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TERMINATING SYSTEM FOR SHIELDED CIRCUITS

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FIG. 1

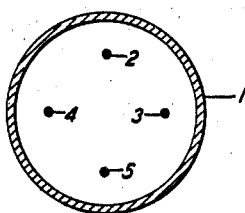
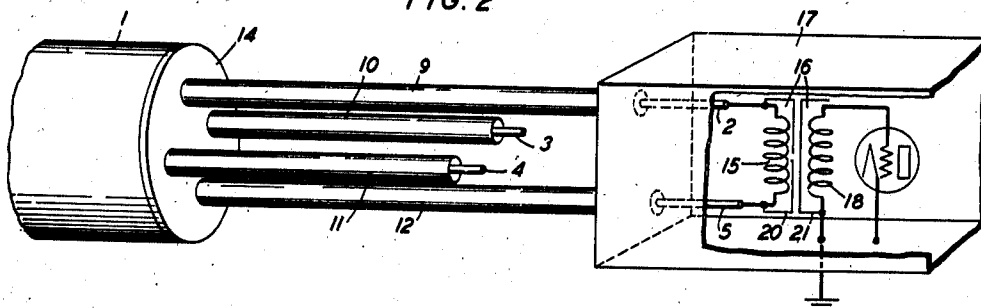


FIG. 2



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## UNITED STATES PATENT OFFICE

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TERMINATING SYSTEM FOR SHIELDED  
CIRCUITS

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5 Claims. (Cl. 179-78)

This invention relates to a shielded spiral four cable and particularly to means for connecting the conductors thereof with terminal apparatus for maintaining the capacity balance of the conductors between the end of the cable and the terminating apparatus.

It has been found that by placing four conductors within a common shield a reasonably good balance can be maintained between circuits if in each plane perpendicular to the axis of the shield the imaginary line joining the centers of the conductors of one circuit is at right angles to that joining the centers of the conductors of the other circuit and all conductors are placed equidistant from the axis of the shield. The pairs may be twisted or spiraled about this axis of the shield and diagonally opposite pairs used for the opposite sides of the circuit.

In order, however, to maintain the balance in the conductors in that space between the end of the cable and the terminating apparatus it is necessary to provide special means and it is with this feature that this invention is concerned.

In accordance with the general features of this invention each individual wire of the spiral four is surrounded by a circular shield between the end of the cable sheath and the terminating apparatus and the compartment housing the terminating equipment or apparatus is also shielded.

In the drawing illustrating this invention

Fig. 1 is an end view of a shielded quad or spiral four; and

Fig. 2 is a view in side elevation illustrating the connections of the conductors with its terminating equipment.

Referring first to Fig. 1, the reference numeral 1 designates a circular shield and 2, 3, 4 and 5 the four conductors of the shield which as shown are equidistant from the axis of the shield. Diagonally opposite conductors such as 3 and 4 are used as the sides of the circuit to be considered.

As shown in Fig. 2 the conductors 2, 3, 4 and 5 where they emerge from the shield are surrounded by cylindrical shielding members 9, 10, 11 and 12, each shielding member forming with its associated conductor what in effect is a coaxial. All of the shielding members are joined to the shield 1 of the spiral four by means of a metal plate 14 that closes the end of the shielded spiral four around the shields 9, 10, 11 and 12 of the four coaxials, so that the pairs are completely shielded at their junction with the spiral four.

Preferably the diameter ratio of the coaxial conductors is so selected that the characteristic impedance of the pairs with double circular shields is the same as the shielded spiral four in order to minimize the impedance mismatch at the junction.

At their ends away from the cable the conductors 2 and 5 are led into the primary 15 of a transformer 16 constituting the input of an unbalanced-to-ground repeater enclosed in a shielded compartment 17 to which the shields 9 and 12 of coaxials 2 and 5 are connected. The repeater is grounded to the container.

Surrounding the induction coil primary 15 is a two part shield 20, one part connected to each end of the primary, and the induction coil secondary designated as 18 is surrounded by a shield 21 connected to ground. The shield around the primary 15 is to prevent any spurious currents that may be flowing between any of the wires of the spiral four and ground from flowing along the primary winding to the grounded shield surrounding the secondary thereby inducing a voltage in the secondary.

The other pair including coaxials 3-10 and 4-11 may be similarly connected to another shielded compartment and repeater.

What is claimed is:

1. In combination, a common shield, four conductors in said shield paired to form two balanced physical circuits, terminating apparatus for each pair beyond the end of the common shield, and a concentric metal shield for each conductor between the common shield and the terminating apparatus.

2. In combination, a circular shield, four conductors in said shield paired to form two balanced physical circuits, terminating apparatus for each pair, a shield for the terminating apparatus, and a concentric metal shield for each conductor extending between the end of the circular shield and the terminating apparatus shield.

3. In combination, a circular shield, four conductors in said shield paired to form two balanced physical circuits, terminating apparatus for each physical circuit, a shield for the terminating apparatus, a concentric metal shield surrounding each conductor extending between the end of the circular shield and the apparatus shield and a metal plate in the end of the circular shield in which the concentric shield for each conductor terminates.

4. The combination of a shielded spiral four comprising a common shield and four conduc-

tors in the shield paired to form two balanced physical circuits, terminating apparatus for each physical circuit comprising a repeater and a shielded compartment therefor, a circular metal shield enclosing each of the four conductors between the end of the common shield and the shielded compartment, and individual shielding means for parts of the repeater apparatus.

5. In combination, a shield, four conductors in the shield paired to form two balanced physical circuits, terminating repeater apparatus for

each physical circuit, a transformer included in said repeating apparatus, a grounded shield for the secondary of the transformer, a divided shield for the primary of the transformer, one part of said shield connected with each end of the primary, a shielded compartment surrounding the repeater apparatus, and individual coaxial shields for each of the conductors of the spiral four extending between the shield of the spiral four and the shielded compartment.

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