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R. N. LEONARD

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TELEVISION RECEIVING ANTENNA

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2 Sheets-Sheet 1

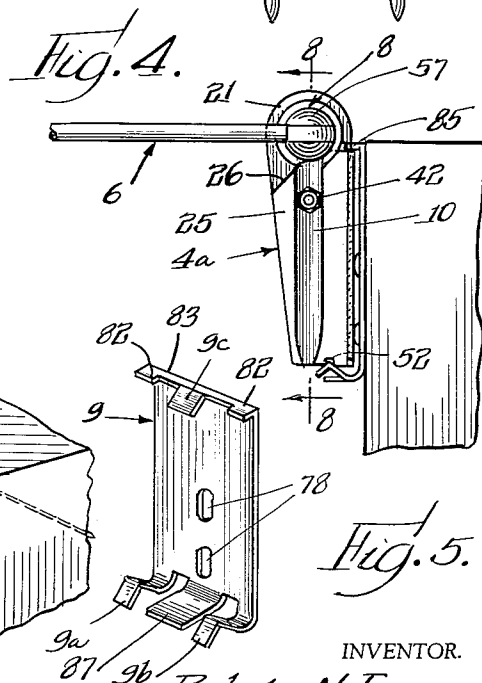
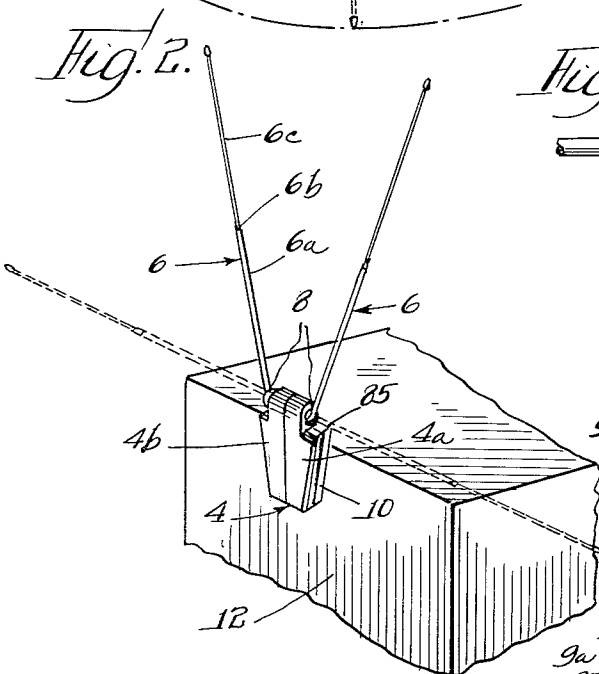
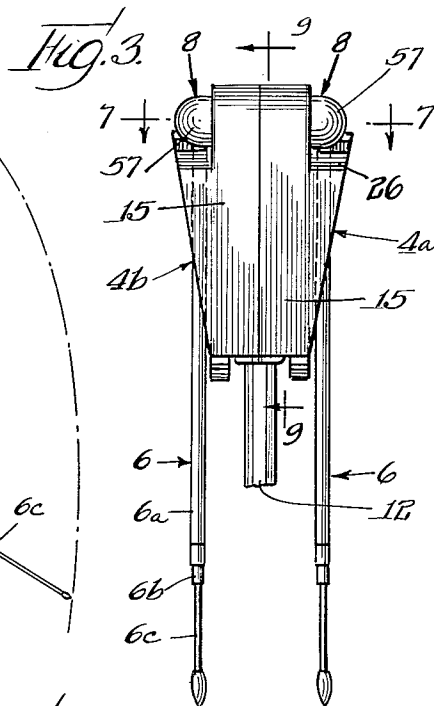
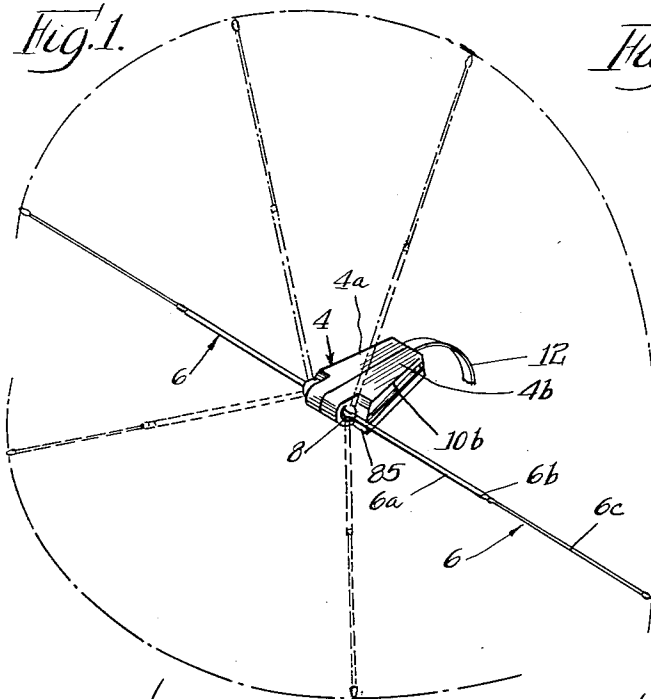


