

April 2, 1940.

DE WITT R. GODDARD
TRANSMISSION LINE TRANSPOSITION
Original Filed Jan. 11, 1936

2,195,986

Fig. 1

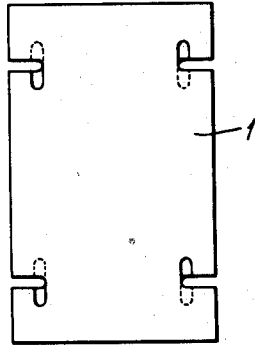


Fig. 2

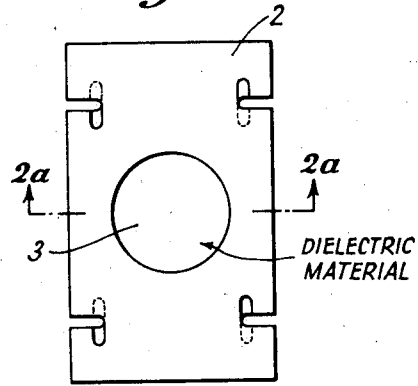


Fig. 2a



Fig. 3

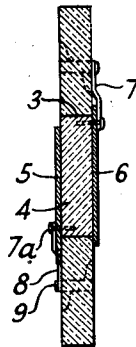


Fig. 4

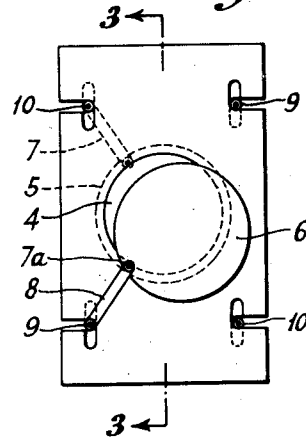
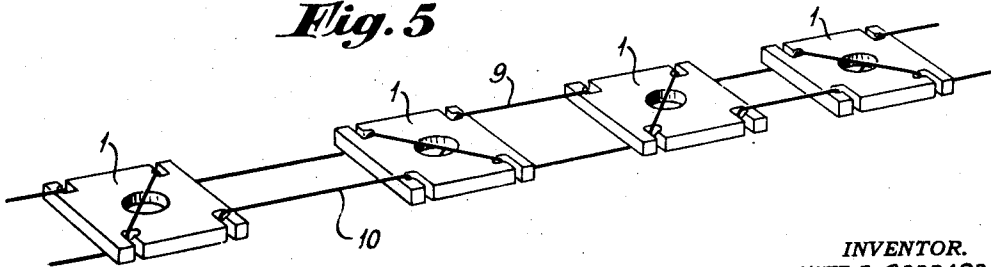


Fig. 5



BY

INVENTOR.
DE WITT R. GODDARD
H. S. Grover
ATTORNEY.

UNITED STATES PATENT OFFICE

2,195,986

TRANSMISSION LINE TRANSPOSITION

De Witt Rugg Goddard, Riverhead, N. Y., assignor to Radio Corporation of America, a corporation of Delaware

Original application January 11, 1936, Serial No. 58,725. Divided and this application December 11, 1937, Serial No. 179,271

6 Claims. (Cl. 174—33)

This invention relates to a new and novel transmission line transposition system which is particularly adapted to reception of short wave signals.

5 This application is a division of my copending application Serial No. 58,725, filed January 11, 1936, and is particularly directed to Figs. 3 and 4 of the drawing, in which a plurality of metallic members is mounted at each side of a transposition block, one of the metallic plates being variable to vary the impedance of a transmission line.

10 An object of this invention is to provide an improved transmission line having an improved spacing member or transposition block to transpose the wires in a manner to give a highly efficient transmission line.

15 Another object of this invention is to improve a transmission line to give a predetermined surge impedance by changing the arrangement of the transmission block.

In the prior art, it was customary to use transmission line transpositions designed to provide as low a capacity between wires as possible. However, it is occasionally desirable to provide a transmission line with a different surge impedance than that which is obtained by using the ordinary spacing members or transposition blocks for spacing the wires. In the past, when a different surge impedance was required, it was customary to place small evenly spaced fixed capacities or condensers across the transmission line, thereby loading the line to a new capacity value, thus resulting in a lower surge impedance.

20 According to my invention, the desired lower surge impedance of the transmission line is changed by obtaining the desired surge impedance directly from the transmission line spacing members themselves and not obtaining it from extra capacities added to the transmission line. I propose to use several methods of changing the characteristics of the transposition blocks which are shown in the accompanying drawing, in which:

25 Fig. 1 is a plan view of a simple type of transmission block;

Fig. 2 is a plan view partly in section of another type of transmission block similar to that of Fig. 1, except that it contains a central aperture;

30 Fig. 2A is a section of Fig. 2;

Fig. 3 is a sectional view of a transmission block having metal plates forming the electrodes or plates of the condenser;

Fig. 4 is a plan view of Fig. 3; and

35 Fig. 5 is a perspective view of a transmission

line having transmission blocks arranged to cause certain portions of the impedance of the line to vary.

