

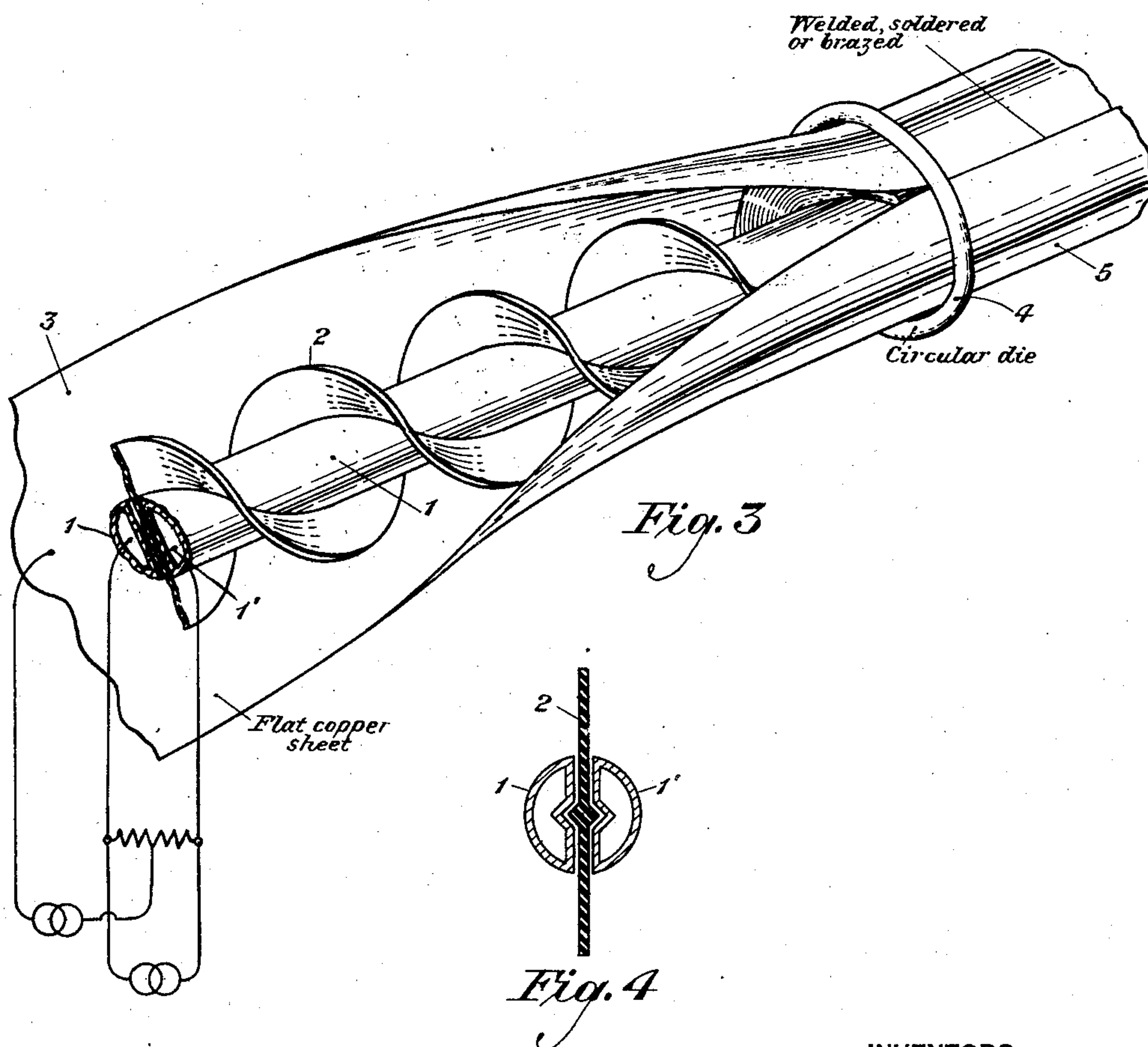
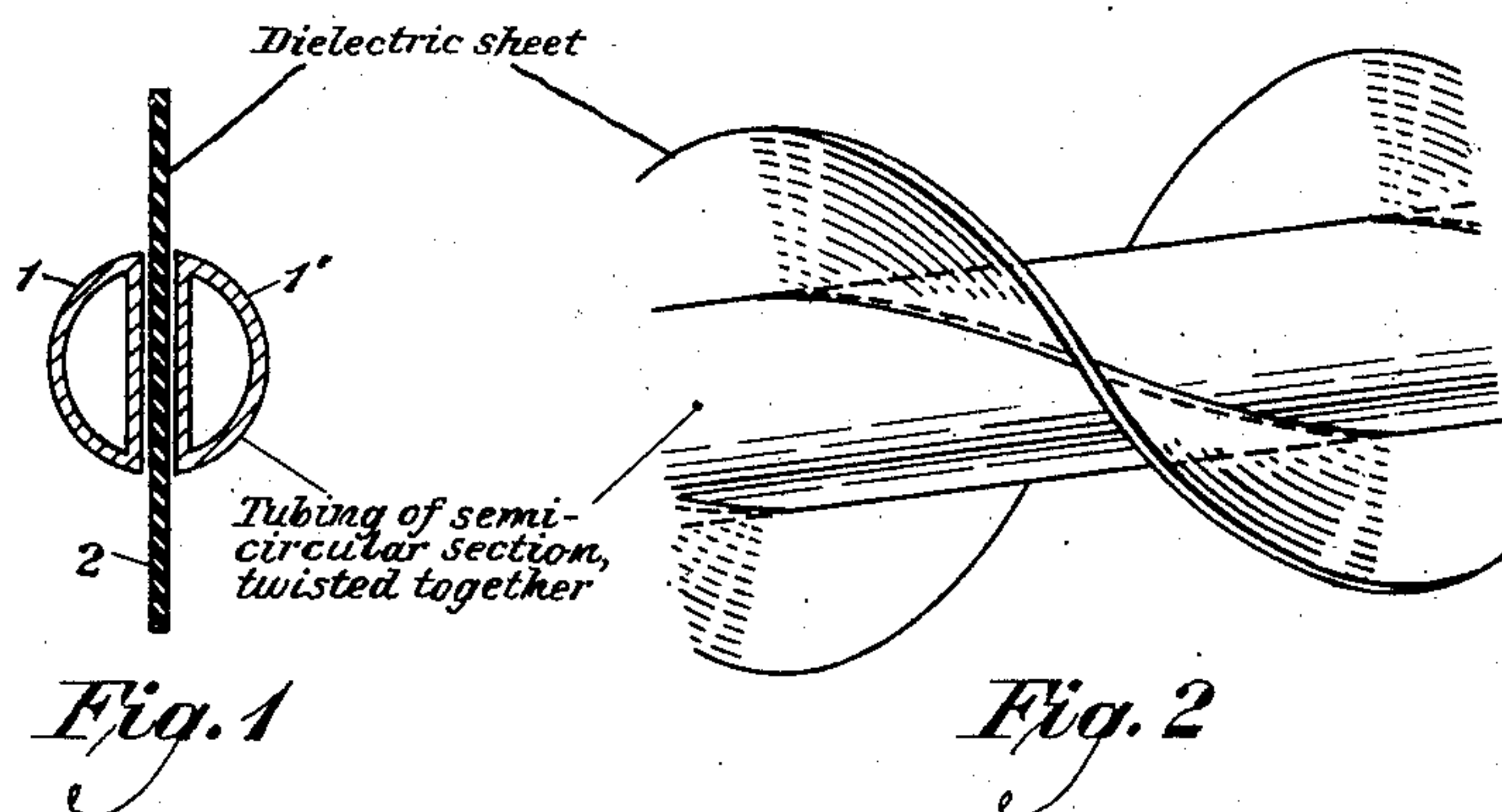
March 14, 1933.

