Nov. 11, 1958 J. E. KREPPS, JR 2,860,312

ANTENNA INPUT TRANSFORMER

Original Filed Dec. 23, 1953

FIG. 1

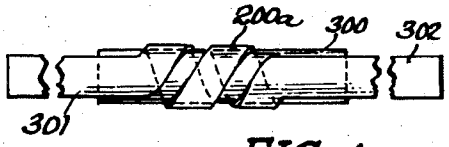


FIG. 2



FIG. 3



FIG. 4

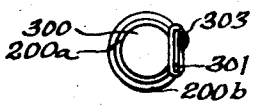


FIG. 5

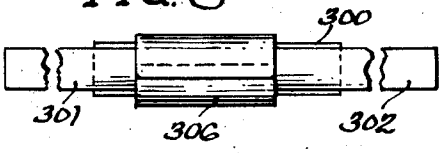


FIG. 6

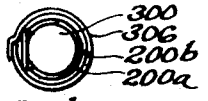


FIG. 7

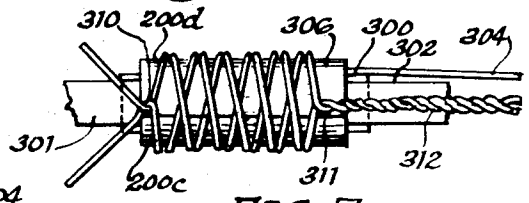
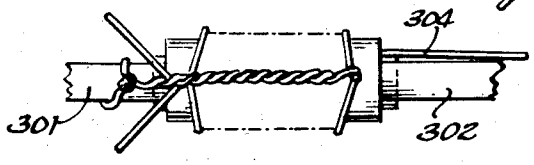


FIG. 8



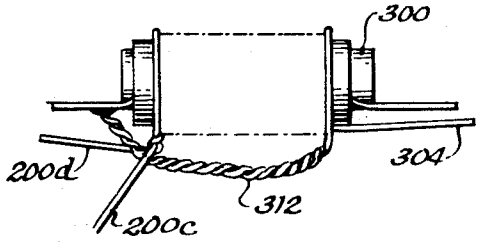


FIG. 9

INVENTOR.
James Edgar Krepps, Jr.
BY
Mason, Kolehmainen, Rathburn & Wyss
Attorneys

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ANTENNA INPUT TRANSFORMER

James Edgar Krepps, Jr., Bloomington, Ind., assignor to Sarkes Tarzian, Inc., Bloomington, Ind., a corporation of Indiana

Original application December 23, 1953, Serial No. 399,928, which is a division of Patent No. 2,665,377, dated January 5, 1954. Divided and this application November 2, 1955, Serial No. 544,519

5 Claims. (Cl. 336—69)

The present invention relates to transformers and more particularly to antenna input transformers for coupling an antenna system to the signal input of a television receiver. Specifically, the present invention is a division of my copending application Serial No. 399,928, filed December 23, 1953, and assigned to the same assignee as the present invention, which copending application is itself a division of my issued Patent No. 2,665,377 which is also assigned to the same assignee as the present invention.

A principal object of the present invention is to provide a new and improved antenna input transformer.

Another object of the present invention is to provide a new and improved antenna transformer for use in television receivers for matching the impedance of an input cable from a receiving antenna system to the input circuit of a television receiver in either the low frequency or high frequency portions of the V. H. F. television band.

Briefly, the above and further objects are realized in accordance with the present invention by providing an antenna input transformer for coupling to an associated receiver signals intercepted from high and low frequency V. H. F. television stations by an antenna system. This transformer comprises an elongated core, first and second secondary windings which are wound one on top of the other along the length of the core, a balanced primary winding including a pair of cross-wound sections extending in the same direction along the length of the core and terminating in a common center tap lead which extends back over the cross-wound section, and a common electrical connection for one end of both the secondary windings and the center tap lead.

Fig. 1 is an elevational view of the core and one winding of a preferred antenna input arrangement;

Fig. 2 is an end view of the arrangement of Fig. 1;

Figs. 3 and 4 are elevational and end views, respectively, of the arrangement of Fig. 1 showing an additional winding thereon;

Figs. 5 and 6 are elevational and end views of the arrangement of Fig. 1 at a different stage in the construction thereof;

Figs. 7 and 8 are side elevational views of the arrangement of Fig. 1 showing additional steps in the construction thereof; and

Fig. 9 is a plan view of the arrangement of Fig. 1 in its completed form.

In Figs. 1 to 9, inclusive, there are shown the structural details of a suitable antenna input transformer **200** which may be employed to match the 300 ohm input cable of the antenna system **10** to the input circuit of the tube **203** in either of the low frequency or high frequency portions of the V. H. F. television band. Referring to these figures, there is provided an elongated cylindrical core **300** which is preferably of powered iron or other suitable ferromagnetic material and has a length of one-half inch and a diameter of .1 inch. The high frequency secondary winding **200***a* is comprised of a relatively wide

flat strip of conductive metal, such as copper, which is wound directly on the core **300** in the manner shown in Fig. 1. It will be noted that the end portions **301** and **302** of the high frequency secondary winding **200***a* are formed so that they extend away from the ends of the core **300** in a direction generally parallel to the axis thereof. It will also be noted that the secondary winding **200***a* is wound flatwise along the length of the core **300** so that it conforms substantially to the cylindrical surface thereof.

