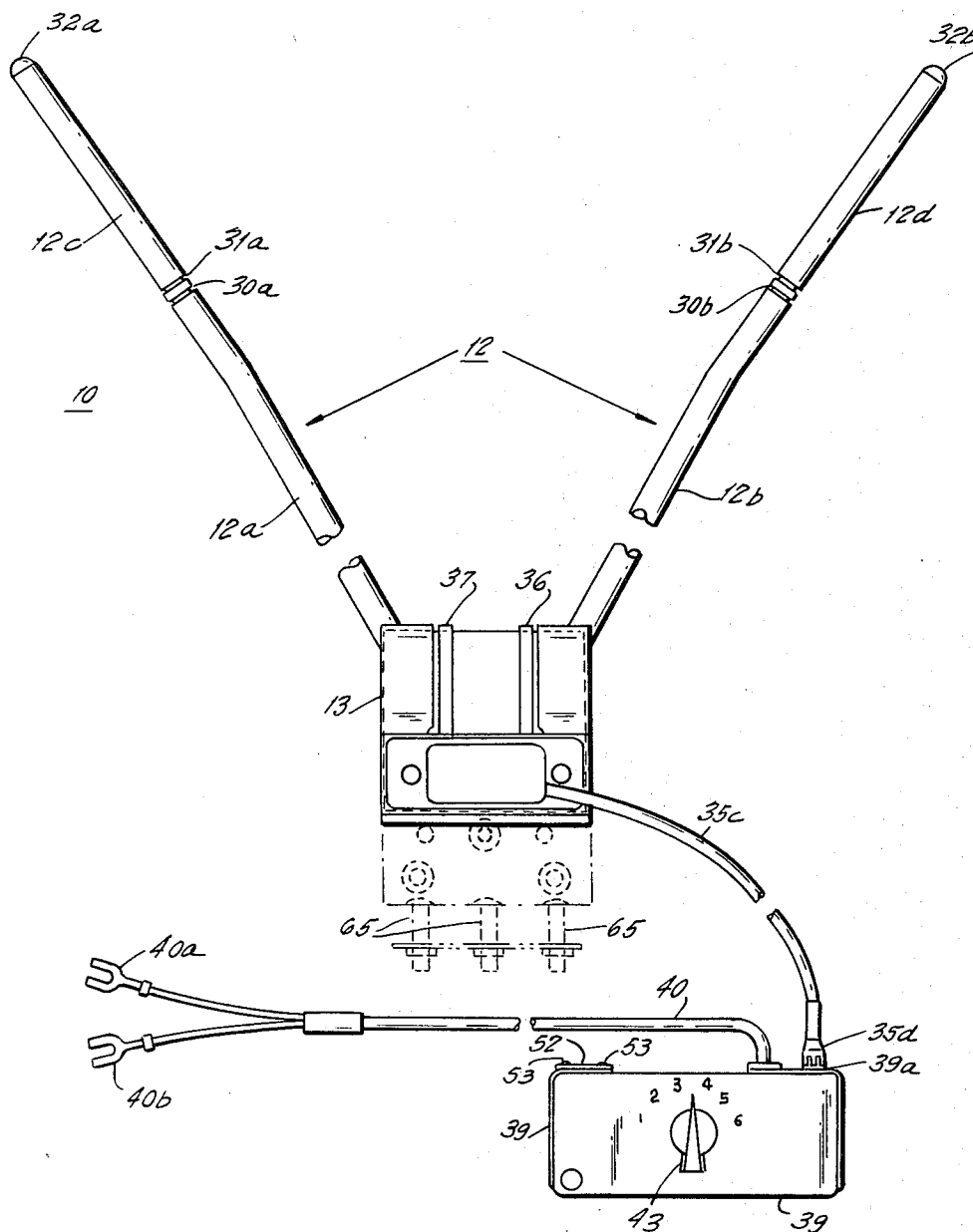
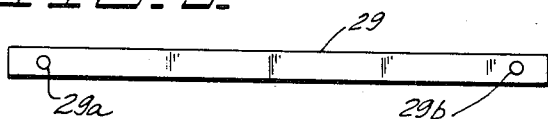


FIG. 5.



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FIG. 2.

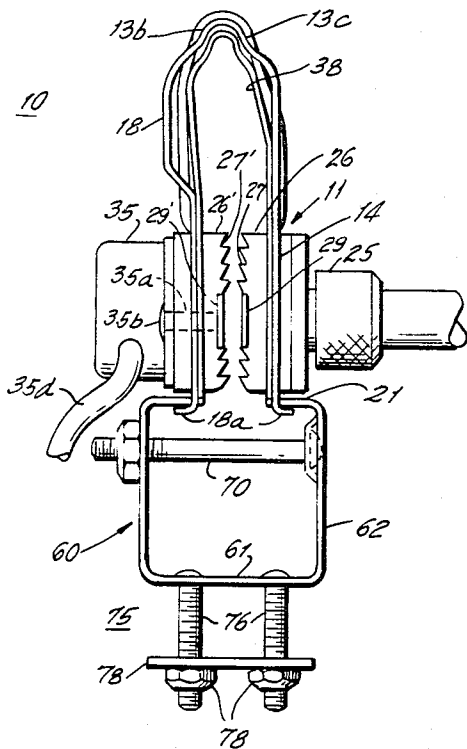


FIG. 3.