Fig. 5.

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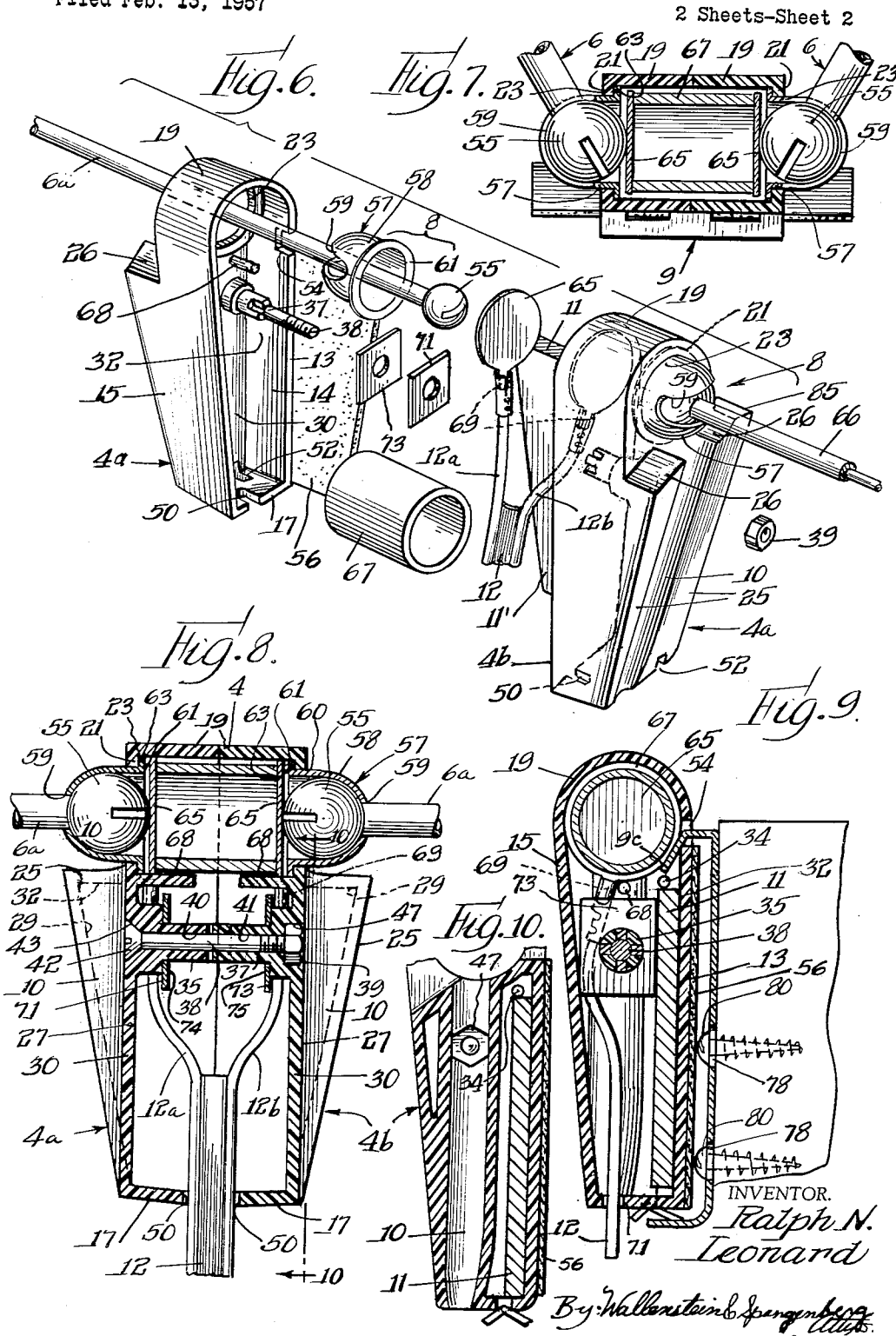
Ralph N. Leonard

