

Jan. 16, 1940.

A. GOTHE

2,187,584

HIGH FREQUENCY ENERGY LINE

Filed April 21, 1937

Fig. 1

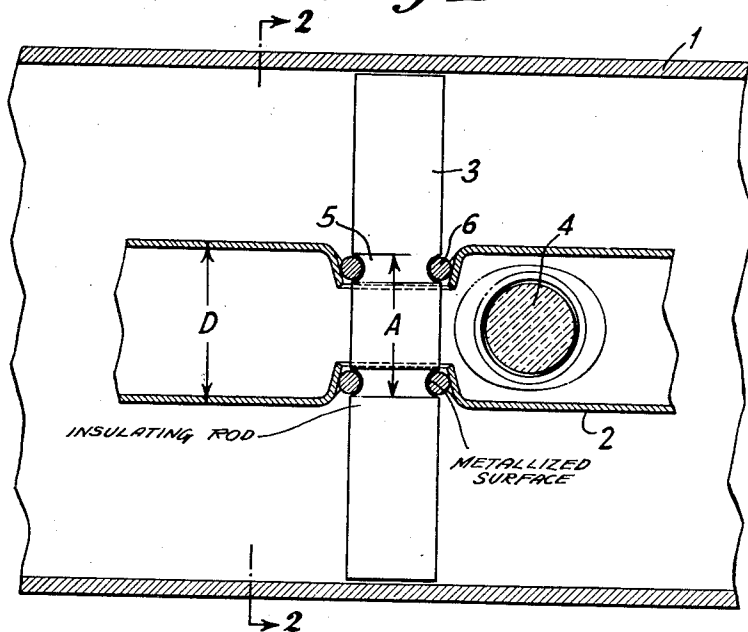


Fig. 4.



Fig. 2

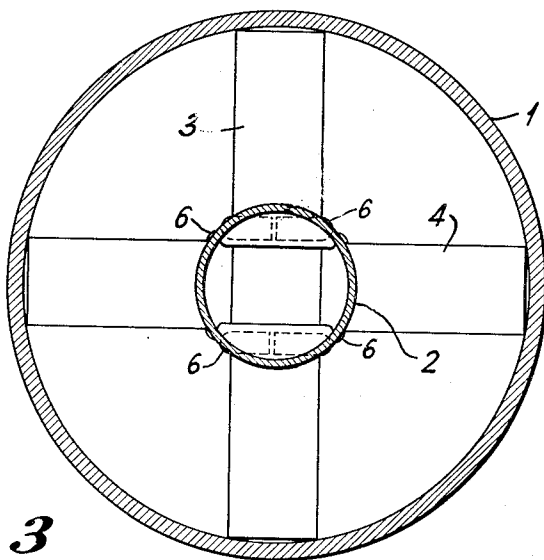
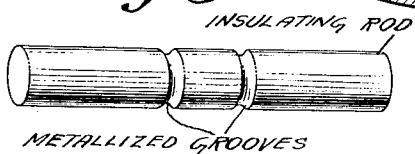


Fig. 5.



Fig. 3



BY

INVENTOR
ALBRECHT GOTHE
H. S. Grover
ATTORNEY

UNITED STATES PATENT OFFICE

2,187,584

HIGH FREQUENCY ENERGY LINE

Albrecht Gothe, Berlin, Germany, assignor to
Telefunken Gesellschaft für Drahtlose Tele-
graphie m. b. H., Berlin, Germany, a corpora-
tion of Germany

Application April 21, 1937, Serial No. 138,113
In Germany April 6, 1936

11 Claims. (Cl. 174—28)

This invention relates to a corona free construction of a concentric high frequency energy line, for the transmission of high voltages.

