Jan. 16, 1951 H. A. BASS 2,538,497

ANTENNA CONNECTOR SYSTEM

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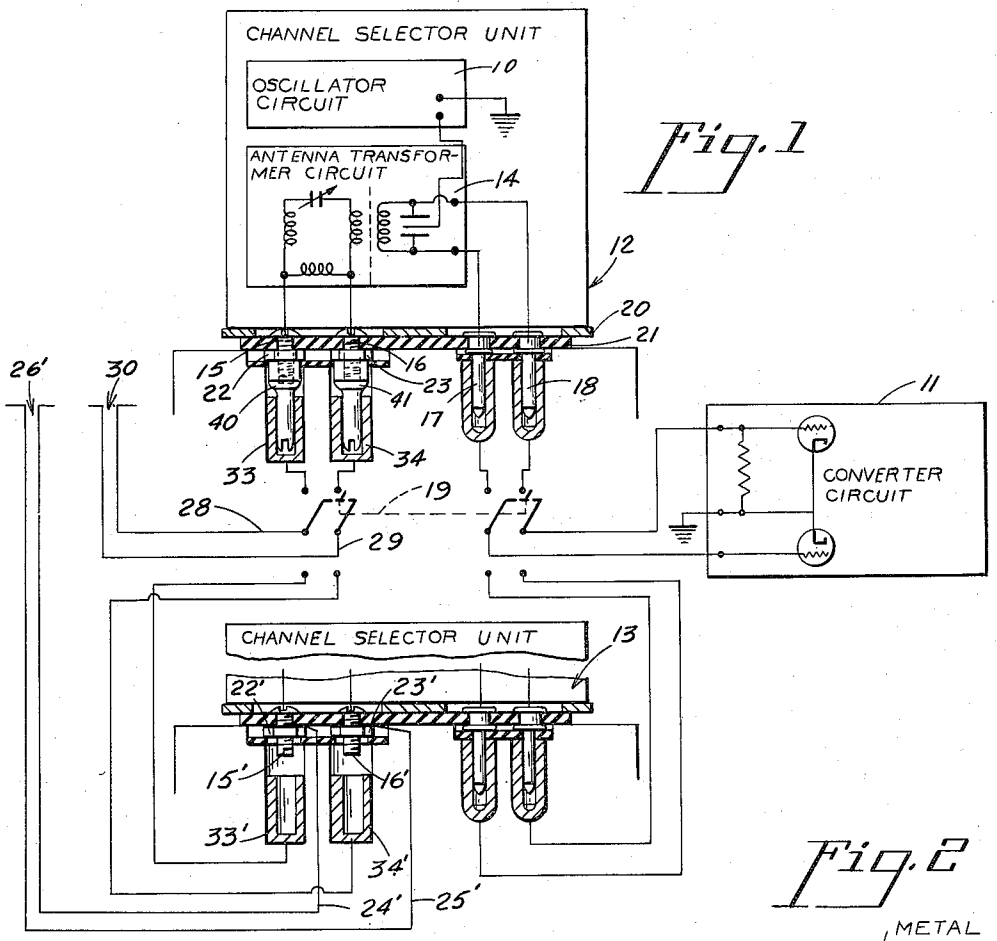


Fig. 1

Fig. 2

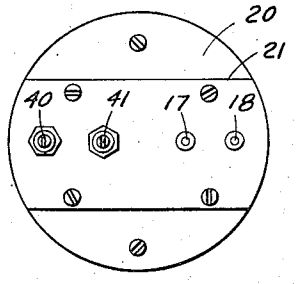
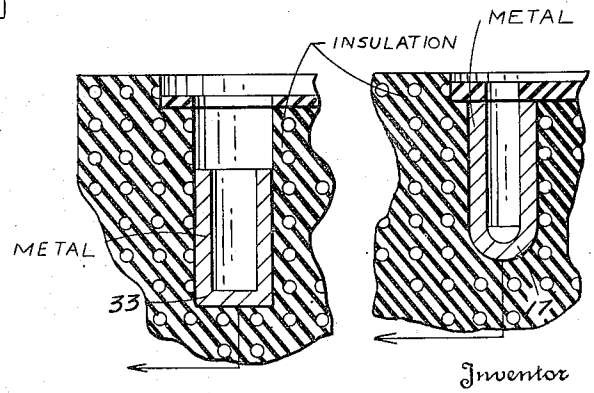


Fig. 3



Inventor

Harland A. Bass.