By: Wallenstein & Spangenberg
attys.

R. N. LEONARD

TELEVISION RECEIVING ANTENNA

2 Sheets-Sheet 2



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2,979,720

TELEVISION RECEIVING ANTENNA

Ralph N. Leonard, Crystal Lake, Ill., assignor to The Radion Corporation, Chicago, Ill., a corporation of Illinois

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The present invention relates to portable, indoor-type television receiving antennas, particularly to the so-called rabbit-ear antennas comprising a pair of extensible rod assemblies which are pivotally mounted for relative movement over a range of positions.

It is commonly known that the optimum length for television receiving antennas varies with the frequency of the signal being received and that, due to reflections of the television signals from buildings and the like, and the different locations of the transmitting antennas relative to the receiving antenna, the optimum angle and orientation of the television antenna rods varies from station to station. For these reasons, indoor-type antennas are most commonly of the rabbit-ear construction wherein both the length and orientation of the antenna ears or rods and the position of the antenna base may be selectively varied.

Heretofore, it was customary to mount the antenna rods on a portable base which was supportable only upon a horizontal surface. Moreover, the antenna rods were mounted for pivotal movement relative to the base in only a single plane and, to orient the rods at right angles to the direction of the oncoming television signal which gives the best reception, it was necessary to adjust the angle of the rods in their single plane of adjustment and the position of the antenna base in separate steps. Also, since it was necessary to vary the position of the antenna base, it was not feasible to mount the antenna base in a fixed position.

It is accordingly one of the objects of the present invention to provide an antenna unit having a base adapted to be selectively supportable on a horizontal support surface and/or fixedly mountable upon a vertical support surface, such as a rear wall of a television receiver cabinet, wherein, in either case, the antenna rods may be adjusted over a wide range of angular positions in both horizontal and vertical planes.

An ancillary object of the present invention is to provide a portable rabbit-ear-type antenna unit having a base adapted for either horizontal or vertical orientation thereof and wherein the antenna rods or ears may be moved about in both horizontal and vertical planes, the range of movement thereof preferably being at least from "0" to 180 degrees in each case. With this arrangement, the antenna base may be mounted in any one of a number of different positions, and, without moving the base, the rabbit ears may be adjusted in length and angle in both horizontal and vertical planes to obtain optimum response for any given signal with a minimum of effort.

It is still another object of the present invention to provide an antenna unit as above described which may be collapsed into a unit of minimum overall dimensions. Still another object of the present invention is to provide an antenna unit as above described which may be readily assembled, is ruggedly constructed, and is inexpensive to fabricate so as to compete in price with portable indoor antennas of the conventional type.