In concentric high frequency energy lines as known in the prior art, difficulties are frequently encountered due to the construction of the insulation retained by the inner conductor and bearing against the outer conductor, causing corona effects to occur at high voltages. If the two concentric conductors are to be insulated in the manner known in the prior art, for example by means of disks or rings, the latter must be securely fastened to the inner conductor, otherwise, at the existing air gaps very high field intensities would appear, giving rise to undesired corona effects. The manufacture of concentric transmission lines as known in the prior art with the use of insulating disks or rings involves a problem which makes it very difficult to prevent corona effects and the construction is quite expensive.

It has been proposed to maintain the distance between the inner conductor and the outer conductor by means of insulating rods which are passed through an ordinarily tubular inner conductor and rest with their ends against the inside of the outer conductor. Also, in this case there is the danger of corona effects between the insulating rods and the edges of the bores of the inner conductor through which the rods are mechanically inserted. In order to avoid the danger of corona effects in such concentric lines insulated by means of rods, the rods according to the present invention are provided with two grooves into which elastic metal rings are placed whose external distance of the outside diameter and width of the ring is smaller than the diameter of the inner conductor of the energy line, so that when the metal rings abut against flat seats or depressions provided at the inner conductor, the electric field will not be altered. The flat portions are produced by depressing the borders of the bores of the inner conductor.

The invention will be elucidated by Figs. 1 to 5, inclusive of the drawing, in which:

Fig. 1 is a longitudinal view of a concentric conductor;

Fig. 2 is a cross-section of Fig. 1;

Fig. 3 is a detail of an insulating spacer;

Fig. 4 is a detail of a corrugated tube; and

Fig. 5 is a detail of a spiral ring.

Referring now in detail to the drawing, within the tubular outer conductor 1 there extends a tubular inner conductor 2. The inner conductor is insulated in approximately equal distances

against the outer conductor by means of two insulating rods 3 and 4 passed through the inner conductor closely spaced from and arranged at right angle to each other and resting with their ends on the inside of the outer conductor. The borders of the bores of the inner conductor are pressed inwardly so that round seat-like depressions are obtained. On the insulating rods at a distance A from each other, two grooves 5 are provided. The distance A is always made smaller than the diameter D of the inner conductor, so that the maximum overall dimension of rings 6 will not exceed the outside diameter of tube 2. Into these grooves 5 the split spring-like metal rings 6 are inserted which rest tightly against grooves in the insulating rods, as well as against the sunken-in edges of the bores. The grooves 5 are preferably metallized so that between the inner conductor and the insulating rod no air gaps can appear. The metal rings may be formed of corrugated tubings or wire spirals as shown by Figs. 4 and 5, respectively. They serve in the first place to assure a corona safe abutting of the insulating rods against the inner conductor. In view of the fact that the all-over distance between the metal rings is smaller than the diameter of the inner conductor, no increases in the field strength between inner conductor and outer conductor appear. Furthermore, the metal rings have the task of mechanically securing the insulating rods in place and preventing a displacement of the inner conductor.

The Figures 1 and 2 of the drawing indicate that the inner conductor together with the insulating rods form a separate mechanically sturdy structure which can be separately produced and subsequently inserted into the outer conductor.

What is claimed is:

1. A concentric high frequency line for the transmission of high voltages comprising an inner and an outer conductor, means for spacing said conductors apart, said means comprising a plurality of insulating members arranged to pass through apertures in flattened portions on said inner conductor, a groove on each one of said insulating members, and an elastic member co-operating with the groove on each insulating member to secure them on said flattened portions of the inner conductor so that the electric field between said inner and outer conductor is not altered.

2. A concentric high frequency line for the transmission of high voltages comprising an inner and an outer conductor, means for spacing

said conductors apart, said means comprising a plurality of insulating members arranged in groups to pass through apertures in flattened portions on said inner conductor, a groove on each one of said insulating members, and an elastic member co-operating with the groove on each insulating member to secure them on said flattened portions of the inner conductor so that the electric field between said inner and outer conductor is not altered.

