Oct. 27, 1953 L. F. KLEIS 2,657,311

ANTENNA

Filed June 18, 1952 2 Sheets-Sheet 1

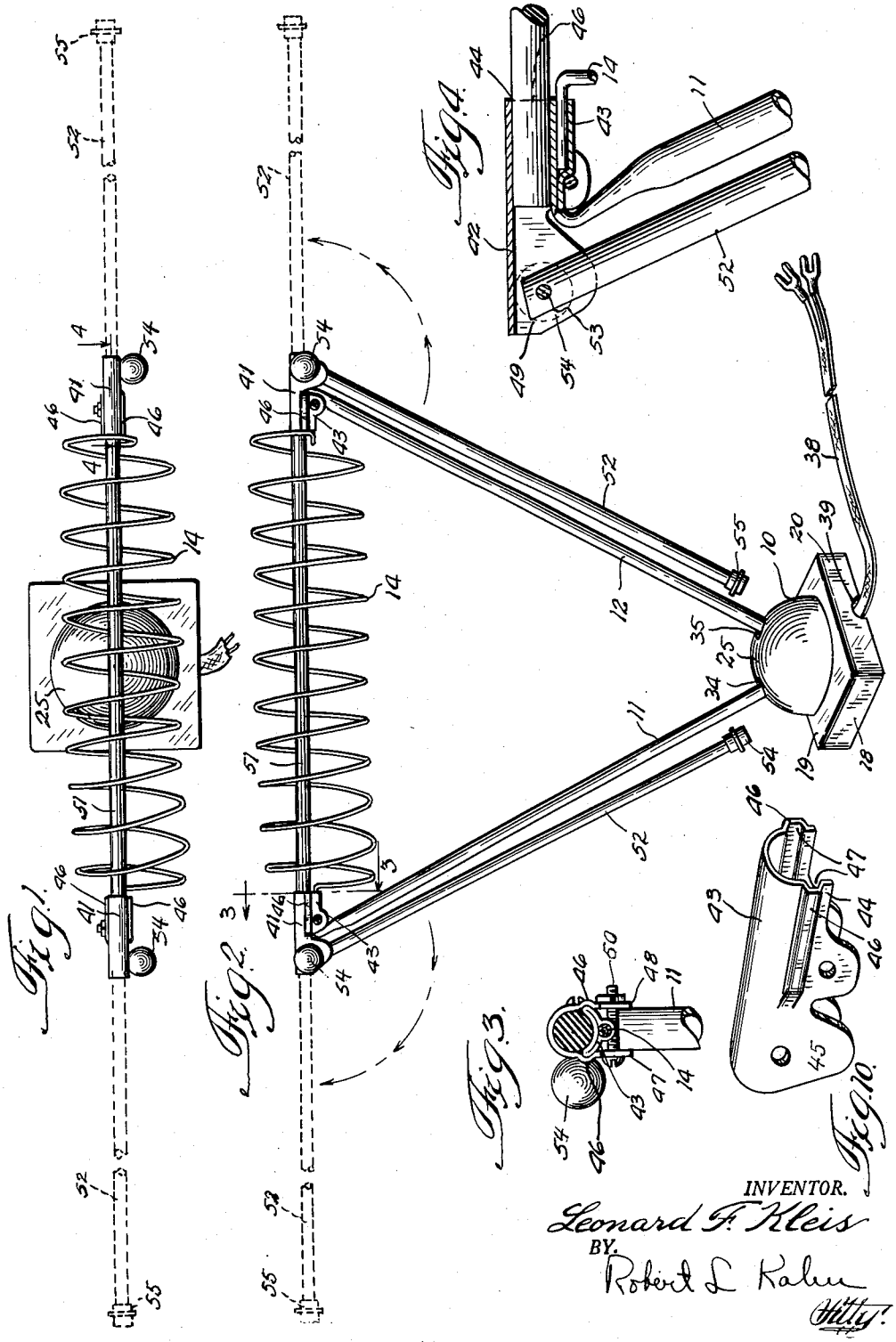


Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 10.