In accordance with the preferred form of the invention,

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the antenna ears or rods are pivotally supported from the antenna base by universal joints, the location of the joints and the construction of the base being such that the antenna rods are operable when moved almost from "0" to 180 degrees in planes varying in orientation preferably throughout a complete revolution, that is 360°. The antenna unit base preferably has a flat bottom with a covering of felt or other similar scratch-preventing material for supporting the base upon a horizontal support surface. Means is also provided for supporting the antenna base upon a vertical surface, preferably with the above-mentioned flat base surface vertically oriented. Since the antenna rods are universally pivotable relative to the antenna unit base, it can be seen that for either a horizontal or vertical orientation of the antenna base, the rods may be adjusted to a large variety of angles and orientations to obtain optimum signal response without moving the antenna base. The means for mounting the base upon a vertical support surface preferably comprises a bracket plate with resilient fingers adapted to snap into position about the antenna base, the bracket plate being provided with openings for passage of securing screws and the like.

The base of the antenna is preferably formed from two complementary parts forming a casing with a compartment for supporting a heavy but relatively thin plate for weighing down the antenna base, and a ball and socket joint containing section for housing respective ball and socket assemblies. Assuming the casing to be resting upon a horizontal support surface, the ball and socket joint containing section preferably projects forwardly from the rest of the casing, the opposite sides thereof being spaced inwardly of the corresponding adjacent sides of the weight-receiving portion of the casing. These opposite sides are provided with openings from which flanged cup-shaped ball socket forming elements protrude, the flanges thereof being within the base and facing respective shoulders in which the latter openings are formed. The cup-shaped elements each have a spherical internal surface in which a 180 degree slot is formed extending in a plane at right angles to the plane of the mouth of the cup-shaped element. The antenna rods have ball elements on the ends thereof which respectively pivotally fit within the sockets of the cup-shaped elements. Flat conductive disks contact the inner surfaces of the ball elements to make electrical contact thereto, the disks being preferably connected directly to the insulated conductors of a conventional type antenna cable. An insulating tube preferably extends between the conductive disks within the ball and socket assembly containing section of the casing, and the insulating tube, ball elements and cup-shaped elements are forced together preferably by suitable bolt and nut means which draw the casing parts together.

The antenna rods extend through the 180 degree slots of the cup-shaped elements and, for any given position of these elements, the elements being turnable over a full 360 degrees, the antenna rods can be pivoted through 180 degrees. To change the plane of pivot of the antenna rods, the antennas are forced against the slot-defining walls of these elements to pivot the element into the desired angular position. Pivoting of the elements, of course, shifts the plane of the above-mentioned slots to thereby shift the plane of pivotal movement of the antenna rods.

The outermost side walls of the casing parts are preferably provided with external grooves into which the antenna rods may be extended in their collapsed positions, thereby resulting in an antenna unit of minimum size when the unit is not in use.

Other objects, advantages and features of the inven-

tion will become apparent upon making reference to the specification to follow and the drawings wherein:

Fig. 1 is a perspective view of the antenna unit of the invention with the base thereof mounted in a horizontal position, dotted lines being used to indicate the various positions to which the antenna rods may be adjusted;

Fig. 2 is a view of the antenna unit of Fig. 1 when mounted upon the vertical rear wall of a television receiver cabinet, and likewise shows in dotted lines a number of positions to which the antenna rods may be adjusted;

Fig. 3 is a rear view of the antenna unit shown in Fig. 2, with the antenna rods in their fully collapsed and retracted positions;

Fig. 4 is an end view of the antenna unit shown in Fig. 2;

Fig. 5 is a perspective view of the bracket plate for mounting the antenna unit in the vertical position shown in Fig. 2;

Fig. 6 is an enlarged exploded view of the antenna unit less the bracket plate;

Fig. 7 is a transverse section through the end of the antenna base containing the ball and socket joints for the antenna rods, taken along section line 7—7 in Fig. 3;

Fig. 8 is a longitudinal section through the base of the antenna unit, taken along section line 8—8 in Fig. 4;

Fig. 9 is a longitudinal section through the base of the antenna unit, taken along section line 9—9 in Fig. 3; and

Fig. 10 is a longitudinal section through the base of the antenna unit, taken along section line 10—10 in Fig. 8 with the nut removed from the clamping bolt.

