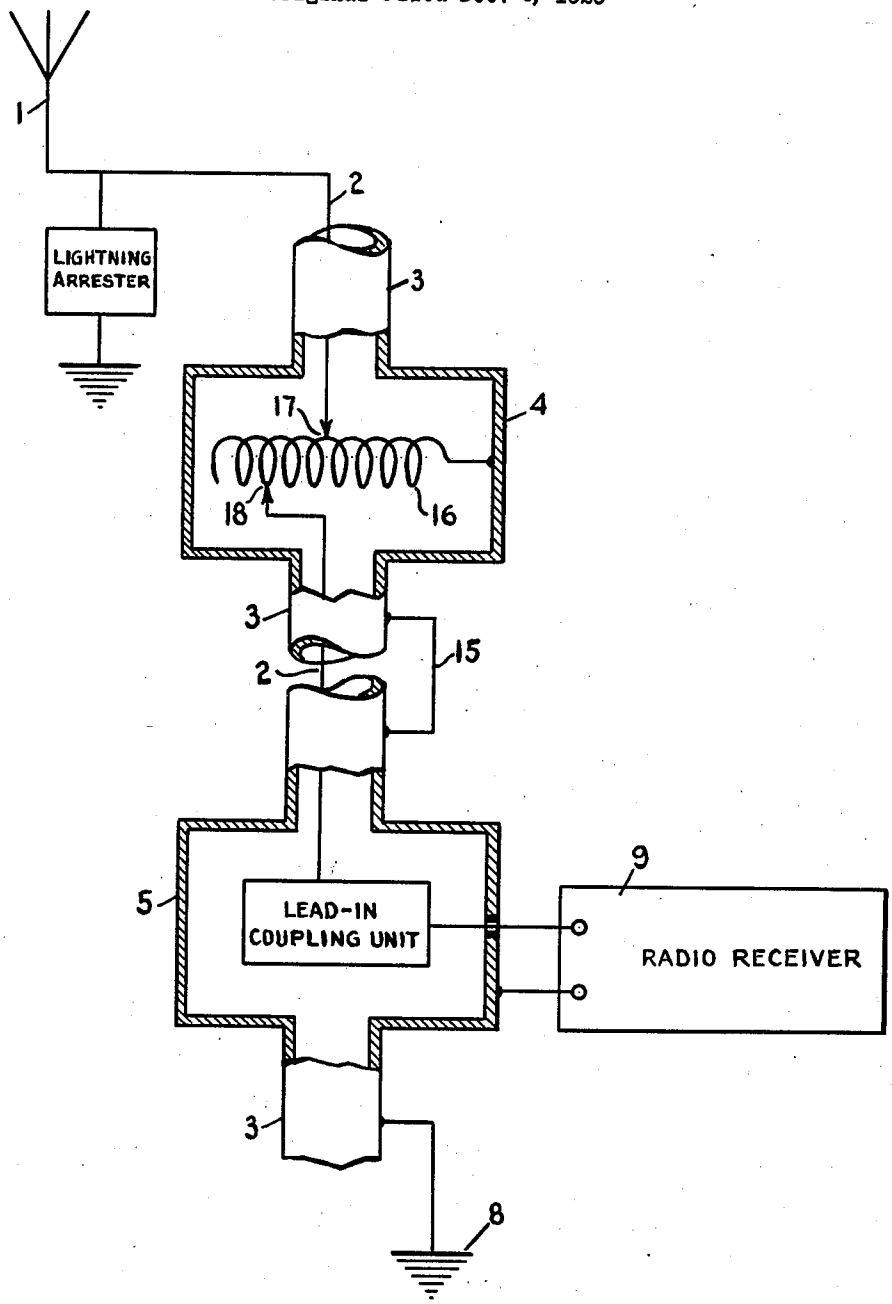
Dec. 5, 1933. E. V. AMY ET AL 1,938,092

RADIO RECEIVING SYSTEM

Original Filed Dec. 4, 1929



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Patented Dec. 5, 1933 1,938,092

UNITED STATES PATENT OFFICE

1,938,092

RADIO RECEIVING SYSTEM

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Original application December 4, 1929, Serial No. 411,435. Divided and this application September 24, 1932. Serial No. 634,774

9 Claims. (Cl. 250—20)

This invention relates to radio receiving systems and more particularly to a radio receiving system in which the antenna lead-in is positioned within a grounded, metallic conduit for protection of the lead-in against interference.

