

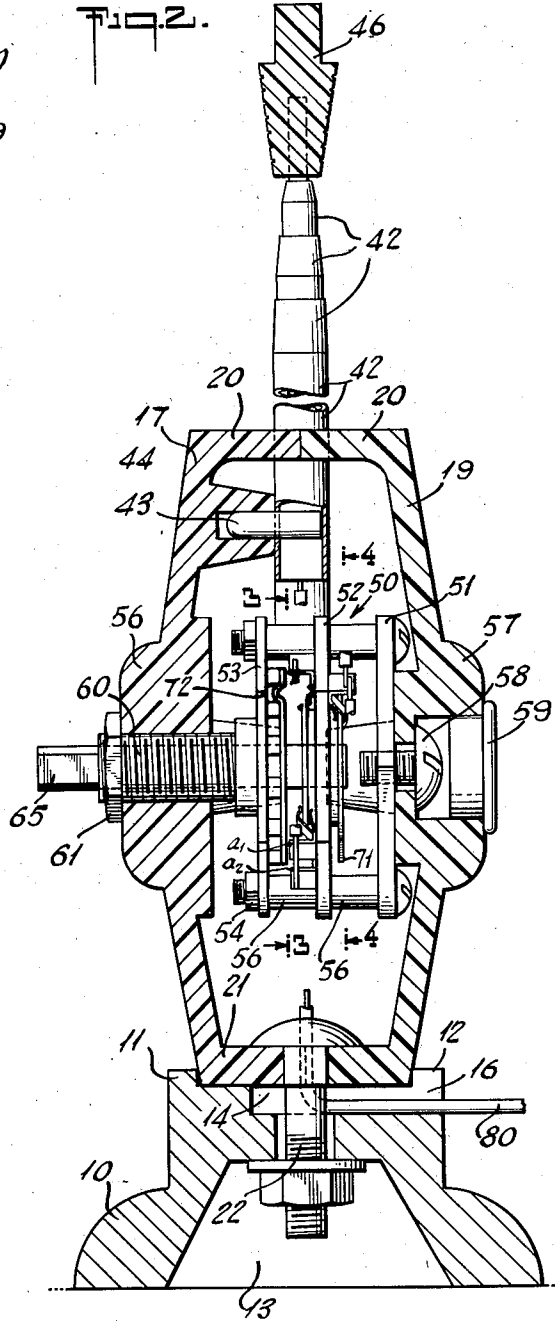
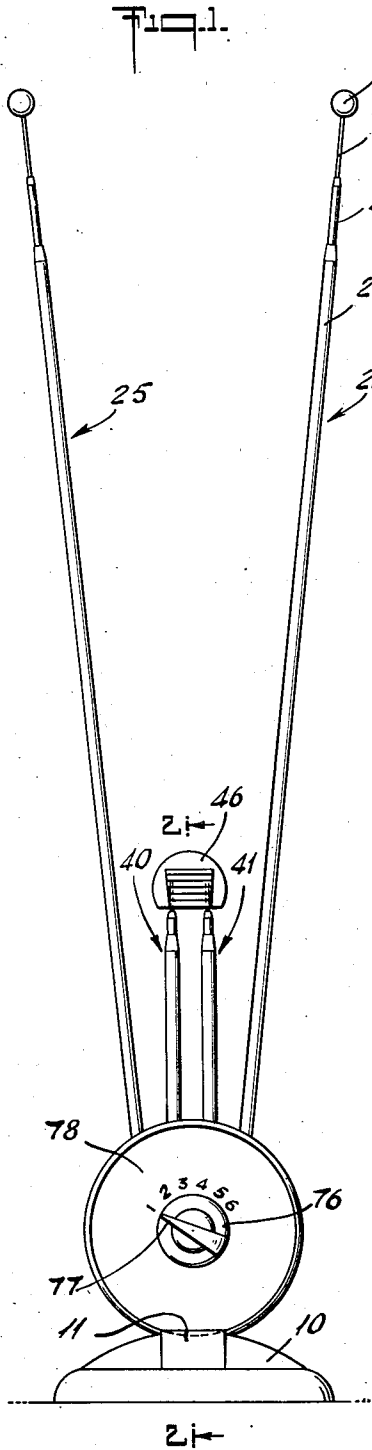
May 6, 1958