Referring now more particularly to Fig. 1 or 2, the portable television receiving antenna of the present invention comprises a casing 4 preferably made of two complementary molded plastic parts 4a and 4b, antenna rod assemblies 6—6 each comprising a number of telescoped sections 6b and 6c which are retractable within a larger hollow rod section 6a, ball and socket assemblies 8 for enabling the antenna rod assemblies to be moved through a wide angle in any one of a number of different planes, and a bracket plate 9 securable upon any suitable vertical support surface and adapted to interlock with the casing 4, to support the base in a vertical position, as shown in Fig. 2. The casing 4 has a flat bottom for supporting the antenna base on a horizontal surface, as shown in Fig. 1. In either the horizontal or vertical orientation of the antenna base or casing 4, the antenna rods can be pivoted into positions where the antenna rods make relative angles of from "0" through 180 degrees in any plane between and including a horizontal and a vertical plane. Thus, the antenna rods may be adjusted to their optimum position without moving the antenna base. The sides of the antenna base are provided with grooves 10—10 into which the antenna rod assemblies may be nestled when in their fully retracted and collapsed position, as shown in Fig. 3.

In addition to the ball and socket assemblies 8, the casing 4 contains a weight 11 having tapered sides 11' and the antenna lead-in cable 12. It also contains various means for holding the ball and socket assemblies in place within the casing and means for making electrical connection between the antenna lead-in conductors and the antenna rods.

Each of the casing parts 4a and 4b forms an open-sided compartment or space 14 defined by a flat longitudinal wall 13, an opposite longitudinal wall 15 inclining with respect to the flat longitudinal wall 13, a flat end wall 17 joining the closer ends of the walls 13 and 15, and a rounded opposite end wall 19 joining the other ends of the longitudinal walls 13 and 15.

The rounded end 19 of the casing parts together define a compartment section which contains the ball and socket assemblies 8—8 and the means for holding the

same in place within the casing. This portion of each casing part has a flat side wall 21 having a circular opening 23 formed therein. The side wall 21 is spaced inwardly of the wide end of a wedge-shaped side wall 25 of the associated casing part having a longitudinal indentation therein forming the above-mentioned groove. An indented inclined transverse shoulder 26 angling toward the adjacent casing end in the direction of the flat longitudinal wall 13 joins the side walls 21 and 25 of each casing part.

The inner defining wall 27 of each groove 10 extends parallel to the longitudinal axis of the casing part, as shown most clearly in Fig. 8. The depth of the groove 10 thereby tapers from a wide end formed by the outermost end of the wedge-shaped side wall 25 adjacent to the ball and socket containing end thereof to the shallow portion at the other end of the casing part. The casing part interior defined by the wedge-shaped portion thereof has a similar wedge-shape as indicated by the wedge-shaped dotted line 29 in Fig. 8. The indented portions of the wedge-shaped walls 25 form longitudinal ribs 30—30 within the interior of the casing parts, the ribs defining a confined space 32 for the wedge-shaped weight 11 along with the flat longitudinal walls 13—13, the end walls 17—17, and a pair of retainer pins 34—34 extending inwardly from casing wall 25—25 (Fig. 9). Small spaces 33—33 are provided between ribs 30—30 and the longitudinal walls 15—15 for receiving the split ends 12a—12b of the antenna cable 12.