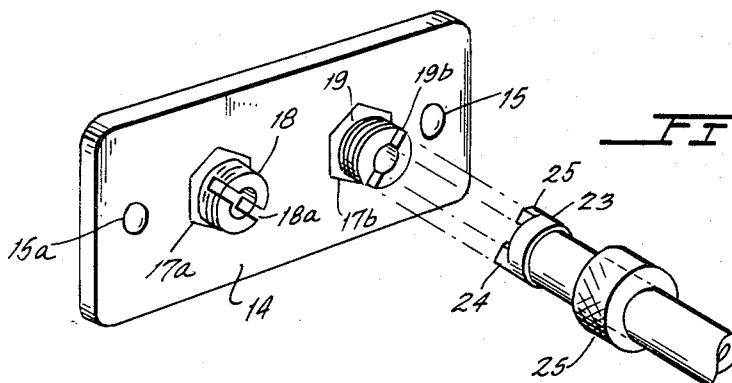
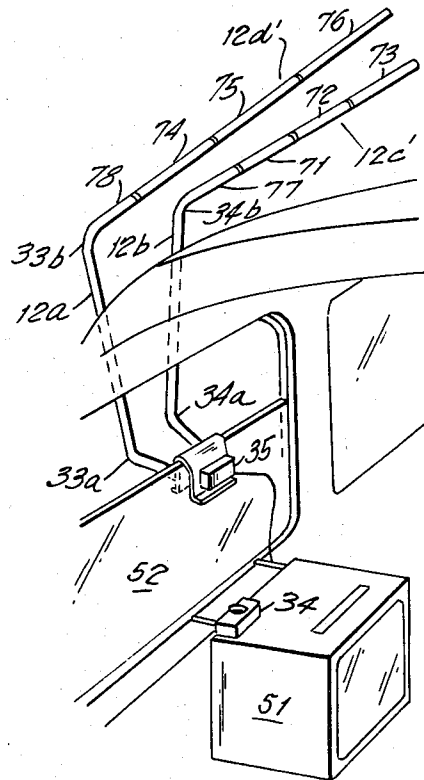


FIG. 4.

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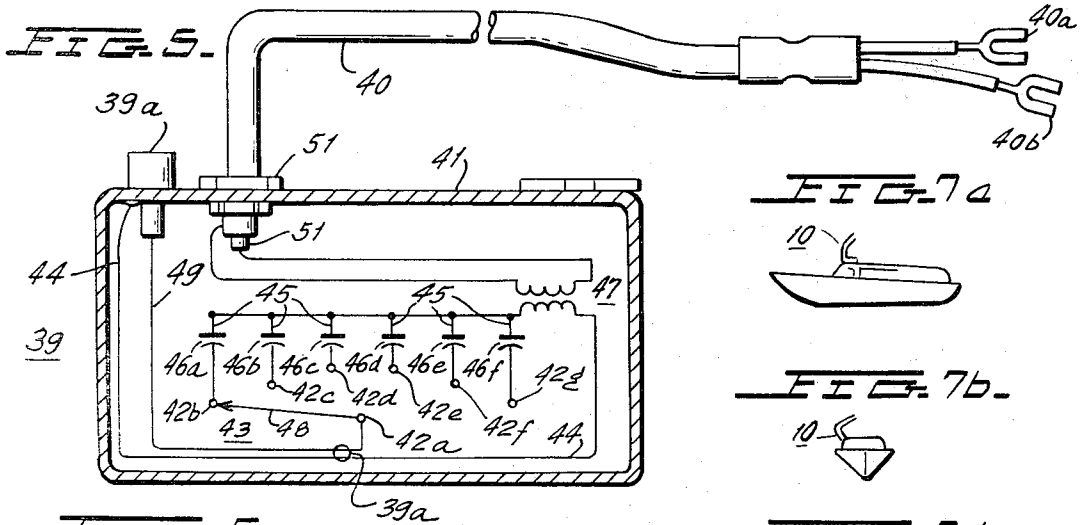


FIG. 6a.

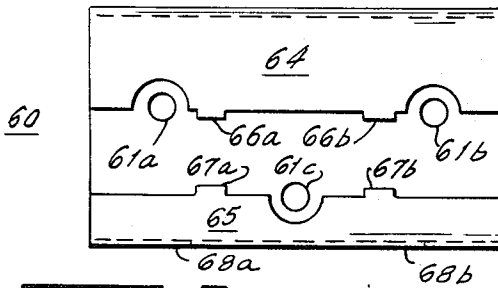


FIG. 6b.