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TELEVISION ANTENNA

2,834,015

Filed Oct. 26, 1954

2 Sheets-Sheet 1



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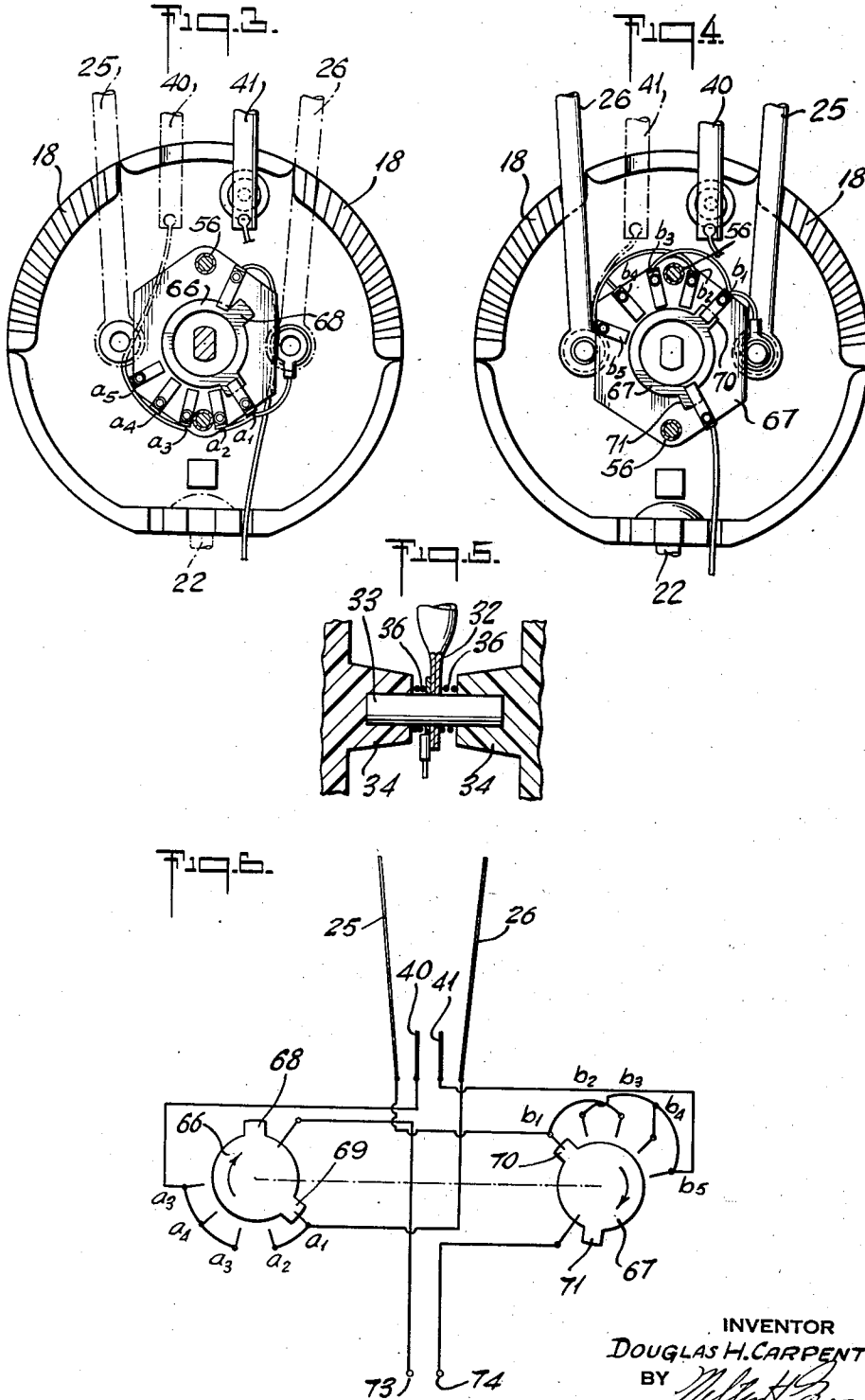
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## TELEVISION ANTENNA