Extending from the rib 30 of casing part 4a is a hollow pin 35 which is notched at its outer end so as to interlock with complementary projections formed in a correspondingly located hollow pin 37 extending from the internal rib 30 of the other casing part 4b. The casing parts are held together by a headed bolt 38 and a nut 39, the bolt passing through bores 40 and 41 in the hollow pins 35—37. The head 42 of the bolt is nestled in a recess 43 formed in the inner slot defining wall 27 of the casing part 4a, and the nut 45 which is a conventional hexagonal nut is nestled within a complementary hexagonal recess 47 formed in the inner slot defining wall 27 of the casing part 4b and is threaded around the end of the bolt which terminates just short of the longitudinal groove 10.

Notches 50—50 are formed in the confronting edges of the casing part end walls 17—17 to form a pass-through slot for the antenna lead-in cable 12. Corner slots 52—52 are formed in the end and side walls 17—25 of each casing part for receiving the projecting portion of one of the clasp fingers 9a or 9b of the bracket plate 9. Also, notches 54—54 are formed in the confronting edges of the flat walls 13—13 in the casing parts to form a slot for receiving an returned central locking tongue 9c of the bracket plate 9.

A piece of felt 56 is preferably cemented to the outside of the longitudinal walls 13—13 of the casing parts to avoid marring of soft wood surfaces.

The ball and socket assemblies 8 each comprise a metal ball element 55 secured to the end of the inner section 6a of each antenna rod assembly and a cup-shaped, socket-forming element 57. The latter element has a generally hemispherical-shaped body portion 58 with a 180° slot 59 formed therein extending generally in a plane which is at right angles to the plane of the mouth of the cup-shaped element. A short cylindrical skirt portion 60 tangentially joins the hemispherical body portion and it terminates in a flange 61 formed at the mouth of the cup-shaped element. When the ball and socket assemblies are assembled in the casing, the hemispherical body portions 58—58 of the cup-shaped elements project from the casing openings 23—23, the flanges 61—61 thereof being frictionally but adjustably pressed against the shoulders 63—63 around the openings 23—23.

Electrical contact is made with the ball elements 55—55 of the rod assemblies by thin wafer-like metal contact

discs 65—65 sandwiched between the associated ball element and the ends of a cylindrical insulating tube 67. When the casing parts are loosely held together, the tube 67 is held in place by inwardly extending short pins 68—68 projecting from the inner ends of casing walls 27—27. Tightening of the nut 39 around the bolt 38 and the consequent drawing together of the casing parts forces the flanges 61—61 of the cup-shaped elements 57—57 against the casing shoulders 63—63, the ball elements against the spherical internal surfaces of the cup-shaped elements and the contact discs 65—65 against the ball elements, the cup-shaped elements and the ball elements, however, being adjustable in position relative to the antenna casing or base by the application of a small amount of force.

The cup-shaped elements 57—57 are turned most easily by moving the antenna rod assemblies to the ends of the slots 59—59 and then forcing the same against the sides of these slots. The cup-shaped elements can be turned 360° about the axis of the casing openings 23—23 because the casing design permits the antenna rod assemblies to be pivoted 360° in the plane of the mouth of the cup-shaped elements. The antenna rod assemblies can thus be rotated over the angle of the slots 59—59 (180°) in a number of planes varying in angle from 0—360° or more, so that a true universal movement of the antenna rod assemblies is provided.

The conductors of the antenna cable sections 12a and 12b are each soldered to a terminal lug 69 extending from one of the contact discs 65. The cable sections are held apart in the casing by insulating separator discs 71 and 73 tightly fitting around the pins 35 and 37 and positioned against shoulders 74—75 formed by enlarged bases of the pins. The cable sections are located in the spaces between the discs 71—73 and the casing sides.

As above indicated, the antenna base or casing 4 can be vertically mounted upon a vertical support surface by the bracket plate 9 which is applied over the felt covered walls 13—13 thereof. The plate is accordingly provided with mounting holes 78—78 which receive mounting screws 80—80. In addition to the clasp fingers 9a, 9b and the tongue 9c which interlock with the casing slots 54—54 and 52—52, the bracket plate has straight tabs 82—82 extending from a flange 83 from which the locking tongue 9c also extends. The tabs 82—82 engage the flat shoulders 85—85 at the wide end of the wedge-shaped portion of the casing. A tab 87 is provided at the other end of the bracket plate 9 between the clasp fingers 9a—9b. When supporting the antenna unit base 4 in a horizontal position, the base 4 is removed from the bracket plate and supported upon its felt-covered bottom.