INVENTOR.
Leonard F. Kleis
BY.
Robert L. Kahn
Attorney

Oct. 27, 1953 L. F. KLEIS 2,657,311

ANTENNA

Filed June 18, 1952 2 Sheets-Sheet 2

Fig. 6.

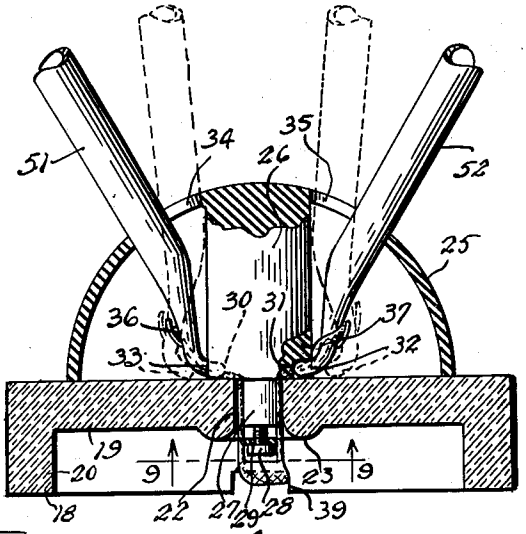


Fig. 5.

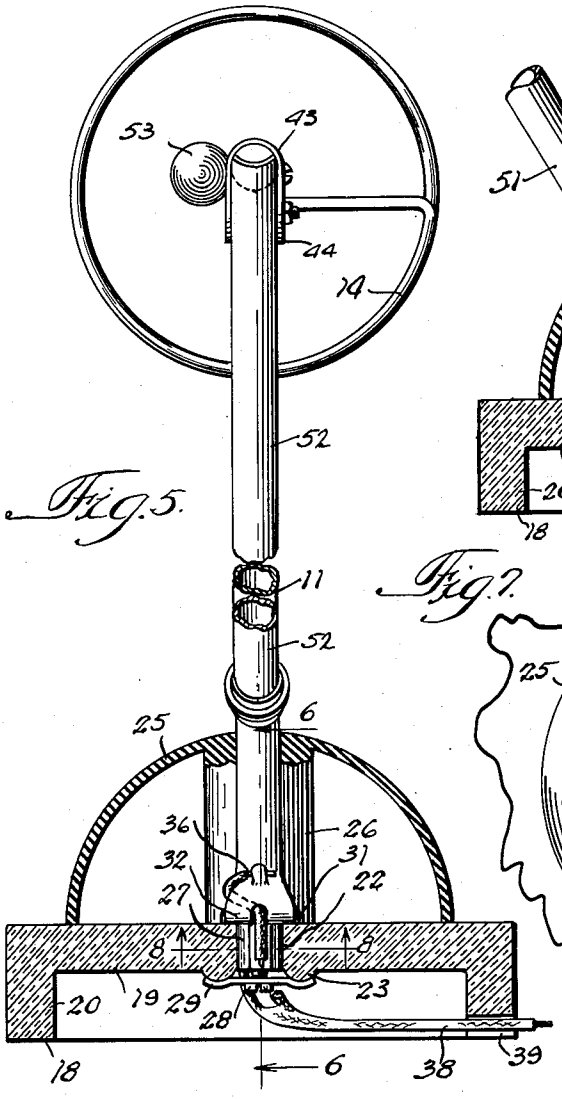


Fig. 7.

