Dec. 22, 1942. DE WITT R. GODDARD 2,305,688

TRANSPOSITION BLOCK

Filed March 30, 1940

Fig. 1

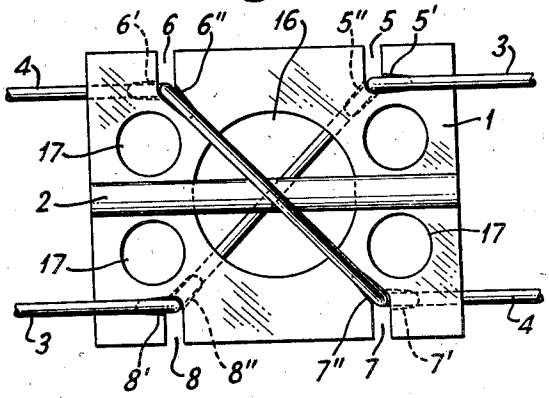


Fig. 2

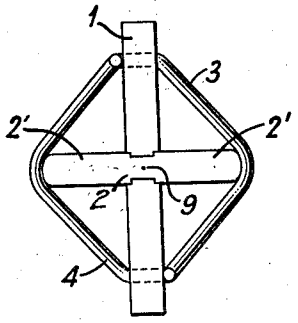
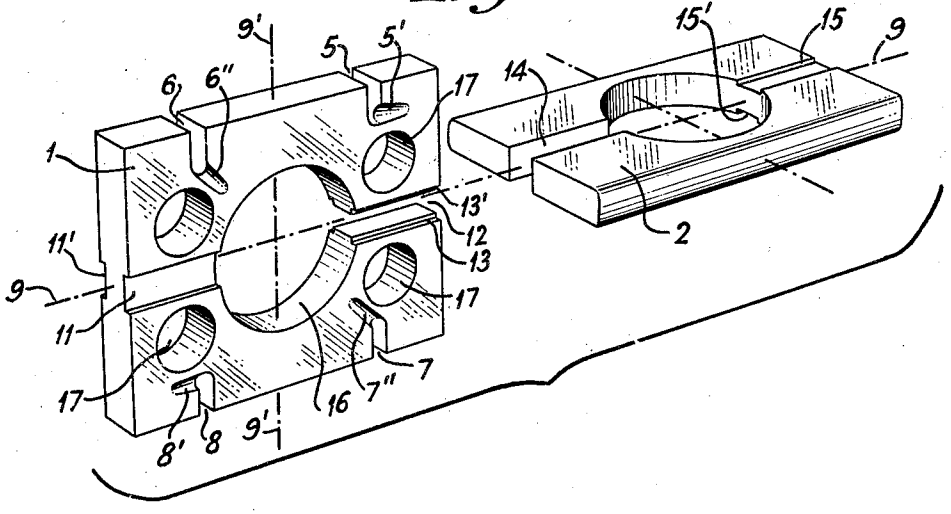


Fig. 3



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TRANSPOSITION BLOCK

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10 Claims. (Cl. 174—33)

This invention relates to a novel type of transposition block which is used to transpose the transmission line from a radio antenna to a receiver or transmitter.

An object of this invention is to simplify and improve transposition blocks used on the transmission line of an ultra-high frequency circuit.

Another object of this invention is to provide an improved transmission block made from two sheets or plates of insulation which is assembled together to form an X section without the use of extra binding members, such as screws, bolts, nuts, etc.

A feature of this invention is the provision of a projecting portion on the top and bottom of a transposition block to separate the wires which are secured to the block. The transmission blocks known in the prior art generally consisted of a flat plate of insulating material which allowed the wires to come rather close together at the point where they cross one another. This type of block is disadvantageous for the reason that snow and sleet will often fill in the space between the wires at their cross-over point, thereby introducing losses by a change in impedance, furthermore, the decrease in spacing of the wires at the cross-over point causes an increase in capacity between the wires, which is undesirable. The type of transmission block of my invention maintains essentially constant spacing between the conductors of the transmission line, thereby decreasing the capacity between the conductors, increasing the voltage rating, and reducing the detrimental effects caused by ice and snow.