Referring now to Fig. 1, a simple type of transmission block 1 is shown which is similar to those used in the prior art except that instead of being made of standard ceramic material such as "Isolantite" it is made of a new ceramic dielectric material known in the trade as "Faradite", which has a dielectric constant of about eighty, whereas the dielectric constant of a similar block of "Isolantite" has a dielectric constant somewhat less than four. Therefore, if a transmission line using number 14B and S gauge wire is used with the ordinary spacing members, the capacity between the wires would be about two micromicrofarads, whereas if the transmission block is made of "Faradite" the capacity would be about fifty micromicrofarads. Therefore, the use of "Faradite" would change the surge impedance of the transmission line with the transposition members spaced about five feet apart from approximately 460 ohms to 200 ohms, which is an exceedingly useful value, particularly when receiving relatively short wave signals.

In Fig. 2, the transmission block 2 is shown to be of the type having a central aperture 3. According to my invention, in order to change the surge impedance of the line to a lower value, a plug 4 made of dielectric material having a high dielectric constant is arranged to fit within this aperture. Variations of the thickness of the plug 4 with respect to the thickness of the transmission block 2, and also that of the materials used in making this plug, will provide a method for easily adjusting the capacity between the wires of the transmission line offered by the transposition. These plugs may be retained within the aperture by any suitable means, such as simple cementing.

40 In Figs. 3 and 4, there is shown a transmission block similar to that of Figs. 1 and 2, except that there is provided metallic plate members 5 and 6 which are placed each side of the plug 4 of the transmission block. These metallic plates constitute the plates of a fixed condenser and are provided with relatively short leads 7 and 8, which are connected to the wires 9 and 10 that are being transposed. Transmission line wires 9 and 10 may be soldered to the metallic plates 5 and 6 preferably at pin 1A. One of the plates 5 or 6 may be pivotally secured by any suitable means, such as pin 1A, to the transmission block, and arranged to be moved with respect to the other plate to provide a variable condenser, as

indicated by the eccentrically located circular line in Fig. 4.

In the transmission line shown by Fig. 5, the mechanical arrangement is such that the transposition blocks are spaced apart from each other so as to gradually increase in number toward one end of the line, therefore, the surge impedance of the line could be made to vary, for example, between the value of 80 ohms, the impedance of a half wave doublet, and 200 ohms, the impedance of the pickup or input coil of a receiver. This same result can also be accomplished by maintaining even spacing and varying the types of transmission blocks, that is, using blocks having a higher capacity at the point where the doublet antenna is to be connected.

While only a few modifications of this invention have been shown, it is to be distinctly understood that this invention may take other forms within the spirit and scope of the invention and therefore should not be limited except by such limitations as are imposed in the appended claims.

What is claimed is:

1. A transmission line spacing member for transposing a line, said spacing member being of insulating material, a metallic plate located on each face of said spacing member, and a metallic connection member adapted to make connection between each one of said plates and oppositely disposed wires on said transmission line.

2. A transmission line spacing member for transposing a line, said spacing member being of insulating material, a metallic plate located on each face of said spacing member, and a metallic connection member adapted to make connection between each one of said plates and oppositely disposed wires on said transmission line, and at least one of said plates being arranged to be varied with respect to the other.

3. A transmission line spacing member for transposing a line, said spacing member being of insulating material, a metallic plate located on each face of said spacing member, and a metallic

connection member adapted to make connection between each one of said plates and oppositely disposed wires on said transmission line, one of said plates being provided with a pivot so as to be varied with respect to the other plate.

4. A transmission line spacing member for transposing a line, said spacing member being of insulating material, a metallic plate located on each face of said spacing member, and a metallic connection member adapted to make connection between each one of said plates and oppositely disposed wires on said transmission line, both of said plates being provided with pivoted members so as to be varied with respect to each other.

5. A transmission line spacing member for transposing a line, said spacing member being of insulating material, a central aperture in said spacing member, a removable block of dielectric material located within said aperture, the dielectric constant of the material of said block being greater than that of said spacing member, a metallic plate located on each face of said spacing member, a metallic connection member adapted to make connection between each one of said plates and oppositely disposed wires on said transmission line, and at least one of said plates being arranged to be varied with respect to the other.

6. A transmission line spacing member for transposing a line, said spacing member being of insulating material, a central aperture in said spacing member, a removable block of dielectric material located within said aperture, the dielectric constant of the material of said block being greater than that of said spacing member, and the thickness of said block being different from the thickness of said spacing member, a metallic plate located on each face of said spacing member, a metallic connection member adapted to make connection between each one of said plates and oppositely disposed wires on said transmission line, and at least one of said plates being arranged to be varied with respect to the other.

DE WITT RUGG GODDARD.