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Application October 26, 1954, Serial No. 464,693

2 Claims. (Cl. 343—876)

The present invention relates to an improved receiving antenna and it relates more particularly to an improved adjustable television receiving antenna suitable for indoor use.

The requirements for a good antenna, particularly that used in television reception, is that it be capable of receiving the desired signal to the substantial exclusion or the relative attenuation of other and spurious signals and to the exclusion of the same signal traversing a different path, that it have good gain characteristics of the desired signal and that it be capable of efficiently delivering the signal to the transmission line without the introduction of additional time delayed signals. In order that the antenna pick up the desired signal at its maximum strength and without the interference of other signals or without picking up the same signal displaced in time to cause ghosts the antenna should have good directivity and be capable of adjustable orientation. While stacked arrays and antennae provided with directors and reflectors are superior in this respect, the simple dipole is highly satisfactory particularly in relatively strong signal areas and possesses the advantage of compactness, which permits its indoor use and the simple manipulation for the proper orientation thereof. As to the relative gain of the various antennae, the stacked arrays and those provided with directors and reflectors are generally higher than the simple dipole. However, they are extremely bulky and are not adopted for indoor use. Moreover, they are not readily adaptable to tuning by means of length adjustment, as is the simple dipole, and hence are of varying gain characteristics, frequently below that of the correspondingly tuned dipole. Thus the simple dipole of adjustable length readily lends itself to indoor use, specifically for the reception of television signals, since it is compact, readily tunable by the adjustment of the length thereof and easily directed. However, with the advent of color television the requirement that the signal be faithfully and efficiently delivered to the transmission line has assumed great importance. In order to effect such transfer of the signal it is necessary that the antenna be matched to the transmission line. Not only does a mismatch result in an attenuation of the transmitted signal but more important the discontinuity caused by the mismatch results in multiple reflections and consequently in ghosts. While these ghosts, under normal circumstances in black and white television are only slightly spaced and effect the definition of the picture in only a minor degree, in the case of colored television, the observed undesirable results are appreciable, reducing definition and color fidelity. It is thus important that a relatively good match be achieved between the antenna and the transmission line. The transmission line usually employed in television reception is the so-called two-wire flat ribbon line or its equivalent, being a balanced line having a nominal 300 ohm impedance but usually somewhat less in commercial availability, of the order of 270 ohms. In order to achieve a good match between the antenna and the conventional 300 ohm transmission line it is necessary that the out-

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put impedance of the antenna system be always adjustable about the three hundred ohm range at the various frequencies to which the antenna is tuned.

It is thus a principal object of the present invention to provide an improved antenna.

Another object of the present invention is to provide an improved indoor receiving antenna.

Still another object of the present invention is to provide an improved indoor television receiving antenna.

10 A further object of the present invention is to provide an improved indoor television receiving antenna simply tunable to resonate at selected frequencies.

15 Still a further object of the present invention is to provide an improved portable television antenna capable of being matched to a transmission line over a wide range of frequencies.

20 Another object of the present invention is to provide an improved antenna, simply tunable to resonate at a selected frequency throughout a wide range and easily adjustable to effect an impedance match to a conventional 300 ohm transmission line.

25 The above and further objects of the present invention will become apparent from a reading of the following description taken in conjunction with the accompanying drawings wherein

Figure 1 is a front elevational view of an improved antenna constituting a preferred embodiment of the present invention;

30 Figure 2 is an enlarged sectional view taken along line 2—2 in Figure 1 with parts broken away for convenience of illustration;

Figure 3 is a sectional view taken along line 3—3 in Figure 2;

35 Figure 4 is a sectional view taken along line 4—4 in Figure 2;

Figure 5 is a detailed sectional view taken along line 5—5 in Figure 4; and

Figure 6 is a schematic wiring diagram of the improved antenna.