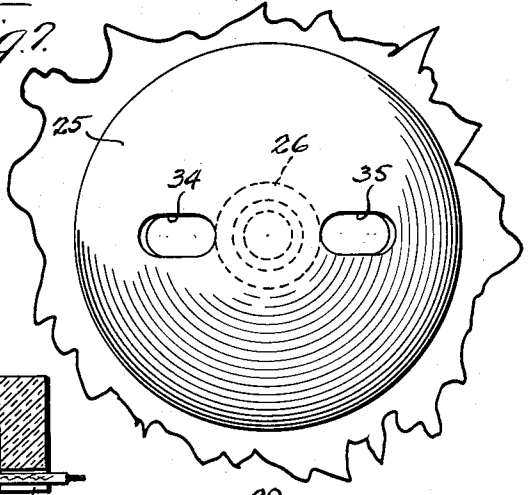


Fig. 8.

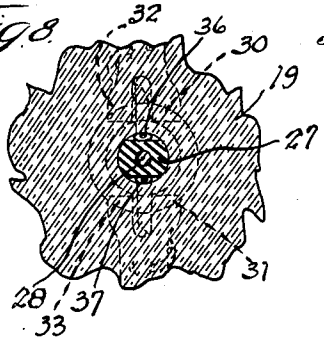
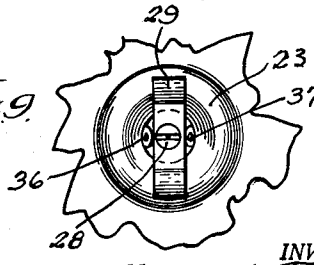


Fig. 9.



INVENTOR.
Leonard F. Kleis
BY.
Robert L. Kahn
Kitty

Patented Oct. 27, 1953

2,657,311

UNITED STATES PATENT OFFICE

2,657,311

ANTENNA

Leonard F. Kleis, Oak Park, Ill., assignor to K-G Electronics Corporation, Chicago, Ill., a corporation of Illinois

Application June 18, 1952, Serial No. 294,167

5 Claims. (Cl. 250—33)

1

This invention relates to an antenna, and particularly to an indoor antenna for reception of television, frequency modulation and similar bands where high frequency radiant energy is involved.

Antennas for television receivers for use indoors are well known, and are made in a variety of forms. Such antennas, as a rule, are characterized by ungainly structure and require substantial space within which the device must be disposed. Frequently such antennas, when assembled, require large cartons for shipment and, in general, make an indoor antenna an aesthetic liability. Certain indoor antennas, made in the shape of various articles of furniture, represent a compromise between technical requirements and aesthetic requirements. As a rule, such compromise antennas are neither efficient nor beautiful.

This invention provides a construction which is simple, effective, and which takes but little space. Furthermore, the new antenna operates with high efficiency over the entire range of television bands. The new antenna consists of simple components which may be assembled easily and quickly, with a minimum of tools, and which requires a comparatively small amount of space.

In order that the invention may be understood, an exemplary embodiment will now be described in connection with the drawings, it being understood that variations in details may be made without departing from the spirit of the invention.

Referring therefore to the drawings:

Figure 1 is a top plan view of the new antenna, the dotted lines showing auxiliary arms in a raised position;

Figure 2 is a side elevation of the antenna shown in Figure 1, the auxiliary arms being down and the dotted lines showing an alternative position of the auxiliary arms;

Figure 3 is a sectional detail on line 3—3 of Figure 2;

Figure 4 is a sectional detail on line 4—4 of Figure 1;

Figure 5 is an end elevation of the new antenna, certain parts being shown broken away and the base being shown in section to illustrate the interior construction thereof;

Figure 6 is a sectional detail on line 6—6 of Figure 5, this view illustrating the mounting of the matching arms to the base and the adjustability thereof;

Figure 7 is a top view of the base, the matching arms being removed and a certain portion of the base being cut away;

Figure 8 is a detail on line 8—8 of Figure 5 illustrating the attachment of the antenna to the base support;

2

Figure 9 is a detail on line 9—9 of Figure 6;

Figure 10 is a perspective detail of a clamp.

The new antenna comprises a base generally indicated by 10 supporting a pair of metal impedance matching arms 11 and 12 extending upwardly from the base to form a V and wire helix 14 coupled both mechanically and electrically to the free ends of arms 11 and 12.