This invention will best be understood by referring to the accompanying drawing, in which:

Fig. 1 is a top view of the transposition block of this invention;

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

Fig. 3 is a perspective view showing the transposition block with the two plates separated prior to being assembled.

Referring now in detail to the drawing, the transposition block of this invention comprises two plates of insulating material 1 and 2, both in the form of flat plates, assembled to form an X shaped member with a plate portion 1 and a projecting portion 2' located centrally on both the top and bottom of the plate portion 1. The plate portion 1 of the block is provided with four slots 5, 6, 7 and 8 through which two conductors 3 and 4 pass so as to be suitably transposed. As will be seen by Fig. 1, slot 5 has a slightly tapered entrance slot 5' which is located parallel to the axis 9. On the opposite side of the plate 1, an entrance slot 5'' is located and is arranged diagonally to face a corresponding slot 8''. Slot 6 has an entrance slot 6'' diagonally located to face a corresponding slot 7''. On the opposite side of the plate are slots 6' and 7' and as shown in Fig. 1, there is also located a slot 8'. It will be noted that slots 5', 6', 7' and 8' are all located parallel to the axis 9, whereas slots 5'', 6'', 7'' and 8'' are diagonally arranged to face each other. The purpose of entrance slots 5' and 5'' to 8' and 8'' inclusive will be readily seen by referring to Fig. 2, wherein the conductors 3 and 4 are shown in their transposed position. The projecting portion 2' is of such height above and below the plate portion that the conductors are so separated that they are of substantially the same spacing as they pass over the projecting portions as they are when they pass through the slots 5, 6, 7 and 8. In other words, at a distance taken from the central axis 9 of block 1, the outer conductor will be the same from the block axis to the bottom of the slots as it is from the top and bottom projecting portions 2'. It is preferable that the plate 2 be made of the same insulating material as the rest of the transposition block which is generally that of a good grade of ceramic material.

The manner in which plate 1 and the projecting portion 2 is made and assembled will be more completely understood by referring to the detailed showing of Fig. 3. It will be noted that the insulating material forming the plate portion 1 is slotted on both sides or surfaces, as indicated by slots 11 and 11' which are located centrally in the axis 9, and if the plate is to be made of solid material will extend to the central portion thereof, as indicated by the dot and dash line 9'. The width of slots 11 and 11' is equal to the thickness of the material of plate 2 of the projecting portion 2'. Directly opposite slots 11 and 11' is an open slot 12 which cuts completely through the sheet of insulating material to the center line 9' and is made slightly smaller in width than that of slots 11 and 11'. On each side of slot 12 and on both surfaces of plate 1 there is provided additional slots 13 and 13', the width of these slots being such that they equal the thickness of the material of plate 2 so that sheet 2 may freely slide therein. The depths of slots 13 and 13' are equal to the depths of slots 11 and 11'. The plate 2 comprises a plate of insulating material having an open slot 14 which is located on the center of the axis 9 and opposite from the open slot 12 of plate 1, and extends to the center line 9'. Slots 15 and 15' are located below slot 14 and extend upward to center line 9'. The width of slots 14, 15 and 15' are equal to that of the narrow open slot 12 of plate 1. The depths of slots 15 and 15' are made such that they permit plate 2 to slide in the slots 13 and 13' of sheet 1. It will be noted that with this construction, the transposition block may be assembled without the use of any tools whatsoever, as the natural springiness in the material will generally suffice to maintain the two parts

together. However, this is not necessary should the insulation material of block 1 be that of material which has substantially no springiness in it, for the reason that conductors 3 and 4 will completely bind the plates together when constructed according to this invention. By the use of these plates, it will also be seen that members 1 and 2 do not require the use of extra binding materials, such as the ordinary metallic screws, bolts, nuts, etc., which when placed in the electrostatic field give rise to losses in the transmission line.