40 The present invention broadly contemplates the provision of an improved antenna comprising a base member, a pair of separated antenna elements of adjustable length carried by said base member, a pair of parallel open ended tuning elements of adjustable length each of said tuning elements being coupled to a corresponding antenna element and a transmission line having a pair of conductors each of said conductors being connected to a respective set of antenna element and tuning element.

45 In accordance with a preferred embodiment of the present invention the base member is substantially heavy and supports a pair of upright brackets preferably formed of an insulating material and provided with confronting cavities which define a housing. The brackets are of cup-shaped configuration their open ends facing each other and having peripheral walls provided along their upper confronting edges with recesses having serrated bases. Each of the antenna elements consists of a plurality of telescoping sections so that they may be independently collapsed or extended to any desired length. 50 The inner ends of the antenna elements project through corresponding openings formed in the assembled brackets and are pin connected to the brackets to permit their angular adjustment, the serrated confronting bases of the bracket wall recesses maintaining the antenna elements in selected angular positions. Also carried by the brackets in upright, parallel, closely spaced positions are the tuning elements each of which likewise consists of a plurality of telescoping sections to permit their collapse or extension to any desired length. The tuning elements are open ended, the open ends being engaged by a common insulated finger piece to facilitate the adjustment of the tuning elements to similar positions. A rotary

selector switch is housed within the cavity defined by the brackets and is carried between the walls thereof, the shaft of the switch passing through one of the brackets and terminating in a suitable knob. The switch includes a pair of two-fingered rotary arms rotated in unison and so connected to the inner ends of the tuning elements and of the antenna elements and to the termini of a transmission line or other suitable terminals to permit the interconnection between each of the antenna elements to a corresponding tuning element and the coupling of the transmission line termini to the respective junctions as well as a variety of other combinations that will be hereinafter described.

Reference is now made to the drawings which illustrate a preferred embodiment of the present invention wherein the numeral 10 generally designates a base or pedestal preferably formed of metal and sufficiently heavy to support the antenna in any desired position and arrangement. The base 10 is provided with laterally spaced parallel ridges 11 and 12 and has formed therein a bottom well 13 and an upper well 14. A passageway 16 is disposed between and separates the ridges 12. A pair of cup-shaped bracket members 17 and 19 are vertically arranged with their open ends confronting each other and are provided with horizontally projecting peripheral walls 20 whose respective edges abut each other, the bottom of the assembled brackets being flattened as at 21 and resting upon the base 10 between the ridges 11 and 12 and being tightly secured thereto by means of a suitable nut and bolt fastener 22 passing through corresponding aligned openings formed in the bracket assembly and in the base 10. Furthermore, the bracket members 17 and 19 have confronting recesses 18 formed in their upper peripheral walls extending from the horizontal diameter of the brackets to points short of the top thereof, the bases of the recesses being suitably serrated.

The antenna elements are designated as 25 and 26 respectively and each consists of 3 slidably telescoping sections 27, 28 and 29 of conventional construction the section 29 being rod-shaped and terminating in a plastic ball 30. The sections 27 and 28 are tubular having their outer ends inwardly swaged and their inner ends outwardly swaged whereas the section 29 has its inner end outwardly swaged to prevent the separation of the several sections. The inner end of each of the antenna element sections 27 projects into the bracket cavity through the respective slots defined by the recesses 18 and is flattened, as at 32, and is provided with a circular aperture which rotatably engages a corresponding pin 33 supported in aligned wells formed in oppositely disposed bosses or stubs 34 located upon confronting faces of the bracket members 17 and 19. A pair of helical compression springs 36 register with the pin 33 and are entrapped between the opposite faces of the antenna flattened end 32 and the confronting faces of the stubs 34. It should be noted that a pair of stubs 34 are provided for each of the antenna elements 25 and 26 and are located in diametrically opposed positions and are horizontally spaced. Thus, by means of the above construction, the antenna elements 25 and 26 are independently adjustable to any desired length and are likewise independently adjustable to any desired angular position being maintained at such position by being engaged by the opposite serrated bases of the recesses 18.