A. CARPE ET AL

1,900,976

CONCENTRIC CONDUCTOR SYSTEM

Filed May 22, 1930



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CONCENTRIC CONDUCTOR SYSTEM

Application filed May 22, 1930. Serial No. 454,734.

This invention relates to concentric conductor systems, and particularly to the mechanical and electrical construction of such systems.

5 A concentric conductor system as ordinarily constructed comprises inner and outer tubular conductors concentrically arranged and suitably spaced from each other by means of insulating washers or elements
10 strung along the inner conductor. The two conductors are, of course, so connected that one acts as a return for the other. In accordance with the present invention, it is proposed to simplify the construction by
15 using spirally arranged dielectric spacing material instead of spaced washers or equivalent devices for separating the inner and outer conductors. This is accomplished by forming the inner tubular conductor of two
20 semi-circular pieces of tubing with their flat sides abutting, and with dielectric material in the form of thin, flat sheets laid between the two pieces of tubing, the flat sheet of dielectric material being of greater width
25 than the diameter of the inner conductor. The elements thus arranged are twisted so that the dielectric sheet is in the form of a spiral. The outer conductor will then have an inner diameter corresponding to the di-
30 ameter of the spiral dielectric. If desired, the outer conductor may be formed from a flat sheet of copper or other suitable conductive material, by means of a die which folds the flat conductive material with its edges
35 abutting to form the tube, the inner core comprising the dielectric element and the two semi-circular pieces of tubing being fed in during the formation of the outer conductor.

40 The invention will now be more fully understood from the following description when read in connection with the accompanying drawing in which Figure 1 is a sectional view showing the arrangement of
45 the two pieces of tubing comprising the inner concentric conductor and the dielectric sheet; Fig. 2 shows these elements after being spirally twisted to form the core of the system; Fig. 3 is a drawing showing how the
50 outer conductor is formed and mounted

upon the inner core; while Fig. 4 is a cross-sectional view of a modified arrangement of the inner core comprising the inner concentric conductor and spiral insulator.