Referring to base 10, support 18 of any suitable shape and of insulating material is provided. As shown here, support 18 may be made of glass or any plastic and has top portion 19 and depending side portions 20. The size of support 18 may be as desired and, in practice, should be large enough so that the entire antenna construction is stable. For convenience, support 18 has a generally rectangular shape as seen from the top. Support 18 has the center thereof provided with transverse channel 22. The material of the base is shaped to provide peripheral boss or flange portion 23 around channel 22 at the inside space of top part 19. Boss 23 is annular and provides a rotatable bearing surface for the mechanism.

Rotatively supported upon the top face of part 19 of the base is hemisphere 25 of insulating material. This hemisphere is preferably of molded plastic material although, of course, it may be of any desired insulation material. Hemisphere 25 has centrally disposed supporting boss 26 aligned with and extending downwardly toward channel 22 in the base. Boss 26 has reduced portion 27 extending therefrom, this reduced portion being small enough to lie within channel 22 of support 18. Reduced portion 27 has the end thereof drilled and tapped to accommodate bolt 28. Bolt 28 cooperates with spring-retaining clamp 29, the clamp extending to reach annular boss 23. By drawing bolt 28 tightly up against the reduced end, clamp part 29 will bear against the bottom of the base.

Boss 26 is provided with two diagonally opposed slots or recesses 30 and 31 above the top surface of support 18. Into these recesses are slipped flattened bent ends 32 and 33 of impedance matching arms 11 and 12. Bent ends 32 and 33 are shaped with the two flattened ends being disposed opposite to each other in a horizontal plane as seen in Figure 6, for example. In this position, arms 11 and 12 extend upwardly and diverge. Arms 11 and 12 are of metal tubing, such as aluminum or copper, and these arms extend through slots 34 and 35 in hemisphere 25. Slots 34 and 35 are diametrically opposed to each other, as seen in plan in Figure 7, and these slots are elongated toward each other. The flattened and bent ends of arms 11 and 12 are so shaped with reference to the hemisphere and the recesses

for receiving the tube ends, as well as slots **34** and **35**, that, when arms **11** and **12** are correctly disposed in assembled position, the arms have their maximum divergence with the flattened ends tightly forced into recesses **30** and **31**, respectively.

Attached to arms **11** and **12** near the bottom are wires **36** and **37** of wire line **38**. A suitable clearance opening **39** in one side wall **20** of support **18** permits the open wire line cable to pass outside of the base. This open wire line cable has suitable connectors at the end for connection to a television receiver or other apparatus with which the antenna is to be used.

Wire helix **14** is made of copper or aluminum of sufficiently heavy wire gauge so as to have substantial self-support. The ends of helix **14** are rigidly clamped and electrically connected to flattened ends **41** of matching arms **11** and **12**. These flattened arm ends are gripped by sheet metal clamps **43**, one of which is shown in perspective in Figure 10. Each clamp has generally U-shaped body **44** with large apertured ears **45** and small apertured ears **46**. Body **44**, near small ears **46**, has grooves **47** formed at the sides. Bent end **41** of an arm is inserted from the large ear end of the body and extends between small ears **46**. The side edges of the flattened arm end fits in grooves **47**. The flattened arm end is spread to allow the helix wire end to be inserted into the arm end. Bolt **50** passing through apertures in the small ears serves to tighten the clamp.

Insulating rod **51** axially of the helix has its ends received by clamp body **44** just above grooves **47**. Thus insulating rod **51** and arms **11** and **12** form a generally triangular figure except for the fact that arms **11** and **12** do not meet at the bottom.

Between large ears **45** there is pivotally mounted auxiliary arm **52**. Bolt **53** having ornamental knob **54** provides the pivot for the auxiliary arm. Each auxiliary arm is of metal and is tipped with ornamental plug **55** at the outer end. The auxiliary arms are movable from positions alongside matching arms **11** and **12** to positions along the axis of the helix. The auxiliary arms supplement the antenna action of the structure and increase the signal strength.