In another embodiment of this invention, the plate surface of the transposition block is perforated with either a single large aperture 16 shown in Fig. 1, or a system of large and small apertures 17 so as to further reduce the dielectric material in the electrostatic field of the wires, thereby still further reducing the capacity between the conductors and the losses in the line.

Although only a few embodiments of this invention are shown, it is to be distinctly understood that it should not be limited precisely thereto.

What is claimed is:

1. A transposition block consisting of two fixed plates of insulating material, each one of said plates being partially slotted for engaging the other in a plane at right angles thereto to form a unitary structure, one of said plates having a plurality of slots arranged in adjacent pairs for engaging a pair of conductors, the other plate having a width substantially equal to the distance between the inside ends of adjacent conductor slots on the first plate to space a pair of conductors in constant spacing relationship as they cross one another at the transposition points.

2. A transposition block consisting of two plates of insulating material, each one of said plates being partially slotted for engaging the other in a complementary relationship, said plates being located in planes at right angles to each other, one of said plates having engaging means to retain a pair of conductors of a transmission line in transposed relationship, the other plate arranged to maintain a constant spacing between said conductors at the transposition points.

3. A transposition block consisting of two plates of insulating material, each one of said plates being slotted for engaging the other to form a unitary structure having an "X" cross-section, at least one of said plates having engaging means to retain a pair of conductors of a transmission line in transposed relationship, the other plate being arranged to maintain a constant spacing between said conductors at the transposition points.

4. A transposition block consisting of two plates of insulating material, each one of said plates being slotted half-way through its length for engaging the other to form a unitary structure having an "X" cross-section, at least one of said plates having engaging means to retain and space a pair of conductors of a transmission line in transposed relationship at the transposition points.

5. A transposition block consisting of two plates, one plate forming a plate portion having a plurality of slots arranged in adjacent pairs for engaging a pair of conductors, the other plate forming a projecting portion having a projection substantially equal to the distance between the inner ends of the adjacent conductor slots on said plate portion, said projecting portion being centrally located on the top and bottom portions of said block to space said conductors apart as they pass over said plate portion.

6. A transposition block consisting of two plates, one plate forming a plate portion having two slots on each side thereof and located opposite each other, said slots being arranged for engaging a pair of conductors, the other plate forming a projection portion having a projection substantially equal to the distance between the inner ends of opposite conductor slots on said plate portion, said projecting portion being centrally located on the top and bottom portion of said block to space said conductors apart as they pass over said plate portion.

7. A transposition block consisting of two plates, one plate forming a plate portion having a plurality of slots arranged in adjacent pairs for engaging a pair of conductors, the other plate forming a projecting portion having a projection substantially equal to the distance between the inner ends of adjacent conductor slots on said plate portion, said projecting portion being centrally located on the top and bottom portions of said block to space said conductors apart as they pass over said plate portion, and a central aperture in said plate portion to reduce the dielectric material at a point where the conductors cross each other.

8. A transposition block consisting of two plates of ceramic material, one plate forming a plate portion having a plurality of slots arranged in adjacent pairs for engaging a pair of conductors, the other plate forming a projecting portion having a projection substantially equal to the distance between the inner ends of adjacent conductor slots on said plate portion, said projecting portion being centrally located on the top and bottom portion of said block to space said conductors apart as they pass over said plate portion.

9. A transposition block consisting of two plates of insulation material, at least one of said plates having a plurality of apertures therein, each one of said plates being partially slotted for engaging the other in planes at right angles to each other to form a unitary structure, one of said plates having engaging means to space and retain a pair of conductors of a transmission line in transposed relationship, the other plate arranged to maintain a substantially constant spacing between said conductors at the transposition points.

10. A transposition block consisting of two plates of insulation material, each one of said panels being slotted halfway through its length for engaging the other to form a unitary structure having an X cross-section, and at least one of said plates having engaging means to retain a pair of conductors, at least one of said plates having apertures therein to reduce the dielectric material in the electrostatic field of the conductors, the other plate having a single aperture and being arranged to maintain a constant spacing between said conductors at the transposition points.

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