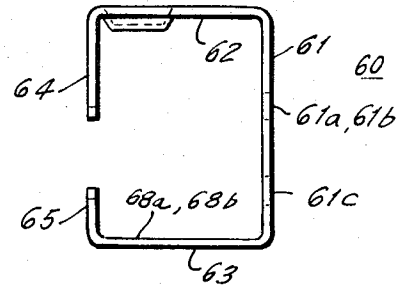


FIG. 8a

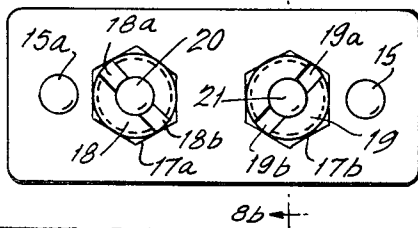


FIG. 8b.

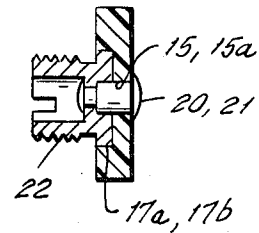
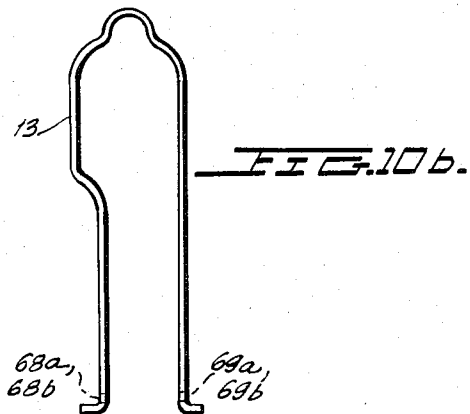
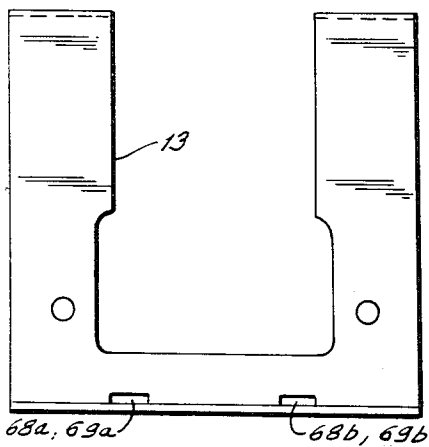


FIG. 10a.



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PORTABLE ANTENNA ASSEMBLY

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Filed Apr. 29, 1966, Ser. No. 546,378
7 Claims. (Cl. 343-713)

The instant invention relates to antennas, and more particularly to an antenna assembly for use with portable TV receivers which yields vastly improved reception capabilities over present-day portable antenna assemblies while providing versatile mounting means to greatly facilitate mounting of the antenna in a variety of different ways.

Present-day portable TV receivers typically employ telescoping antenna assemblies which, due to their collapsible capability, are substantially self-storing and occupy very little space in the collapsed condition, usually being capable of being collapsed within the confines of the receiver housing so as to facilitate transportability of the receiver. However, such telescoping antenna assemblies have certain drawbacks in that they are not capable of being extended in certain environments, and they provide only marginal reception in suburban areas which lie outside of metropolitan areas where TV transmitting stations are normally located. As one example, the use of portable TV receivers in automobiles is rapidly increasing. However, due to the confines of an automobile, it is quite often impossible to extend the dipole arm or arms of the telescoping antenna assemblies. Also, the metallic body of the automobile will act as a barrier to transmitted waves, and such portable TV telescoping antennas are not normally designed to cope with automobile ignition interference. In addition thereto, in other applications such as, for example, on marine craft where sufficient headroom may be available for extending the telescoping antenna assemblies, such telescoping assemblies fail to provide the reception required outside the normal reception ranges due to their low gain characteristics.

The instant invention is characterized by providing a portable TV antenna structure which is capable of being easily and readily mounted upon an automobile, and having bracket means to expand the versatility of the mounting means in order to mount the antenna to moving structures such as marine craft, and the like.

The instant invention is comprised of a substantially U-shaped window clamp assembly which is designed to fit snugly upon the upper edge of a car window which is rolled down to receive the clamp assembly. The interior surface of the window clamp assembly is provided with a pair of gripping gaskets preferably formed of a resilient material for frictionally engaging the opposing surfaces of the window. After slipping the window bracket upon the rolled-down window, the window may then be completely closed to provide a snug mounting. The window bracket is designed in such a way to permit the window to be completely closed, with the bracket mounted upon the window to provide for a snug mounting, as well as to prevent the ingress of air, rain, snow or any other objectionable matter.

The window clamp assembly is provided with a pair of joining nut assemblies for receiving the lower sections of the antenna dipoles which are each bent in two places along their length so as to generally conform to the exterior curvature of the automobile. The upper sections of the antenna dipoles are mounted to their associated lower sections by means of joining nut assemblies, and when so secured, extend over the top of the automobile.