The tuning elements, designated as 40 and 41 respectively, are each likewise formed of a plurality of telescoping sections 42, illustrated as being four in number permitting the adjustment of the length of the tuning elements over a wide range. The construction and assembly of the telescoping sections of the tuning elements are similar to that of the antenna sections. The tuning elements 40 and 41 are located between the antenna elements 45 and 46 and are parallel to each other extending vertically from the brackets 17 and 19 the inner ends thereof projecting through corresponding circular open-

ings formed in the brackets 17 and 19 and terminating in transversely projecting pins 43 which are engaged by recesses formed in corresponding stubs 44 located on the inner face of the brackets 17 and 19 respectively. A finger piece 46 formed of a suitable insulating material engages the upper end of the innermost tuning element telescoping section to permit the adjustment of the tuning elements 40 and 41 to correspondingly equal lengths.

Housed in the cavity formed in the bracket assembly is a rotary switch 50 consisting of a base plate 51, an intermediate contact carrying plate 52 and a detented index plate 53 the plates 51, 52 and 53 being assembled and supported in parallel laterally spaced position by a suitable pair of screws and nuts 54 the screws passing through corresponding openings formed in the plates 51, 52 and 53 and having registering therewith between the successive plates tubular spacing elements 56. The bracket members 17 and 19 have centrally disposed hubs 56 and 57 respectively, integrally formed thereon, the switch base plate 51 being secured to the inner face of the hub 57 by means of a screw 58 passing through a corresponding opening formed in the hub 57 and engaging a tapped opening formed in the switch base plate 51. A removable cap 59 seals the front opening in the hub 57. Mounted on the index plate 53 and projecting forwardly thereof is an externally threaded bushing 60 which passes through an opening in the hub 56 and is tightly secured thereto by means of a nut 61 engaging the threaded bushing 60 and adjusted into tight abutment with the outer face of the hub 56. The contact plate 52 carries on opposite faces thereof a lower set of five contacts, A1, A2, A3, A4 and A5 respectively, and an upper set of regularly spaced contacts, B1, B2, B3, B4 and B5 respectively. The successive contacts in each set are separated by a unit increment. A shaft 65 extends through the bushing 60 projecting beyond both ends thereof and carries at its inner end, by means of suitable insulated discs, a pair of switch arms 66 and 67 respectively, the switch arm 66 being provided with a pair of fingers 68 and 69 separated by four increments and adapted to be brought into selective registry with the lower set of contacts A1 to A5 whereas the arm 67 is provided with fingers 70 and 71 likewise angularly spaced four increments and adapted to be brought into registry with corresponding contacts B1 through B5. The switch arms 66 and 67 are rotatable in unison and are carried by the shaft 65 on opposite sides of the contact plate 52, the relative positions of the fingers 68 and 69 and 70 and 71 being such that when the finger 69 registers with the contact A1 the finger 70 registers with the contact B1 and the arms are rotatable so that the fingers 69 and 70 register with successive contacts A1, A2, A3, A4 and A5 and B1, B2, B3, B4 and B5 respectively. Also carried by the shaft 65 is a disc 72 which is provided with sprung fingers which are brought into registry with successive detents formed on the index plate 53 in a conventional manner so that the fingers 69 and 70 are positioned in registry with successive contacts. It should be noted that when the fingers 69 and 70 register with contacts A5 and B5 the fingers 68 and 71 register with the contacts A1 and B1. The electrical connection of the tuning elements, the switches and the transmission line terminals are illustrated in Figure 6 of the drawing. The transmission line terminals 73 and 74 are connected to the switch arms 66 and 67 respectively by means of suitable brushes. The contacts A1 and A2 are commonly connected to the antenna element 26 whereas the contact elements B1 and B3 are connected to the antenna elements 25. Furthermore, the contact elements A3, A4 and A5 are connected to the tuning element 60 and the contact elements B2, B4 and B5 are connected to the tuning element 41. The various electrical connections may be made with insulation covered wire in the conventional manner. The shaft 65 carries a suitable knob 76 provided with a