By

Alden Redfield.

Attorney

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ANTENNA CONNECTOR SYSTEM

Harland A. Bass, Mount Healthy, Ohio, assignor to AVCO Manufacturing Corporation, Cincinnati, Ohio, a corporation of Delaware

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2 Claims. (Cl. 250—20)

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The present invention relates to a novel antenna connecting system for electromagnetic wave energy receivers. While it has a considerable range of prospective utility, it is most effective in providing a very flexible antenna system for television receivers. The invention is particularly adapted for incorporation in the novel channel selector units disclosed and claimed in U. S. Patent 2,507,995 to John D. Reid, entitled "Television Receiving System," issued May 16, 1950, and assigned to the same assignee as the present application and invention (AVCO Manufacturing Corporation). Briefly described, the invention contemplates, for use in association with a special antenna optimized for a particular channel or group of channels, a receiver-input plug provided with terminals adapted to be connected or disconnected at will to said antenna, a socket adapted to receive said plug and having terminals spaced from said plug terminals, a general antenna suitable but not optimized for a greater number of channels and adapted to be connected to the socket terminals, and removable conductive extensions adapted to connect the plug terminals to said socket terminals and to couple the general antenna to the receiver input. Such extensions are employed when the general antenna is used and are removed when the special antenna is used. In the latter event, the special antenna is directly connected to the receiver input plug.

It is often desirable to provide a plurality of antennas for a television receiver, each specially designed and oriented to provide for optimum interception of signals in a particular channel or a group of neighboring channels. Since television transmission and reception involves very-high-frequency electromagnetic waves, reflecting images not only occasion destructive interferences but they also cause duplication of images and the phenomenon known to those skilled in the television art as "ghosts," unless suitable precautions are taken to minimize reflections. The best precautions to be taken depend on the direction of the individual transmitting station relative to the television receiver and on the nature of the various obstacles encountered by wave energy propagated from that station to the receiver. The best precautions as to receiving antenna design and location to be taken for a station having one bearing with respect to the receiver are very different from those to be taken for a station having a different bearing with respect to the receiver. It is, of course, possible to employ one antenna for all available television channels and stations in a given location but at the cost of

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a drastic loss in efficiency and other desirable receiver characteristics. It is therefore highly desirable to provide a simple and flexible antenna system for television receivers.

When the dimensions of the wave-intercepting elements become comparable to the wave lengths of the signals being transmitted and received, as in the case of television, the directional characteristics of an antenna are highly functionally dependent on signal frequency. A given antenna which manifests one directional pattern during reception of signals in a given channel may display entirely different directional pattern characteristics when receiving signals in another channel. To exploit optimum directional characteristics and patterns for each channel often requires the use of separate antennas for the individual channels or related groups of channels. This is another reason why it is desirable to employ a plurality of antennas in a television receiver and to provide a simple, inexpensive and easily operable antenna-connecting system for coupling a desired one of the antennas to the receiver input whereby optimum wave intercepting conditions may be realized for each channel.

Stated in another way, signals from the various channels are received with optimum signal intensity when optimum directivity characteristics are realized for each channel. It is often impossible for one general antenna to manifest optimum directivity characteristics for all of the available channels. This is particularly true if there be considered the extreme case of two available channels associated with two transmitting stations having bearings at right angles relative to the receiver.

For all the foregoing reasons, including the impossibility of designing one antenna having uniform directivity characteristics over an extremely broad band, proper television receiving practice requires facilities for the ready and easy coupling of optimized special antennas to the receiver input. It is an object of the invention to provide such an antenna connecting system.

A specific object of the invention is to provide, for use in conjunction with any desired one of one or more special antennas each optimized for a specific channel or group of channels, a receiver-input connector member provided with terminals adapted to be coupled to the appropriate one of said antennas, a complementary connector member adapted to engage the first-mentioned connector member and having terminals spaced from the first-mentioned terminals, a general antenna adapted to be coupled

to the last-mentioned terminals, and removable extensions adapted to connect the first-mentioned terminals to the last-mentioned terminals and to couple the general antenna to the receiver input.

For a better understanding of the present invention, together with other and further objects, advantages and capabilities thereof, reference is made to the accompanying drawings in which there is illustrated a television receiving system including channel selector units embodying a preferred illustrative form of antenna connector system in accordance with the invention.