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The window clamp assembly is provided with insulated cable means which are electrically connected to the antenna dipole located on the exterior side of the car window, and generally follow the curvature of the U-shaped mounting bracket so as to extend to the interior side of the window where they are electrically connected to a balun transformer means which is mechanically secured to the window bracket assembly. The insulated connecting strip is so positioned within the window bracket assembly so as not to be capable of being damaged by the window when it is in the fully closed position. A coaxial cable coupled to the balun transformer assembly is electrically mated to an input terminal of a control box which has an exterior mounting bracket for securing the control box to the upper surface of the portable TV receiver. The control box is provided with impedance matching elements which are designed to react with the antenna dipoles so as to improve the reception characteristics of the antenna for all VHF channels. The control box is provided with manually operable switching means for selectively switching one of the impedance elements into circuit with the antenna dipoles in order to improve the antenna reception characteristics. The antenna, which consists of a V-bent dipole mounted to the window bracket assembly, is designed to be resonant in the $\lambda/4$ mode at 55 megacycles (channel 2). This means that the same dipole structure will be resonant in the $3\lambda/2$ mode at 175 megacycles (channel 7). Thus, the dipole is a multimode element being resonant in the $\lambda/2$ mode for low band, and $3\lambda/2$ mode for the high band operation. The impedance matching control box is provided with a sufficient number of impedance matching elements and switch positions to match the reactance of the antenna for operation at channels 3 through 6 in the low band VHF and 8 through 13 in the high band VHF. The balun transformer is provided for the purpose of transforming the real impedance of the antenna from 20 ohms to 75 ohms in order to match antenna impedance to the TV receiver input impedance.

The impedance matching control box is further provided with an output terminal which is electrically coupled through a coaxial cable to the antenna input terminals of the TV receiver.

When not in use, the upper and lower sections of the antenna dipoles can be uncoupled from one another and the lower sections of the antenna dipoles can be uncoupled from the window mounting bracket to facilitate storage and transportation of the antenna. When it is desired to use the antenna, it is a simple matter to couple the antenna dipole lower sections to the window mounting bracket and to couple the upper dipole sections to the lower sections. The window mounting bracket simply and readily slips over the upper edge of the window, and the window can be rolled up to the completely closed position in order to provide a snug fitting of the window mounting assembly to the automobile. The two sections of coaxial cable are then connected between transformer and control box to antenna input leads of the TV receiver.

In operation, the portable receiver is tuned to a television station and adjusted for normal reception. The control box manually operable switch means may then be operated to any one of its plurality of positions to provide the best reception for the channel being received. The antenna is designed to give optimum performance under average operating conditions, and is further designed to minimize the pick-up of automobile ignition interference.

In the case where it is desired to mount the portable antenna assembly upon a boat, for example, this may be readily and simply done through the use of a marine mounting bracket which is a substantially U-shaped member comprised of a yoke or base portion having a pair of

arms extending from said yoke in substantially the same direction. The outer marginal edges of said arms are bent inwardly so as to extend toward one another. These bent portions or flanges are adapted to embrace the lower ends of the window mounting assembly whose marginal edges are bent outwardly and away from one another so as to be bent around and lie beneath the flanges of the marine bracket. The marine bracket flanges are further provided with a plurality of projections or tabs adapted to be received by suitable slots of substantially similar dimensions provided near the lower end of the window mounting assembly bracket. Apertures are provided in the arms of the marine bracket for receiving suitable fastening means so as to draw the arms of the marine bracket and hence, the flanges, toward one another in order to very snugly embrace the window mounting assembly. The marine bracket is further provided with suitable apertures in its base portion and, additionally, in one of its arms for the purpose of securing these brackets to a mounting surface.

Mounting of the marine bracket may be performed simply by employment of suitable fastening means in either the apertures provided in one arm thereof or in the base portion for securement to a mounting surface. The window mounting assembly may then be inserted between the facing flanges of the marine bracket, and the bracket fastening members may then be tightened, causing the marine bracket to very snugly embrace the window mounting assembly. The marine bracket may be left in position on the mounting surface, and the antenna assembly may be dismounted from the marine bracket very simply through the loosening of the marine bracket fastening means so as to permit use of the antenna assembly in an automobile. While the marine bracket has been described as being capable of simply and readily mounting the antenna assembly to marine craft, it should be understood that the bracket is versatile enough to be employed in a variety of other applications.

It is, therefore, one object of the instant invention to provide a novel antenna assembly for use with portable TV receivers.

Another object of the instant invention is to provide a novel antenna assembly for use with portable TV receivers having a first mounting assembly to permit the antenna to be simply and readily mounted upon an automobile window.

Still another object of the instant invention is to provide a novel antenna assembly for use with portable TV receivers, and having novel mounting assemblies enabling the antenna assembly to be removably mounted upon an automobile window or a suitable mounting surface of marine craft, for example, and to be readily and simply removed and disassembled.

Another object of the instant invention is to provide a novel antenna assembly for use with portable TV receivers which is so designed as to be simply and readily mounted upon the window of an automobile wherein the antenna dipoles are positioned exterior to the automobile and generally conform to the curvature of the automobile body.

