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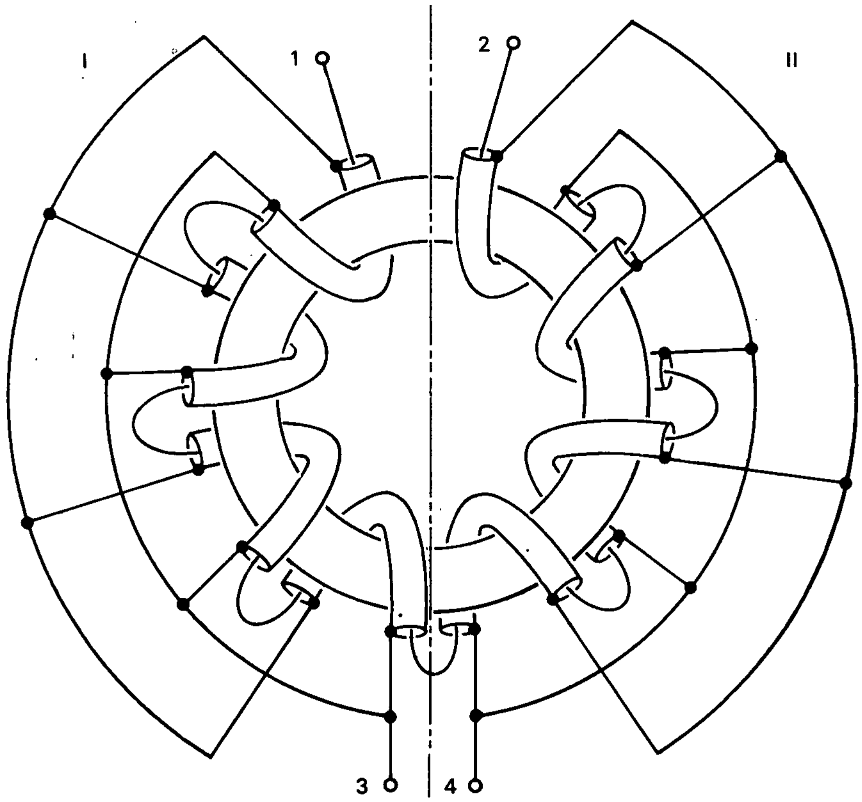
## High Frequency Wide-Band Transformer Uses Coax to Achieve High Turn Ratio and Flat Response




### The problem:

To design a high frequency wide-band transformer with a high turn ratio, a high coupling coefficient, and a flat broadband response. It is difficult to obtain efficient coupling in standard high frequency transformers with turn ratios above 2:1. Also, flat broadband frequency response is not readily available in transformers with very high turn ratios.

### The solution:

A toroidal core is spirally wound with a single coaxial cable. The inner conductor of the coaxial cable functions as the primary winding and the outer coax shielding is segmented to form the secondary winding.

### How it's done:

A center-tap push-pull transformer configuration is shown which consists of a helical winding of coaxial

(continued overleaf)

cable on a ring of ferrite core material. The ferrite inner conductor, with input terminals 1 and 2, corresponds to the primary winding. The outer shielding, with output terminals 3 and 4, corresponds to the secondary winding.

The cable is initially wound on the core at a 1:1 ratio. The method used to obtain a 4:1 stepdown ratio is illustrated. For each half of the transformer I and II there are effectively four primary windings magnetically coupled to one secondary winding. The effect of reducing the number of turns in the secondary is accomplished by sectionally discontinuing the outer shielding and rewiring the resulting sections into four parallel networks. Thus, the secondary is electrically equivalent to a single turn of a conductor about a magnetic core wound with four primary turns.

**Notes:**

1. Specific performance data of this design indicate that the coupling coefficient between primary and secondary approaches 1. Stray inductance loss is lowered by this configuration. The amount of coupling and/or stray inductance loss may be varied as a function of the diameters of the two conductors.
2. Empirical study of the frequency response of this transformer indicates a completely flat response from 100 Kc to 10 Mc.
3. The networks in parallel need not be single turn as illustrated, but may be any number as required to meet specific requirements.
4. Inquiries concerning this innovation may be directed to:

   Office of Industrial Cooperation
   Argonne National Laboratory
   9700 South Cass Avenue
   Argonne, Illinois 60439
   Reference: B66-10600

Source: T.De Parry
Particle Accelerator Division
(ARG-107)

**Patent status:**

Inquiries about obtaining rights for commercial use of this innovation may be made to:

Mr. George H. Lee, Chief
Chicago Patent Group
U.S. Atomic Energy Commission
Chicago Operations Office
9800 South Cass Avenue
Argonne, Illinois 60439