The present invention has thus provided a rugged, simply constructed antenna unit which is mountable either on a horizontal or a vertical support surface and, in either of these positions, the antenna rods thereof can easily be pivoted into practically any position without moving the base.

It should be understood that numerous modifications can be made in the preferred embodiment of the invention above described without deviating from the broader aspects of the invention.

I claim as my invention:

1. A television antenna unit comprising a base formed by a casing made of two juxtaposed complementary casing parts and having ball socket forming means at opposite sides of said casing parts and having ball-receiving sockets opening onto the casing interior, a pair of antenna rods outside of said casing and having conductive ball elements on the ends thereof pivotally fitting inside the sockets of said ball socket forming means which pivotally support said antenna rods for universal movement relative to the base, a pair of insulated antenna leads, contact discs in said casing connected respectively to said antenna leads and contacting the inner surfaces of said

conductive ball elements, insulating spacer means in said casing extending between said contact discs, and means forcing said conductive ball elements, discs and insulating spacer together including bolt and nut means drawing said casing parts together, said ball elements thereby being frictionally but adjustably held in said ball sockets.

2. A television antenna unit comprising a casing made of two juxtaposed complementary casing parts having aligned openings in opposite sides of said casing parts, said openings communicating with a space inside of said casing occupying the region between said openings, cup-shaped ball socket forming elements at said casing openings and each having a spherical interior surface and an outwardly extending flange at the mouth of the cup, the body of each cup-shaped element protruding from one of said casing openings and its flange being inside the casing and opposite the casing wall surrounding the associated casing opening, each of said cup-shaped elements having an antenna rod guide slot in the socket-forming body thereof extending in a plane approximately at right angles to the plane of the mouth thereof, said cup-shaped elements being adjustable in position about the axis of said casing openings, a pair of antenna rods with conductive ball elements on the ends thereof pivotally fitting inside said respective cup-shaped elements, said antenna rods passing through the slots of said respective cup-shaped elements which slots enable said antenna rods to be pivoted over a range of positions, a pair of insulated antenna leads, conductive means connected respectively to said antenna leads and contacting the inner surfaces of said conductive ball elements, insulating spacer means in said casing extending between said conductive means, and means forcing said cup-shaped elements, ball elements, conductive means and insulating spacer together including bolt and nut means drawing said casing parts together, said cup-shaped elements and said ball elements thereby being frictionally but adjustably held respectively in said casing openings and cup-shaped elements.

3. A television receiving antenna comprising a base formed by a casing made in two complementary parts which together form a ball and socket containing compartment, ball-socket-forming means at opposite sides of said ball and socket containing compartment, a pair of extensible antenna rod assemblies outside of said casing and having ball elements on the inner ends thereof which pivotally fit within the sockets of said ball-socket forming means, said casing parts respectively having hollow interlocking pins inside the same, insulating means in said ball and socket joint containing compartment between said ball elements, and means for forcing said insulating means, ball elements and ball-socket forming means together comprising a headed bolt passing through said hollow interlocking pins and a nut threaded over the end of said bolt for drawing said casing parts together.

4. A television receiving antenna comprising a base having a support surface for supporting the base horizontally upon a horizontal support surface, and a pair of extensible antenna rod assemblies pivotally supported from said base, and a bracket plate for supporting said base in a vertical position and including a flat central portion sized to fit over said base support surface and having holes for the passage of anchoring means for securing the plate to a vertical surface, a tab extending from one end of said plate and resilient clasp fingers extending from the other end of said plate and adapted to embrace, said base having recesses for respectively receiving said tab and resilient fingers to enable the base to be snapped in place upon said bracket plate.

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