Another object of the instant invention is to provide a novel antenna assembly for use with portable TV receivers, and the like, and having a mounting assembly to permit the antenna assembly to be readily and simply mounted upon the window of an automobile, and further having manually adjustable impedance matching means for improving the reception of all TV channels in the VHF band.

These and other objects of the instant invention will become apparent when reading the accompanying description and drawings, in which:

FIGURE 1 is an elevational view of an antenna assembly designed in accordance with the principles of the instant invention.

FIGURE 2 shows an end view of the mounting assemblies of FIGURE 1.

FIGURE 3 is a perspective view showing the manner in which the antenna assembly is mounted to an automobile.

FIGURE 4 is a perspective view showing in detail the manner in which the lower dipole element is secured to the antenna window mounting assembly.

FIGURE 5 is a schematic diagram showing the electronic arrangement of the antenna control box.

FIGURES 6a-6b are top and end views, respectively, of the marine bracket.

FIGURES 7a-7b show two different views of a marine mount for the antenna assembly.

FIGURES 8a-8b are front and end views, respectively, of the dipole mounting plate of FIGURE 4.

FIGURE 9 is a plan view of one of the holding plates shown in FIGURE 2.

FIGURES 10a and 10b are side and end views, respectively, of the automobile mounting plate of FIGURES 1-3.

Referring now to the drawings, FIGURES 1 and 2 show the antenna assembly 10 of the instant invention, which is comprised of a window mount assembly 11 for positioning and supporting the antenna dipole assembly 12 upon an automobile, in a manner to be more fully described.

The window mounting assembly 11 is comprised of a substantially U-shaped bracket 13 having a pair of outwardly directed flanges 13a and 13b at its lower end. A first arm of the bracket 13 has secured thereto a front insulator plate 14 which is a substantially flat rigid insulating member made of a suitable plastic and which is provided with a pair of openings 15 and 15a for receiving rivet members 16, only one of which is shown in FIG. 2. FIGURES 8a and 8b show the top and end views of the front insulator plate 14. A second pair of openings 17a and 17b are provided for receiving the lock plugs 18 and 19 which are secured to front insulator plate 14 by means of rivets 20 and 21, respectively. The lock plugs 18 and 19 are threaded at 22 in order to threadedly engage mating plugs, to be more fully described, which are secured to the lower ends of the lower dipole elements. The lock plugs 18 and 19 are each provided with a pair of grooves 18a-18b, 19a-19b, for receiving the locating pin structure provided at the lower end of the lower antenna dipole elements. As shown in FIGURE 4 the locating pins are rigidly secured to lower ends of the lower dipole elements 12a and 12b (see FIG. 1) and each pin 22 is provided with a pair of projections 23 and 24 which are arranged substantially in straight line fashion and which are designed to be received by the slots, for example, the slots 19b-19b in order to align the lower dipole elements 12a and 12b at an angle to the vertical direction as shown in FIGURE 1. The lower elements 12a and 12b are rigidly secured to the lock plugs and hence to the bracket assembly by means of the slip nuts 25, shown best in FIGURES 2 and 4, which have their interiors threaded so as to threadedly engage the threaded portions 22 of lock nuts 18 and 19.

The opposite surface of the bracket arm supporting the front insulator plate also supports a substantially flat vinyl mounting member 26 which is provided with a plurality of grooves 27 for frictionally gripping an automobile window in a manner to be more fully described. The vinyl mount member 26 is provided with a pair of openings for receiving the rivets 16. A harness strip 29, shown also in FIGURE 9 and which is a substantially flat and narrow metallic member, is provided with a pair of holes 29a and 29b for receiving the rivets 16 so as to rigidly secure both the harness strip and the vinyl mount to the bracket 13 by means of rivets 16.

The dipole antenna 12, as was previously described, is comprised of a pair of lower dipole elements 12a and 12b which are bent in the manner best shown in FIG-

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URE 3. The lower ends of the lower elements are secured to the bracket assembly 11 and aligned in the manner shown in FIGURE 1 by virtue of the cooperation between the lock plugs 18 and 19 with the locating pins 23 and with the slip nuts 25. The upper ends of lower elements 12a and 12b are provided with male join nuts 30a and 30b which threadedly engage female join nuts 31a and 31b to allow for simple disassembly of the antenna for handling and transportation purposes. The upper element portions 12c and 12d to which the female join nuts 31a and 31b are secured, are also provided at their extreme upper ends with sealing plugs 32a and 32b, respectively. While the assembly in its preferred form, is comprised of antenna elements 12a-12d which are hollow tubular members, it should also be understood that these members may also be formed out of solid rods if desired. With the antenna in the fully assembled form, as can best be seen in FIGURE 3, it will be noted that the dipole lower elements 12a and 12b are each bent at 33a-33b and 34a-34b, whereas the upper element portions 12c and 12d are substantially straight.