From the presently assigned television channels ranging from 2 to 13 inclusive, we have found that the triangle formed by arms **11**, **12** and rod **51** may be generally equilateral and having a length of about 15 inches on a side. The length of wire helix **14** may be varied over substantial limits. Thus, in one form which has been used to advantage, a helix having a diameter of about 2¾ inches with about 11 turns and having an axial length of about 10 inches exclusive of the terminal ends may be advantageously used. Auxiliary arms **52** may have a length of around 12 inches, although this of course may vary. The dimensions given above will vary somewhat with the gauge of metal used, the wall thickness of the arms and other factors.

For shipping purposes, bolts **50** holding the top ends of arms **11** and **12** may be removed. Flattened bent ends **41** of arms **11** and **12** may then be pulled loose. Then arms **11** and **12** may be brought together to free the lower bent ends from the recesses, as shown in dotted lines in Figure 6, and the various arms and helix and rod may be packed in a comparatively small space.

In certain regions where extended band coverage is not required, some changes in the nature of the helix may be made to render the entire structure more resonant to desired bands. By virtue of arms **11** and **12**, a desirable matching action is obtained whereby the impedance of the transmission line is properly matched to the antenna.

Auxiliary arms **52** are movable in generally vertical planes as is clearly evident from the drawing. The plane in which an auxiliary arm moves is generally defined by the adjacent metal arms, **11** or **12**, and rod **51** which is generally disposed at the axis of the helix.

What is claimed is:

1. An antenna construction comprising an insulating base, an insulating hollow hemisphere on said base, means for mounting said hemisphere so that it may rotate around a vertical axis on said base in the normal position of the antenna, said hemisphere having a pair of opposed elongated slots therethrough, a pair of metal arms secured within said hemisphere and passing through said slots and diverging to form a generally V-shape, a wire helix supported between the free ends of said arms, said helix having a diameter which is substantially smaller than the length thereof and having its axis generally horibontal, said helix being electrically connected to said arms, an insulating rod disposed axially of said helix clamped to the free ends of said arms to render the construction rigid, and an auxiliary arm at each end of said helix pivotally secured adjacent the free end of the adjacent arm and electrically connected thereto and movable in a generally vertical plane, the bottoms of said V arms forming terminals for said antenna.

2. The antenna according to claim 1 wherein said diverging arms and the insulating rod form a generally equilateral triangle.

3. An antenna for indoor use in television and the like, said antenna comprising a base, a pair of metal arms secured to said base and being spaced from each other at said base and extending upwardly and diverging away from each other to form a generally V shape, a generally horizontal elongated wire helix disposed between the free ends of said arms and being electrically connected thereto, said helix having a diameter which is substantially smaller than its length, an auxiliary metal arm electrically connected to and pivotally secured adjacent each end of the helix, each auxiliary arm being movable in a generally vertical plane defined by the adjacent arm of the V and helix axis, the bottom ends of the V arms being spaced from each other and forming terminals for a transmission line for connecting the antenna to a television receiver or the like.

4. The antenna according to claim 3 wherein an insulating rod is disposed axially of said helix and is clamped to the free ends thereof to render the helix and V rigid.

5. The antenna according to claim 3 wherein said auxiliary arms are somewhat shorter than the adjacent arms of the V so that said auxiliary arms may be folded in close proximity thereto.

LEONARD F. KLEIS.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
2,174,353	Roberts	Sept. 26, 1939
2,175,363	Roberts	Oct. 10, 1939
2,192,187	Gordon	Mar. 5, 1940
2,495,579	Ferris et al.	Jan. 24, 1950
2,521,798	Leonard	Sept. 12, 1950
2,542,884	Trebules	Feb. 20, 1951