In the drawings, Fig. 1 is a sectional view through a pair of channel selector units, showing an antenna connecting system in accordance with the invention and sufficient of the associated wiring and circuit units to make clear the construction and operation of the invention; Fig. 2 is an enlarged sectional view through the plug and socket terminals and the removable extensions provided in accordance with the invention; and Fig. 3 is a perspective view of those elements.

Referring now specifically to Fig. 1 of the drawings, there is illustrated in schematic and abbreviated form a channel selector unit system as described and claimed in the above-mentioned copending patent of John D. Reid. The general function of that system is to apply to the converter circuit 11 received signals and local oscillations optimized for each individual channel. To that end there is provided in accordance with the Reid invention a plurality of channel selector units illustrated generally in block and outline form at 12 and 13. A channel selector switch 19 is also provided and it performs the function of interposing either the channel selector unit 12 or the channel selector unit 13 between the wave intercepting system and the converter circuit unit, depending on the station from which the operator desires to receive. For a complete description of the Reid invention, reference is made to the above-mentioned copending patent. Briefly, however, each channel selector unit includes an antenna transformer circuit generally shown at 14 and a local oscillator circuit generally shown at 10. The antenna transformer unit 14 includes a primary having leads which are connected to receiver-input terminals 15 and 16 of a plug connector member. The output of the antenna transformer circuit is connected to terminals 17 and 18, also carried by this plug connector. The input terminals are adapted to be coupled to an antenna and the output terminals are adapted to be coupled to the converter unit 11. The antenna transformer circuit is designed to voltage amplify the received signals and to select that channel and to apply the signals under optimum conditions to the converter unit 11.

The channel selector unit also includes a local oscillator circuit 10, which is coupled to the output terminals 17, 18 in such a manner as also to apply local oscillations of great frequency stability to the converter unit 11. All components of the channel selector unit 12 are so designed that no vernier tuning is necessary and that signals in its channel may be received under optimum conditions. The channel selector unit 13 is designed for a different channel and in such a way that its antenna transformer input circuit and its local oscillator circuit are optimized for its appropriate channel. Switching from one channel to another is effected by the operation of the channel selector switch 19, which comprises appropriate ganged sections here symbolically shown.

The Reid construction readily and easily lends itself to the novel antenna connector system provided in accordance with the present invention. The illustrative channel selector units shown are of a single-channel type while those shown in the Reid patent drawings are of the two-channel type. The present invention may be most simply described by a showing of the single-channel type of channel selector unit since the same antenna considerations apply to both types of units. In accordance with the present invention, in lieu of prongs of the general type shown at 17 and 18, the antenna terminals of the plug-in channel selector unit 12 comprise a pair of screws 15, 16 rigidly appropriately secured to and projecting downwardly from a suitably insulated metallic base 20. This base is provided with an insulating strip 21, carrying the terminals.

Nuts 22' and 23' provide binding posts for the leads 24' and 25', respectively, of a special antenna 26' which may be optimized for the particular channel, as, for example, the channel of unit 13. When unit 13 is selected the pair of double-pole, double-throw sections of switch 19 are thrown to their lower positions whereby the output of channel selector unit 13 is coupled to the converter circuit 11. Special antenna 26' is already coupled to the receiver input, under this assumed condition.

It will be noted that the leads 28, 29 of the general antenna 30 are adapted to be coupled to the socket terminals 33—34 or 33'—34', respectively, associated with the channel selector unit 12 or the channel selector unit 13, depending on the position of the channel selector switch 19. When the switch is in its lower position general antenna 30 is disconnected from the channel selector unit 13 because of the fact that the screws 15' and 16' are of insufficient length to contact the metallic socket terminals 33' and 34', respectively. Therefore the special antenna 26' alone is coupled to the channel selector unit 13.

It will be assumed that the general antenna 30 is employed in conjunction with channel selector unit 12. When switch 19 is thrown to its upper position, plug terminals 15 and 16 are electrically in conductive relationship to the socket terminals 33 and 34 and unit 14 is coupled to the general antenna 30, by reason of removable conductive extensions 40 and 41, respectively, provided in accordance with the invention.