The remaining arm of bracket 13, as shown in FIGURE 2, has secured thereto a housing 35 formed of a suitable insulating material for positioning and supporting a balun transformer which is employed for the purpose of impedance matching between the antenna and the portable TV receiver when control box 3 is not employed. The housing 35 is provided with suitable openings 35a which receive rivets 35b to secure housing 35 to the interior arm of bracket 13. The opposite surface of the interior bracket arm supports a second vinyl mount 26', having a plurality of grooves 27' and which is substantially identical to the vinyl mount 26 both in configuration and function. The mount 26' is also provided with a plurality of openings for receiving the rivets 35b. A second back-up strip 29' substantially identical to that shown in FIGURE 9, receives the rivets 35b through suitable openings provided therein to rigidly position and secure the balun transformer housing 35 and vinyl mount 26'.

The rivets 20 and 21, shown best in FIGURES 8a and 8b, are electrically connected to conductors 36 and 37 which are housed within insulating sleeves. The first end of the conductors 36 and 37 are electrically connected to the rivets 20 and 21 and hence to the dipole elements, while the opposite ends of these conductors are electrically connected to the input terminals of the balun transformer (not shown) contained within the transformer housing 35. As can best be seen in FIGURE 2, the conductors 36 and 37 are bent in substantially U-shaped fashion and follow the general contour of bracket 13. A substantially flat relatively flexible sheet of plastic material 38 is sandwiched between the vinyl mounts 26, 26' and the arms of bracket 13 and follows the general contour of bracket 13, for the purpose of protecting the sheathed conductors 36 and 37 against any damage by the automobile window when mounted to a car.

The output terminals of the balun transformer (not shown) are coupled through a coaxial cable 35c, as can best be seen in FIGURE 1, and are electrically coupled to an input terminal 39a of control box 34 by means of a plug 35d. The control box 39 is provided for the purpose of tuning the antenna to peak performance at each one of the channel frequencies by means of an electrical circuit to be more fully described. The output of the control box is coupled to a coaxial cable 40 which is provided at its extreme end with a pair of terminal lugs 40a and 40b for coupling to the antenna input terminals of a TV receiver. The balun transformer 49 is preferably mounted within control box 34 in place of the balun transformer contained within housing 32. The balun transformer may be mounted in housing 32 when the control box is not employed.

The electrical circuit of the control box 39 is shown best in FIGURE 5 and is comprised of a molded case 41 having a pin plug 39a for receiving the plug 35d of

coaxial cable 35c. The pin plug 39a is electrically connected through lead 40 to one terminal 42a of a one-pole, six position non-shorting switch 41, which switch is operated by the switch knob 43 shown in FIGURE 1. The positions 1-6 shown on the face plate of housing 39 serves to identify the position of the switch at any given instant. One lead of the coaxial pin plug 39a is electrically connected through conductor 44 and the primary winding of balun transformer 47, to a plurality of conductors 45, all of which are electrically connected to one terminal of ceramic disc capacitors 46a-46f, respectively. The other terminals of capacitors 46a-46f are electrically connected to the switch terminals 42b-42g, respectively. Electrical connection between the terminal 42a and one of the terminals 42b-42g is established by means of a rotatable contact arm 48 which is in continuous engagement with terminal 42a and which selectively engages only one of the terminals 42b-42g at any given time. The rotary contact arm 48 is rotatable under control of a shaft (not shown) secured to the manually operable switch knob 43 shown in FIGURE 1. With the switch in the position shown in FIGURE 6 the electrical circuit is as follows:

One terminal of plug 39a is coupled through conductor 49 to terminal 42a of switch 41. The remaining terminal of plug 39a is electrically coupled through conductor 44, which is inductively coupled to the secondary winding of balun transformer 49 as well as one terminal of all of the capacitors 46a-46f. The conductor 49 is coupled through terminal 42a and rotary contact arm 48 to terminal 42b. The output winding of balun assembly 47 is electrically coupled through output plug 51 and coaxial cable 40 to the antenna input terminal of the portable receiver, thereby placing the selected capacitive reactance in series with one arm of the dipole assembly.

The electrical circuitry of FIGURE 5 acts as an impedance match to match the single dipole assembly 12 on all of the VHF channels. The antenna assembly 12 is preferably of a dipole length which is resonant in the $\lambda/2$ mode at 55 megacycles (channel 2). This means that the same dipole assembly 12 will be resonant at the $3\lambda/2$ mode at 175 megacycles (channel 7). Thus, the dipole is a multi-mode element working in the $\lambda/2$ mode for low-band reception and the $3\lambda/2$ mode for the high band.

Measuring the impedance of the dipole at frequencies in the low-band above channel 2 and at frequencies in the high band above channel 7, it is found that the dipole has an inductive reactance. At the higher frequencies of each band some device is necessary to match the dipole. In the antenna assembly described herein the six-position switch is coupled in electrical series with one arm of the dipole assembly 12. Each capacitive reactance is then selectively inserted in series with the dipole assembly. The capacitive reactance tunes out the inductive reactance of the dipole. With proper selection of the capacitors used in the switch all 12 TV channel frequencies can be matched. The balun assembly 49 is a transformer having a ratio of preferably 4:1. The assembly 47 plays no part in bringing the dipole to a resonance on the higher channels, but is required to transform the real impedance from 20 ohms to 75 ohms in order to match the dipole assembly to the input impedance of the receiver. The values of the ceramic disc capacitors 46a-46f, in order to achieve such matching, have values of 1.8, 3.9, 27, 15, 68 and 12 picofarads, respectively.