pointer 77 which cooperates with the indicia 78 carried on the face of the front bracket member 17. Thus when the switch 50 is in the first position as indicated in Figure 6 of the drawings wherein the fingers 69 and 70 register with the contacts A1 and B1 respectively, the transmission line termini 73 and 74 are each connected only to the corresponding antenna elements 25 and 26. By advancing the switch to its second position the finger 69 registers with the contact A2 and the finger 70 registers with the contact B2 thereby connecting the transmission line conductors to the antenna element 26 and the tuning element 41 respectively. As the switch is advanced to the third position wherein the finger 69 registers with the contact A3 and the finger 70 registers with the contact B3, the transmission line terminal are connected to the tuning element 40 and to the antenna element 25 respectively. In the switch's fourth position the finger 69 registers with the contact A4 and the finger 70 registers with the contact B4 thereby connecting the transmission line termini 73 and 74 to the tuning elements 40 and 41 respectively. In order to connect the transmission line to both tuning elements and to both antenna elements the switch is rotated to its fifth position wherein the fingers 68 and 69 register with the contacts A1 and A5 and the fingers 70 and 71 register with the contacts B1 and B5 so that the transmission line terminal 73 is coupled to the tuning element 40 and the antenna element 26 which are electrically connected at their inner ends and the terminal 74 is connected to the tuning element 41 and the antenna element 25 which are likewise connected at their inner ends. In the sixth position of the switch the transmission line is completely disconnected from the antenna elements and the tuning elements.

Considering now the operation of the improved antenna, it is connected by way of a conventional 300 ohm transmission line 80 to the input terminals of a television receiver. The switch is set at its fifth position and the tuning elements 25 and 26 are then spread and the lengths thereof adjusted until maximum signal is received as indicated by the image on the picture tube. The antenna is then oriented and located in a position whereby minimum ghosts are observed and maximum signal obtained. Thereafter the height of the tuning elements 40 and 41 are adjusted to effect an optimum impedance match between the antenna and the transmission line 80 as determinable by the fidelity and definition of the received picture and by the absence of ghosts. In the majority of cases this procedure will

result in the reception of an optimum picture. However, in the event that reception is still unsatisfactory, the switch 50 may be adjusted to any of its other positions and the antenna and tuning elements manipulated until optimum reception is achieved. It should be noted that in the commercial embodiment of the present invention the tuning elements 40 and 41 are continuously adjustable in length from approximately 4½ inches to approximately 12½ inches whereas each of the antenna elements are adjustable in length from approximately 17½ inches to approximately 43 inches, greater lengths being somewhat awkward.

While there has been illustrated and described a preferred embodiment of the present invention it is apparent that numerous alterations and omissions may be made without departing from the spirit thereof.

What is claimed is:

1. An improved antenna comprising a base portion, a pair of separated antenna elements disposed at an angle to the vertical and carried by said base member, a pair of parallel open ended tuning elements of adjustable length, each of said tuning elements being coupled to a corresponding antenna element and a transmission line having a pair of conductors, each of said conductors being connected to a respective set of antenna element and tuning element.

2. An improved antenna comprising a base member, a pair of laterally spaced elongated antenna elements pivotally connected to said base member adjacent their inner ends to permit the relative angular adjustment thereof, each of said antenna elements including a plurality of mutually slidable telescoping members, an open ended pair of parallel elongated tuning elements carried by said base member, each of said tuning elements including a plurality of mutually slidable telescoping members, a pair of conductors and switching means connected to said pair of conductors and said tuning elements and said antenna elements whereby to permit selective coupling of said conductors to said tuning elements and antenna elements, solely to said tuning elements, and to a single tuning element and a single antenna element respectively.

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