Sept. 29, 1942. H. J. R. VON BAEYER 2,297,513

TRANSMISSION LINE

Filed Oct. 18, 1940

Fig.1.

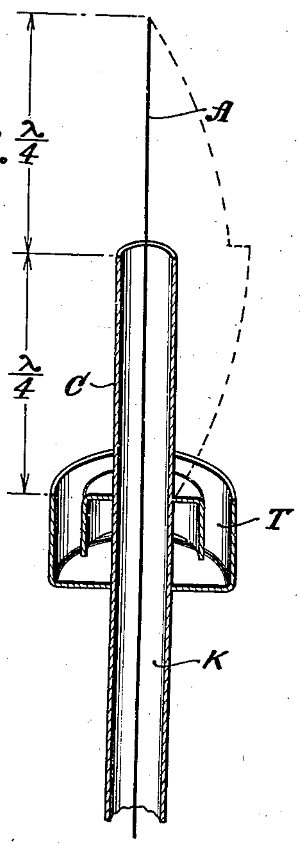


Fig.2.

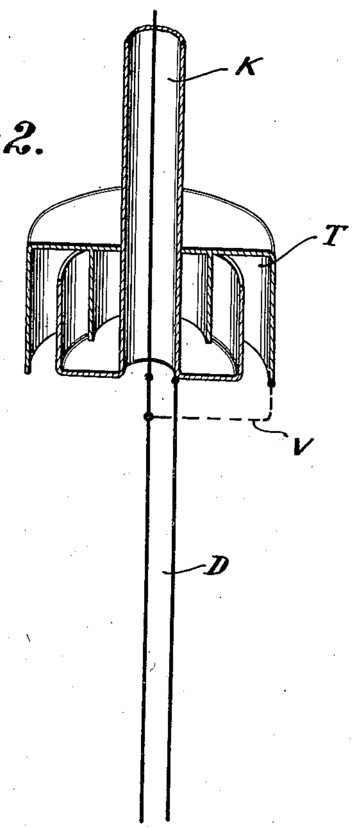
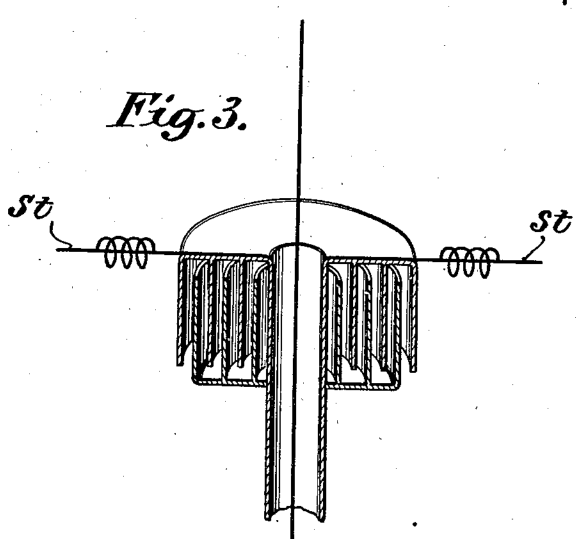


Fig.3.



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TRANSMISSION LINE

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4 Claims. (Cl. 178—44)

At the place of transition of a shielded high frequency line into an asymmetrical antenna, or into a symmetrical line, or antenna it is known to employ cup-shaped structures which can be tuned in their length and which surround the outer covering of the shielded line and are connected unilaterally thereto. These cups serve for suppressing the line covering or shell waves at the transition point of the shielded line into the symmetrical arrangement. As already stated, these cups must be tuned in their length whereby lengths are obtained equal to a quarter wavelength, or when employing additional reactances, equal to slightly less than a quarter wave. For long wavelengths this measure necessitates considerable dimensions and thus a substantially larger amount of means of the structure. In order to reduce this structural requirement and to maintain within reasonable limits the dimensions of the blocking cup in the case of longer waves, it is proposed in accordance with the present invention, to divide the cup into two or a larger number of tubes inserted into each other from opposite sides and connected respectively with the covering of the line in a unilateral manner. The lengths of said tubes are so chosen that a line is formed which extends to and fro in a multiple fashion and is short-circuited at the end thereof whereby the input impedance of the line has the required value.