The present application is a division of our copending application, Serial No. 411,435, filed December 4, 1929, for Multiplex radio receiving systems, to which reference may be had.

It is an object of this invention to provide a system of the class described wherein the lead-in or line conductor from the antenna to the radio receiver may be installed entirely within a building, except for such initial portion as may be required from the antenna to the point of entry into the building.

It is a further object of our invention to provide a system of the class described in which the lead-in may be run through conducting, protective, grounded conduit without serious interference with the operation of the system or without serious loss of efficiency.

It is a further object of this invention to provide a system of the class described wherein the maximum energy delivery from the antenna to the lead-in or any point therein is obtained and wherein the lead-in passes with substantially equal efficiency all frequencies desired to be received, even though the line runs within a conducting conduit.

It is a further object of this invention to provide a system of the class described in which the lead-in and its associated apparatus is protected from picking up interference while maintaining the desired transmission characteristics as fully as possible.

Still other objects and advantages of our invention will be apparent from the specification.

The features of novelty which we believe to be characteristic of our invention are set forth with particularity in the appended claims. Our invention itself, however, both as to its fundamental principles and as to its particular embodiments, will best be understood by reference to the specification and accompanying drawing, in which the single figure is a diagrammatic view of a radio receiving system in accordance with our invention.

Referring now more particularly to the drawing, 1 designates an antenna or pick-up device which may, for example, be installed upon the roof of an apartment house, hotel or other edifice in which the system is to be employed. A suitable lightning arrester may be connected between the antenna and ground as shown diagrammatically. 2 designates a lead-in or line conductor and 3 indicates diagrammatically a form of conduit within which the line conductor 2 is carried. 4 and 5 designate outlet boxes of a type similar to those customarily used in the installation of electric light wiring. 9 is a radio receiver of any usual type such as likely to be found in the hands of the user.

We have found that the so-called BX cable ordinarily used in installing electric light wiring within buildings is not as satisfactory for our purposes as unitary solid piping, for example, ordinary iron pipe. It is necessary, however, if best results are to be obtained, to provide good electrical contact between joints in the conduit and for this reason it is advisable to provide bond 15 electrically joining the separate sections of the conduit, and this is true even though mechanical connections are made between said sections, as for example, by means of threaded joints in the case when conducting piping is used, since ordinarily the resistance of such joints may be so high as to interfere with the operation of our system.

The conduit system is grounded as at 8 and it will therefore be seen that there will exist a considerable distributed capacity between the lead-in conductor 2 and the conduit. This distributed capacity will naturally be the greater the greater the length of the lead-in conductor 2.

Under certain conditions, it is possible that, due to imperfect dielectric and due to eddy currents in the piping, the impedance of the lead-in may be much smaller than the value obtained by calculation using the formula

$$\sqrt{\frac{L}{C}}.$$

If this is the case and if the antenna used has a very large impedance, it is desirable to interpose between the antenna and the beginning of the lead-in an auto transformer such as shown at 16 in outlet box 4. The lead-in conductor terminals 17 and 18 are preferably both variable so that the best adjustment for each may be obtained by trial in the particular case.

The construction of the auto-transformer 16 should be such that there is a minimum amount of magnetic leakage from primary to secondary as otherwise there will not be as much transfer of energy from one side to the other as would be the case if the transformer were not used, and under this condition the energy transfer will be a function of frequency, which is undesired, it being, of course, desirable to have no substantial

difference in the performance of the transformer over the frequency band to be transmitted, as for example, the present broadcast band.

While in general it is desirable to wind the coil 16 in such manner that the tightest possible coupling is obtained between the primary and secondary, yet under certain conditions, if desired, a certain amount of leakage reactance may be provided between these windings to partially neutralize or compensate for the capacity reaction of the antenna over a narrow band of frequencies.

Under certain conditions, as for example, in the case of very tall buildings or under conditions where the dissipation of energy in the lead-in conductor 2 is unusually high, it may be desired to provide within the conduit a direct low resistance path to ground, and for this purpose a ground wire may be run through the conduit 3.

Within the outlet box 5 we may provide a coupling unit which may have the form disclosed and claimed in the copending application of Ernest V. Amy filed June 19, 1929, Serial No. 372,177, but it will be understood that any suitable type of coupling may be provided for connecting the antenna terminal or binding post of the radio receiver 9 to the lead-in 2.