FIGURE 3 shows the manner in which the antenna assembly of the instant invention may be mounted upon an automobile.

In one preferable embodiment the control box 39 is positioned on top of the portable receiver 51. The control box 39 is provided with a bracket 52 which is riveted at 53 to control box 39 and is provided with a suitable opening for fastening to the rear surface of the portable receiver 51. The window mounting assembly 11 is secured

to the automobile by winding down the automobile window 52 to an amount sufficient to permit the arms of bracket 13 to embrace the opposite sides of window 52 in the manner shown in FIGURE 3. The vinyl mounts 26 and 26' will frictionally engage the surfaces of the window. The assembly is mounted so as to have the dipole antenna elements 12 extending to the exterior of the automobile, in the manner shown. The window 52 is then preferably rolled all the way up to provide a snug mounting. The upper bends 13b and 13c of bracket 13, shown best in FIGURE 2, permit bracket 13 to be received within the groove in the window frame in which the top edge of the window is normally received, thereby providing a very snug fit for the assembly. The flexible plastic sheet 38 acts to prevent the sheathed conductors 36 and 37 from being damaged when the antenna assembly is mounted in this fashion.

With the transformer housing 35 extending to the interior of the automobile, the plug 35d of coaxial cable 35c is then plugged in to the receiving plug 39a of control box 39, as shown best in FIGURE 1. The coaxial cable 40 extending from control box 39 is then secured by means of its terminal lugs 40a and 40b to the antenna input terminal of the portable receiver 51. The manner in which the portable receiver 51 is mounted within the automobile is optional and lends no novelty to the device of the instant invention.

In operation, the portable receiver 51 is tuned to a television station and adjusted for normal reception. The control box switch knob 43 may then be adjusted to any one of the six positions provided in order to obtain the best reception for the channel being received.

FIGURE 3 shows an alternative arrangement for the antenna dipole assembly of FIGURE 1. The upper dipole sections 12c and 12d are comprised of telescoping portions 71-73 and 74-76 respectively, shown in the fully extended position. When collapsed, the sections 71-73 are concealed in the upper portion 77 of their lower dipole arm section. Likewise, sections 74-76 when collapsed are concealed in the upper portion 78 of their associated lower dipole arm section. This arrangement reduces the number of elements which must be assembled to one another. The section 71-73 and 74-76 are placed in the operating position simply by moving them from the collapsed (concealed) to the extended position as shown in FIGURE 3.

In cases where the antenna assembly is to be mounted at other locations such as, for example, upon marine craft, a marine bracket 60 is provided. Bracket 60 can best be seen in FIGURES 1, 2 and 6a-6c. The bracket 60 is bent to form a substantially C-shaped configuration, as can best be seen in FIGURES 2 and 6c. The bracket 60 is comprised of a base portion 61 having a pair of extending arms 62 and 63 which are bent inwardly at their upper ends to form the flanges 64 and 65, respectively. Flanges 64 and 65 are provided with a pair of projections 66a-66b and 67a-67b which are designed to be inserted within the cooperating slots 68a-68b and 69a-69b respectively, provided in the arms of bracket 13, as can best be seen in FIGURES 2, 10a and 10b.

The base portion 61 is provided with a plurality of apertures 61a-61c for receiving suitable fastening members 65, shown in FIGURE 1, for securing the base portion 61 to a mounting surface. Arm 63 is provided with a pair of openings 68a-68b and arm 62 is provided with a pair of recessed square-shaped openings 69a-69b for the purpose of receiving the fastening means, one of which is shown in FIGURE 2.

Arm 62 is further provided with a pair of openings 71a and 71b to provide for side mounting, in a manner to be more fully described.

When it is desired to use the antenna assembly on marine craft, for example, the manner of mounting can best be appreciated from a consideration of FIGURES 1, 2, 7a and 7b.

In order to obtain a top mount assembly as shown in FIGURE 7a, the base portion 61 of bracket 60 is secured to a mounting surface 75 by means of fastening members 76. The underside of the mounting surface is provided with a suitable support plate 77 having openings for receiving fastening member 76. The nuts 78 which threadedly engage bolt 76 may then be tightened to rigidly secure bracket 60 to the mounting surface 75. If the mounting surface 75 is of appreciable thickness and is a sufficiently strong durable material, screws such as, for example, wood screws, may be employed in place of the bolts 76, nuts 78 and supporting plate 77.