On top of the high frequency secondary winding **200***a* there is wound a low frequency secondary winding **200***b* (Fig. 3). The secondary winding **200***b* preferably comprises a wire of cylindrical cross-section which is coated with suitable insulating material, such as #32 heavy Formvar wire, and one end **303** of the secondary winding **200***b* is wound about and electrically connected to the tap end **301** of the high frequency secondary winding **200***a*, as best illustrated in Fig. 3. The pitch of the secondary winding **200***b* is approximately twice that of the high frequency winding **200***a*, and the other end portion **304** thereof is formed so that it extends away from the end of the core **300** in a direction generally parallel to the axis thereof. A single layer of insulating tape **306** (Fig. 5) is wound over the secondary windings **200***a* and **200***b* and is overlapped so that the windings **200***a* and **200***b* are completely insulated.

The balanced primary winding including the sections **200***c* and **200***d* is wound on top of the insulating tape **306** in the manner shown in Fig. 7. Thus, referring to this figure, the primary winding includes a pair of cross-wound sections **200***c* and **200***d* which are twisted together at the point **310** and are cross-wound in the same direction along the length of the core **300** and on top of the tape **306**. The cross-wound sections **200***c* and **200***d* terminate in a common center tap lead **311** which is twisted for a substantial length to form the portion **312** which is looped back over the cross-wound portions **200***c* and **200***d* in the manner shown in Figs. 8 and 9, and the end of the center tap portion **312** is wound about and connected to the tab portion **301** of the high frequency secondary winding **200***a* by any suitable means such as soldering, or the like. The twisted portions of the center tap lead **312** are soldered for the entire length of the lead and, as best illustrated in Fig. 9, the center tap lead **312** is dressed so that it loops away from the cross-wound portions **200***c* and **200***d* of the primary winding.

With this construction the high frequency secondary winding **200***a* may effectively match the 300 ohm impedance of an antenna input cable, which is preferably connected to the ungrounded ends of the primary windings **200***c* and **200***d*, to the input circuit of the associated television receiver for the efficient reception of signals from television stations in the high frequency V. H. F. band. On the other hand, the secondary winding **200***b* effectively matches the 300 ohm antenna input impedance to the input circuit of the receiver for signals from television stations in the low frequency V. H. F. band. Because of the fact that the secondary windings **200***a* and **200***b* are closely coupled, short circuiting the winding **200***b* in the manner described in detail in the hereinbefore identified patent during reception of signals in the U. H. F. television band will effectively suppress V. H. F. signals appearing on either of the windings **200***a* or **200***b*. Also with this arrangement, interference from FM stations which are situated between the low frequency and high frequency V. H. F. television bands is positively avoided as a result of the complete damping out of all signals which may be coupled to either of the secondary windings **200***a* or **200***b*.

While a particular embodiment of the invention has

been shown, it will be understood, of course, that the invention is not limited thereto since many modifications may be made and it is therefore contemplated by the appended claims to cover any such modifications as fall within the true spirit and scope of the invention.

What is claimed as new and is desired to be secured by Letters Patent of the United States is:

1. An antenna input transformer for signals from high and low frequency V. H. F. television stations, comprising an elongated cylindrical core of ferromagnetic material, a high frequency secondary winding including a relatively wide, flat conductive strip wound flatwise around said core and having end portions extending away from said core in a direction generally parallel to the axis thereof, a low frequency secondary winding wound on top of said high frequency secondary winding and having substantially twice the number of turns per inch as said high frequency secondary winding, and a balanced primary winding including a pair of cross wound sections extending in the same direction along said core and having a common center tap lead extending back across said cross wound sections and connected to one end of said high frequency secondary winding.

2. An antenna input transformer for signals from high and low frequency V. H. F. television stations, comprising an elongated rod-like core of ferromagnetic material, first and second secondary windings wound one on top of the other along the length of said core, a balanced primary winding including a pair of cross wound sections extending in the same direction along the length of said core and terminating in a common center tap lead extending back over said cross wound sections, and a common electrical connection for one end of both said secondary windings and said center tap lead.

3. An antenna input transformer for signals from high and low frequency V. H. F. television stations, comprising an elongated rod-like core of ferromagnetic material, a high frequency secondary winding including a relatively wide flat conductive strip wound around said core and having end portions extending away from said

core in a direction generally parallel to the axis thereof, a low frequency secondary winding wound on top of said high frequency secondary winding and having twice the number of turns per inch as said high frequency winding, a balanced primary winding including a pair of cross wound sections extending in the same direction along the length of said core and terminating in a common center tap lead extending back over said cross wound sections, and a common electrical connection for one end of both said secondary windings and said center tap lead.

4. An antenna input transformer for signals from high and low frequency V. H. F. television stations, comprising an elongated form, a secondary winding wound on said form, a balanced primary winding wound on said form and magnetically coupled to said secondary winding, said primary winding including a pair of cross-wound sections extending in the same direction throughout the length of said primary winding and terminating in a common center tap lead extending back over said cross wound sections in proximity to the input leads of said primary winding, and a common electrical connection for one end of both said secondary windings and said center tap lead.

5. An antenna input transformer as set forth in claim 4 wherein the sections of said primary winding are twisted together at one end of said primary winding, whereby the end portions of said sections remote from said twist provide terminal leads for said primary winding, and said common center tap lead extends from the respective opposite ends of said sections and is disposed between said terminal leads in proximity to said twist whereby said terminal leads are capacitively balanced with respect to said center tap lead.

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