Figure 1 shows a first example of construction according to the present invention, while Figures 2 and 3 show modifications thereof. In Figure 1 a $\lambda/4$ radiator A is fed from a shielded line K. The upper end of the covering C of the line K having the length equal to $\lambda/4$ oscillates freely and completes in this manner the radiator to a dipole. In the current node (the current distribution on the radiator and line cover is shown in broken lines) a blocking cup T is arranged whose geometrical length is relatively short as compared with the wavelength on account of the placing into each other of several conductors according to the present invention. Yet the open input of the cup respresents a very high resistance (resonance resistance) if the path extending to and fro in the interior of the cup is tuned to $\lambda/4$.

Figure 2 shows the transit of a symmetrical double line D into a shielded line K through the use of a symmetry establishing cup T adapted according to the present invention. The connection V can in general be omitted and thus it is shown in broken lines. In the adaptation shown in Figure 2 the cup is divided up into three reciprocating paths which in total are to be tuned to $\lambda/4$.

Finally, Figure 3 shows a cup subdivided six times in its application to the feeding of an antenna from a shielded cable. The current on the cable covering is absorbed by the tuned rods S_t and the residual excitation of the cable cover is completely suppressed by the cup. More especially in the case of a large number of divisions of the cup as shown in Figure 3, care must be taken (which is, however, not shown especially in the drawing) in choosing the individual diameters of the various tubes in such a manner whereby the wave resistances of the individual line parts are equal to one another, i. e., they must have essentially equal radius proportions and thus distances which increase towards the outside.

I claim:

1. An arrangement for suppressing transmission of high frequency energy along the outside of a conductor comprising a plurality of tubular conductors coaxially arranged around said first mentioned conductor, alternate ones of said tubular conductors being connected at one end to said first named conductor and the remaining ones at the other end whereby an elongated chamber folded concentrically with respect to said first named conductor and closed at its inner end is formed, the length of said chamber being such as to present a high impedance at its outer end to said high frequency energy, and means presenting a low impedance path to ground for said energy connected to the outer of said tubular conductors.

2. An arrangement for suppressing transmission of high frequency energy along the outside of a conductor comprising a plurality of tubular conductors coaxially arranged around said first mentioned conductor, alternate ones of said tubular conductors being connected at one end to said first named conductor and the remaining ones at the other end whereby an elongated chamber folded concentrically with respect to said first named conductor and closed at its inner end is formed, the electrical length of said chamber being an odd multiple, including unity, of one quarter of the operating wavelength, and means presenting a low impedance path to ground for said energy connected to the outer of said tubular conductors.

3. An arrangement for suppressing transmission of high frequency energy along the outer shell of a concentric transmission line compris-

ing a plurality of tubular conductors coaxially arranged about said shell, alternate ones of said tubular conductors being connected at one end to said shell and the remaining ones to said shell at the other end whereby an elongated chamber folded concentrically with respect to the axis of said shell and closed at its inner end is formed, the length of said chamber being such as to present a high impedance at its outer end to said high frequency energy, and tuned absorption rods connected to the outer of said tubular conductors.

4. An arrangement for suppressing transmission of high frequency energy along the outer shell of a concentric transmission line comprising a plurality of tubular conductors coaxially arranged about said shell, alternate ones of said tubular conductors being connected at one end to said shell and the remaining ones to said shell at the other end whereby an elongated chamber folded concentrically with respect to the axis of said shell and closed at its inner end is formed, the electrical length of said chamber being an odd multiple, including unity, of one quarter of the operating wavelength, and tuned absorption rods connected to the outer of said tubular conductors.

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