In the case of the particular form of coupling unit described in the application of which this application is a division and in the applications therein referred to, the particular constants and design of the coupling unit may be so chosen as to compensate for the distributed capacity existing between the lead-in 2 and the conduit 3. The ground terminal of the radio receiver may be connected to ground, for instance, by connection to the cover of the outlet box 5 or to an appropriate terminal provided thereon.

While we have shown and described certain preferred embodiments of our invention, it will be understood that modifications and changes may be made without departing from the spirit and scope of our invention, as will be understood by those skilled in the art, within the scope of the appended claims.

We claim:

1. A radio receiving system for protecting a receiver from local interference comprising, in combination, an antenna for collecting signal energy to be supplied to a receiver, a lead-in, a radio receiver operatively associated with said lead-in, a shielding case surrounding said lead-in over a substantial portion of its length, and means interposed between said antenna and said lead-in for matching the impedances thereof.

2. A radio receiving system for protecting a receiver from local interference comprising, in combination, an antenna for collecting signal energy to be supplied to a receiver, a lead-in, a radio receiver operatively associated with said lead-in, a grounded conductor enclosing said lead-in for a substantial portion of its length and insulated therefrom, and maintained at ground potential, and a transformer interposed between the head of said lead-in and said antenna.

3. In a radio receiving system for protecting a receiver from local interference, in combination, an antenna for collecting signal energy to be supplied to a receiver, a lead-in, a radio receiver operatively associated with said lead-in, a shielding conductor surrounding said lead-in throughout a substantial portion of its length and maintained at ground potential, and a transformer interposed between the head of said lead-in and said antenna, said transformer serving to match the impedance of said antenna to that of said lead-in and to compensate for the capacity between said lead-in and said shielding conductor.

4. In a radio receiving system for protecting a receiver from local interference, in combination, an antenna for collecting signal energy to be supplied to a receiver, a lead-in, a radio receiver operatively associated with said lead-in, and a transformer interposed between the head of said lead-in and said antenna, said transformer and said lead-in being enclosed within a conducting container maintained at ground potential.

5. In a radio receiving system for protecting a receiver from local interference, in combination, an antenna for collecting signal energy to be supplied to a receiver, a lead-in, a radio receiver operatively associated with said lead-in, and an auto-transformer interposed between the head of said lead-in and said antenna, said transformer and said lead-in being enclosed within a grounded conducting container.

6. In a radio receiving system for protecting a receiver from local interference, in combination, an antenna for collecting signal energy to be supplied to a receiver, a lead-in, said lead-in being enclosed within a grounded conducting container, a radio receiver, means for connecting said radio receiver to said lead-in in operative relation, and means interposed between said antenna and said lead-in for maintaining a uniform energy transfer relation between said antenna and said lead-in over a relatively wide band of frequencies.

7. In a radio receiving system for protecting a receiver from local interference, in combination, an antenna for collecting signal energy to be supplied to a receiver, a lead-in, said lead-in being enclosed within a grounded conducting container, a radio receiver, means for connecting said radio receiver to said lead-in in operative relation, and means interposed between said antenna and lead-in for providing energy transfer from said antenna to said lead-in, both said last mentioned means being arranged to compensate for the effects of distributed capacity between said lead-in and said container.

8. In a radio receiving system for protecting a receiver from local interference, in combination, an antenna for collecting signal energy to be supplied to a receiver, a lead-in, said lead-in being enclosed within a grounded conducting container, a radio receiver operatively connected with said lead-in, and a transformer interposed between said antenna and said lead-in, said transformer comprising primary and secondary windings having minimum magnetic leakage therebetween.

9. In a radio receiving system for protecting a receiver from local interference, in combination, an antenna for collecting signal energy to be supplied to a receiver, a lead-in, said lead-in being enclosed within a grounded conducting container, a radio receiver operatively connected with said lead-in, and a transformer interposed between said antenna and said lead-in, said transformer comprising primary and secondary windings, the leakage reactance of said windings being chosen to compensate for the capacity reaction of the antenna over a band of frequencies.

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DISCLAIMER

1,938,092.—*Ernest Valentine Amy* and *Julius Gourgues Aceves*, New York, N. Y. RADIO RECEIVING SYSTEM. Patent dated December 5, 1933. Disclaimer filed September 23, 1936, by the assignee *Amy, Aceves & King, Incorporated.*

Hereby enters this disclaimer of the subject matter of claims 2, 4, and 6 of said Letters Patent, except where the transformer or equivalent means is directly connected to the antenna on the one hand and the lead-in on the other hand without the interposition of extraneous amplifying apparatus.

[*Official Gazette October 13, 1936*]