3. A concentric high frequency line for the transmission of high voltages comprising an inner and an outer conductor, means for spacing said conductors apart, said means comprising a plurality of insulating members arranged in pairs to pass through apertures in flattened portions on said inner conductor, a groove on each one of said insulating members, and an elastic member co-operating with the said groove on each insulating member to secure them on said flattened portions of the inner conductor so that the electric field between said inner and outer conductors is not altered.

4. A concentric high frequency line for the transmission of high voltages comprising an inner and an outer conductor, means for spacing said conductors apart, said means comprising a plurality of insulating members arranged in pairs located at right angles from each other to pass through apertures in flattened portions on said inner conductor, a groove on each one of said insulating members, and an elastic member co-operating with the groove on each insulated member to secure them on said flattened portions of the inner conductor so that electric field between said inner and outer conductor is not altered.

5. A concentric high frequency line for the transmission of high voltages comprising an inner and an outer conductor, means for spacing said conductors apart, said means comprising a plurality of insulating members arranged in groups to pass through apertures in flattened portions on said inner conductor, a pair of annular grooves on each insulating member, and an elastic metal ring co-operating with each one of said grooves on said insulating members to secure them on said flattened portions of the inner conductor so that the electric field between said inner and outer conductor is not altered.

6. A concentric high frequency line for the transmission of high voltages comprising an inner and an outer conductor, means for spacing said conductors apart, said means comprising a plurality of insulating members arranged to pass through apertures in flattened portions on said inner conductor, an annular groove having a metallized surface on each one of said insulating members, and an elastic metal ring co-operating with the grooves on each one of said insulating members to secure them on said flattened portions of the inner conductor so that the electric field between said inner and outer conductor is not altered.

7. A concentric high frequency line for the transmission of high voltages comprising an inner and an outer conductor, means for spacing

said conductors apart, said means comprising a plurality of insulating members arranged to pass through apertures in flattened portions on said inner conductor, a groove on each one of said insulating members, and an elastic metallic wire spiral co-operating with the groove on each one of said insulating members to secure them on said flattened portions of the inner conductor so that the electric field between said inner and outer conductor is not altered.

8. A concentric high frequency line for the transmission of high voltages comprising an inner and an outer conductor, said inner conductor having a plurality of flattened portions thereon, an aperture located in each flattened portion, said apertures arranged in pairs, a pair of apertures being closely adjacent another pair but angularly disposed to each other, a plurality of insulating members located in said apertures, each member having grooves thereon, elastic means located to rest on said flattened portions, said means cooperating with the grooves on said insulating members to space said conductors apart so that the electric field between said inner and outer conductor is not altered.

9. A concentric high frequency line for the transmission of high voltages comprising an inner and an outer conductor, means for spacing said conductors apart, said means comprising a plurality of insulating members arranged to pass through apertures in flattened portions on said inner conductor, an annular groove on each one of said insulating members, and an elastic metallic corrugated tube co-operating with the groove on each insulating member to secure them on said flattened portions of the inner conductor so that the electric field between said inner and outer conductor is not altered.

10. A concentric high frequency line for the transmission of high voltages comprising an inner and an outer conductor, means for spacing said conductors apart, said means comprising a plurality of insulating members passing through apertures in said inner conductor and arranged to pass through said apertures located on flattened portions on said inner conductor, an annular groove on each one of said insulating members, and an elastic metal ring co-operating with the groove on each insulating member to secure them on said flattened portions of the inner conductor so that the electric field between said inner and outer conductor is not altered.

11. A concentric high frequency line for the transmission of high voltages comprising an inner and an outer conductor, means for spacing said conductors apart, said means comprising a pair of insulating members arranged at right angles from each other and passing through apertures in said inner conductor, said apertures located at flattened portions on said inner conductor, an annular groove on each one of said insulating members, and an elastic metal ring cooperating with each groove on each insulating member to secure them on said flattened portions of the inner conductor so that the electric field between said inner and outer conductor is not altered.

ALBRECHT GOTHE.