Referring to Fig. 1, the inner concentric
55 conductor comprises two sections of conductive tubing 1 and 1' of substantially semi-circular section, arranged with their flat sides abutting and with a thin, flat sheet of
60 dielectric material 2 arranged between the flat sides of the two pieces of tubing. The width of the dielectric sheet 2 is greater than the diameter of the combined tubular conductor comprising the elements 1 and 1'.
65 After the dielectric and semi-circular tubing elements have been mounted together, as shown in Fig. 1, they are twisted into spiral form, as indicated in Fig. 2, to form the core of the concentric conductor system. The outer conductor may be in the
70 form of a tube whose inner surface has a diameter sufficient to slide over the dielectric spiral element 2, but preferably it is constructed from a sheet of flat conductive material 3 passed through a circular die 4 so
75 that the two edges of the sheet are brought together to form an outer tubular conductor 5. The inner core, comprising the spiral dielectric 2 and semi-circular tubes 1 and 1',
80 is fed into the outer conductor 5 during the process of passing the sheet 3 through the die 4, so that the conductor may be made up in lengths as long as desired. Preferably, the abutting edges of the outer tubular conductor 5 will be united by welding, soldering or brazing to make the system water-tight. If desired, however, the entire outer conductor may be covered by a sheath of lead or other material.

90 In order to prevent slippage of the dielectric sheet 2 with respect to the semi-circular tubes 1 and 1', these elements may be arranged as shown in Fig. 4 so that ribs are formed along the central axis of the dielectric sheet 2 and corresponding grooves are
95 provided in the flat sides of the semi-circular tubes 1 and 1'. By locating the ribs of the dielectric element in the grooves of the semi-circular sections of tubing, the parts will be
100

locked together after being twisted so that no possible slippage can occur.

The concentric conductor construction above described has the further advantage that the two tubes 1 and 1' can be separately connected to act one as a return for the other for a low frequency transmission system without interference with the relatively high frequency transmission taking place over the outer conductor 5 with the inner conductors 1 and 1' acting as a return therefor.

It will be obvious that the general principles herein disclosed may be embodied in many other organizations widely different from those illustrated without departing from the spirit of the invention as defined in the following claims.

What is claimed is:

1. A concentric conductor system including an inner conductor comprising two pieces of conducting material of substantially semi-circular section, with their flat sides abutting, and a sheet of thin, flat dielectric material located between and extending beyond the flat sides of the two sections of tubing, said elements being twisted together to form a spiral core, and a tubular outer conductor mounted upon the edges of the spiral insulating element.

2. A concentric conductor system including an inner conductor comprising two pieces of conducting material of substantially semi-circular section, with their flat sides abutting, and a sheet of thin, flat dielectric material located between the flat sides of the two sections of tubing, said elements being twisted together to form a spiral core, and a tubular outer conductor formed from a sheet of conductive material having its edges folded together and abutting each other over the spirally arranged core.

3. A concentric conductor system including an inner conductor comprising two pieces of conducting material of substantially semi-circular section, with their flat sides abutting, and a sheet of thin, flat dielectric material located between and extending beyond the flat sides of the two sections of tubing, said elements being twisted together to form a spiral core, and an outer conductor comprising a sheet of conductive material wrapped about the spiral core and formed in the shape of a tube surrounding the spiral core and mounted on the edges of the spiral dielectric sheet.

4. A concentric conductor system including an inner conductor comprising two pieces of conducting material of substantially semi-circular section, with their flat sides abutting, and a sheet of thin, flat dielectric material located between and extending beyond the flat sides of the two sections of tubing, said elements being twisted together to form a spiral core, and a tubular

outer conductor mounted upon the edges of the spiral insulating element and separated from said inner conductor by gaseous space, the two semi-circular tubes being adapted to be connected in parallel to form the return for the outer tubular conductor at high frequencies and said semi-circular inner tubular conductors being adapted to be connected one as a return for the other to form an independent circuit for low frequency transmission.

5. A concentric conductor system including an inner conductor comprising two pieces of conducting material of substantially semi-circular section, with their flat sides abutting, and a sheet of thin, flat dielectric material located between the flat sides of the two sections of tubing, said elements being twisted together to form a spiral core, and a tubular outer conductor formed from a sheet of conductive material having its edges folded together and abutting each other over the spirally arranged core so as to be separated from the inner conductor by gaseous space, the two semi-circular tubes being adapted to be connected in parallel to form the return for the outer tubular conductor at high frequencies and said semi-circular inner tubular conductors being adapted to be connected one as a return for the other to form an independent circuit for low frequency transmission.

6. A concentric conductor system including an inner conductor comprising two pieces of conducting material of substantially semi-circular section, with their flat sides abutting, and a sheet of thin, flat dielectric material located between and extending beyond the flat sides of the two sections of tubing, said elements being twisted together to form a spiral core, and an outer conductor comprising a sheet of conductive material wrapped about the spiral core and formed in the shape of a tube surrounding the spiral core and mounted on the edges of the spiral dielectric sheet so as to be separated from the inner conductor by gaseous space, the two semi-circular tubes being adapted to be connected in parallel to form the return for the outer tubular conductor at high frequencies and said semi-circular inner tubular conductors being adapted to be connected one as a return for the other to form an independent circuit for low frequency transmission.

In testimony whereof, I have signed my name to this specification this 16th day of May 1930.

ALLEN CARPE.

In testimony whereof, I have signed my name to this specification this 19th day of May, 1930.

FRANK A. LEIBE.