Having secured bracket 60 to the mounting surface 75, the window mounting bracket 13 is then inserted between the flanges 64 and 65 of bracket 60, in the manner shown in FIGURE 2, so that the projections 67a-67b and 66a-66b of flanges 65 and 64, respectively, are inserted into the associated slots 68a-68b and 69a-69b, provided near the lower ends of the arms of bracket 13. The bolts 70 are then inserted into the recessed openings 69a and 69b in bracket arm 62 and nuts 79 are rigidly tightened so that the marine bracket 60 rigidly embraces and supports the window mounting bracket 13. As shown in FIGURE 2, the right-hand ends of bolts 70 are preferably provided with a rectangular-shaped cross-section near the heads thereof in order to be keyed to the square shaped openings 69a and 69b, thereby facilitating the tightening of lock nuts 79.

If it is desired to provide a side mount for the antenna as shown in FIGURE 7b, the openings 71a and 71b provided in bracket arm 62 may be employed for the purpose of receiving the bolt 76, shown in FIGURE 2, to provide such a side mounting. The use of the antenna upon marine craft will be the same as previously described with respect to the use of the antenna within an automobile. While the mounting bracket 60 has been shown mounted to marine craft, it should be understood that the bracket can be used for mounting an antenna assembly upon any horizontal vertical or inclined surface. When mounting the antenna assembly in a car as shown in FIGURE 3, bracket 60 is omitted.

It can therefore be seen from the foregoing that the instant invention provides a novel antenna assembly having a wide variety of applications for use with portable receivers and having novel mounting assemblies to allow the antenna assembly to be used with equal ease in automobiles, on marine craft or on any other mounting desired.

Although there has been described a preferred embodiment of this novel invention, many variations and modifications will now be apparent to those skilled in the art. Therefore, this invention is to be limited, not by the specific disclosure herein, but only by the appending claims.

What is claimed is:

1. An antenna assembly comprising a window mounting assembly including a substantially U-shaped bracket; a pair of dipole elements; means for removably coupling the inboard ends of said dipole elements to one arm of said bracket; sheathed conductive means having a first end thereof electrically coupled to the inboard ends of said dipole elements and being arranged to follow the general contour of said bracket member; the opposite end of said sheathed conductive means being located near the end of the remaining arm of said bracket; cable means electrically coupled to said sheathed conductor means for coupling the antenna assembly to a receiver; first and second resilient sheets being secured to the inner surfaces of said bracket arms for embracing and frictionally engaging the rolled down window of an automobile to permit said antenna assembly to be rigidly mounted thereto.

2. The antenna assembly of claim 1 further comprising threaded coupling means for removably securing the in-board ends of said dipole elements to one arm of said bracket, each of said threaded coupling means being comprised of a first coupling member secured to said bracket arm near the lower end thereof and being provided with an outwardly projecting locator pin when said coupling elements threadedly engage one another to orient the associated dipole element at a predetermined angular position.

3. The antenna assembly of claim 1 wherein each of said dipole elements are comprised of upper and lower sections being removably coupled to one another by male and female join nuts, respectively, which threadedly engage one another and which are rigidly secured to the upper end of said lower element section and the lower end of said upper element section, respectively.

4. The antenna assembly of claim 1 wherein said dipole elements have a tip-to-tip length of the order of $\lambda/2$ wavelengths at the lowest VHF channel frequency wherein λ is equal to the wavelength of the lowest channel frequency; control means electrically coupled between the receiver and said cable including a plurality of reactive elements and manually settable switch means for electrically connecting one of said reactive elements in series with one of said dipole elements, the values of said reactive elements being selected to cancel the inductive reactance of the antenna dipole assembly at each of the channel frequencies of the VHF band in order to provide peak reception thereof.

5. The antenna assembly of claim 1 further comprising second bracket means for enabling said antenna assembly to be secured to a mounting surface;

said second bracket assembly being comprised of a substantially U-shaped bracket having a base portion and first and second arms both extending in a first direction, the marginal ends of said arms being bent toward one another to form first and second flanges, each of said flanges having at least one pro-

jecting ear extending in the same direction as its associated flange;

the extreme ends of said window mounting assembly bracket being bent away from one another to form a pair of second and third flanges, each of said first bracket arms being provided with a slot for receiving an associated projecting ear of said second bracket means;

said second bracket means base portion being provided with apertures for receiving fastening means to secure said second bracket to a mounting surface;

the first and second flanges of said second bracket assembly being positioned to embrace the third and fourth flanges of said first bracket assembly;

the projecting ears of said third and fourth flanges being positioned within the associated slots provided in the arms of said first bracket assembly;

the arms of said second bracket assembly each being provided with at least one aperture, said apertures being substantially in alignment;

fastening means inserted through said aligned apertures for joining the arms of said second bracket assembly toward one another in order to tightly embrace the flanges of said first bracket assembly.

6. The antenna assembly of claim 5 wherein at least one arm of said second bracket assembly is provided with additional apertures for receiving fastening means to secure said second bracket to a vertically aligned mounting surface.

7. The assembly of claim 1 wherein the outboard ends of said dipole are each comprised of a plurality of telescoping sections.

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