In any case wherein it is desired to connect a special antenna to any particular channel, the removable extensions 40, 41 may be removed from the plug-in channel selector unit, leaving the short screws 15, 16 in place. The lead-ins from an appropriate special antenna may then be secured to these screws with nuts, such as 22, 23 and the channel selector unit re-inserted in its socket. The screws 15, 16 are sufficiently short so that contact is no longer made to the socket and the common antenna 30 is disconnected from the corresponding antenna input transformer, such as 14.

It will be noted in the system illustrated in Fig. 1, that the common antenna 30 may be employed with either the channel selector unit 12 or the channel selector unit 13. In the latter event, nuts 22' and 23' are loosened and leads 24', 25' disconnected therefrom and removable extensions corresponding to 40, 41 are screwed on to the short screws 15', 16'.

The present invention provides an extremely

flexible antenna system for television receivers, particularly those employing the novel channel selector units disclosed and claimed in the above-mentioned copending Reid patent. The present invention embraces, for use in conjunction with any desired one of one or more special antennas, such as antenna 26', a receiver input plug provided with terminals 15, 16 adapted to be connected to any one of said special antennas, a socket adapted to receive said plug and having terminals 33, 34 spaced from said plug terminals, a general antenna 30 adapted to be connected to the last-mentioned terminals 33, 34 and removable extensions 40, 41 adapted to connect the plug terminals to the socket terminals and to couple the general antenna 30 to the receiver input. The general antenna may be optimized, of course, for the channel of unit 12, if desired.

While there has been show and described what is at present considered to be the preferred form of the present invention, it will be obvious to those skilled in the art that various modifications and substitutions of equivalents may be made therein without departing from the true invention, and it is accordingly intended in the appended claims to cover all such changes and modifications as fall within the true scope of the invention.

Having thus described my invention, I claim:

1. The combination of a television receiver having an antenna input circuit, a dipole antenna and means for normally conductively connecting said antenna to said input circuit, said means comprising a socket, formed with a pair of conductive wells connected to said antenna, and a plug, said socket also having a second pair of wells, said plug comprising an insulating support member formed with a pair of apertures therein, a pair of threaded metallic screws permanently conductively connected to said antenna input circuit and projecting through said apertures, a pair of threaded nuts fitting with said screws to secure them to said support member, and a pair of internally threaded conductive metallic prongs individually removably mounted on the portions of said screws which project through said nuts, said prongs being so shaped and registered as to contact said conductive wells when said plug and socket are mated, said prongs being removable to disconnect said antenna from said input circuit whereupon another dipole antenna may be connected to the binding posts provided by said nuts and screws, said plug also having a second pair of prongs, permanently secured to said support member, which engage said second pair of wells to maintain said plug and socket in mating relationship whether or not said prongs have been removed from said screws.

2. A connector device for normally connecting but optionally disconnecting a television receiver from a two-terminal antenna comprising a socket formed with a pair of conductive wells adapted to be connected to said antenna, a plug comprising an insulating support member formed with a pair of apertures therein, a pair of threaded metallic screws adapted to be permanently conductively connected to said receiver and projecting through said apertures, a pair of threaded nuts fitting with said screws to secure them to said support member, and a pair of internally threaded conductive metallic prongs individually removably mounted on the portions of said screws which project through said nuts, said prongs being so shaped and registered as to contact said conductive wells when said plug and socket are mated, said prongs being removable to disconnect said antenna from said receiver whereupon another antenna may be connected to the binding posts provided by said nuts and screws, said socket also having a second pair of wells, said plug also having a second pair of prongs, permanently secured to said support member, which engage said second pair of wells to maintain said plug and socket in mating relationship, whether or not said prongs have been removed from said screws.

HARLAND A. BASS.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,100,860	Wood	June 23, 1914
1,458,466	Crossley	June 12, 1923
1,755,166	Cannon	Apr. 22, 1930
1,854,915	White	Apr. 19, 1932
2,068,002	Batchelor	Jan. 19, 1937
2,095,254	Holliday	Oct. 12, 1937
2,145,676	Zepler	Jan. 31, 1939
2,173,898	Conron	Sept. 26, 1939
2,298,449	Bailey	Oct. 13, 1942
2,318,516	Newbold	May 4, 1943
2,385,012	Lytle	Sept. 18, 1945
2,438,116	Dodds	Mar. 23, 1948
2,443,389	Hings	June 15, 1948