Sept. 29, 1942. H. J. R. VON BAEYER 2,297,512

ARRANGEMENT FOR SUPRESSING WAVES ALONG A CABLE CASING

Filed Oct. 17, 1940

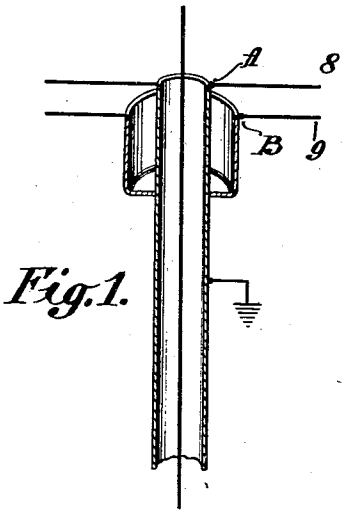


Fig. 1.

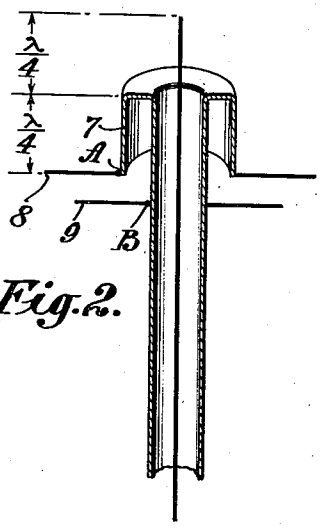


Fig. 2.

Fig. 3.

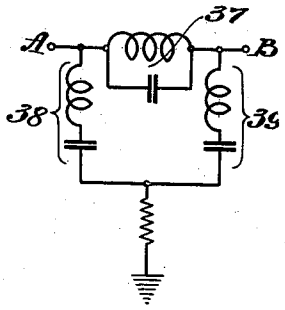


Fig. 4.

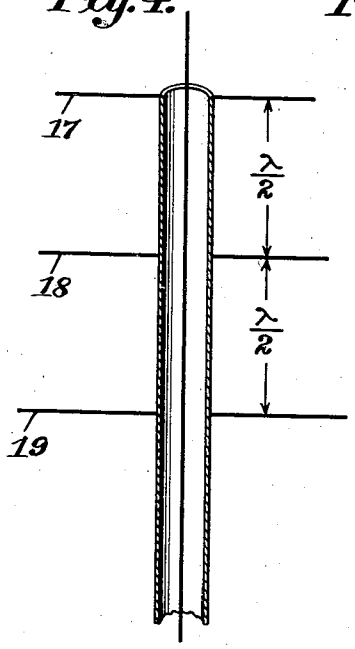


Fig. 5.

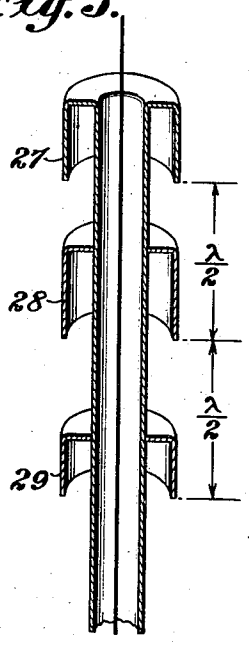
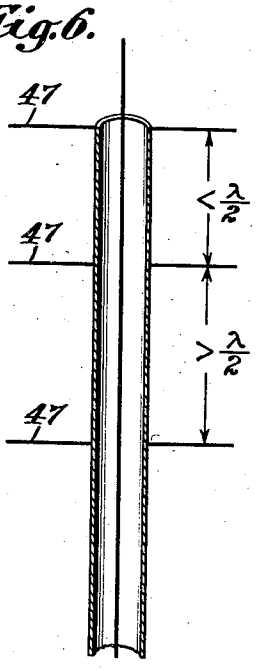


Fig. 6.



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Patented Sept. 29, 1942 2,297,512

UNITED STATES PATENT OFFICE

2,297,512

ARRANGEMENT FOR SUPRESSING WAVES ALONG CABLE CASINGS

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Application October 17, 1940, Serial No. 361,563
In Germany May 26, 1939

5 Claims. (Cl. 178—44)

It is known that in feeding asymmetrical antennas through shielded lines there takes place a disturbing high frequency excitation of the outer cover of the antenna lead for whose elimination various means can be employed. These means consist of a short circuiting of the cover waves through tuned parallel rods at the end of the covering, or by blocking the propagation of the covering waves along the surface of the covering to which end so-called blocking cups are particularly well suited. All these means, however, make use of the resonance properties of conductors of certain shapes such that the suppression of the covering waves concerns but a single frequency, whereas in the transmission of several frequencies, or of an entire frequency band disturbing phenomena remain which cannot be readily eliminated by the said means. The present invention aims at a suppression of the covering waves for several waves, or an entire frequency band. To this end, at the end of the outer covering and below said ends several parallel reactances and/or series reactances of the kind referred to are connected at various distances and/or tuned in different ways such that a band filter effect of the suppression of the covering wave will be obtained. If only a few frequencies are to be taken care of which have a fixed distance between one another, the said reactances are to be selected, for instance, in such a manner whereby the reactance destined for the one frequency forms an infinitely high resistance for the other frequency so that it is ineffective as regards the latter frequency.

For blocking an entire band, filters are to be set up in accordance with the known principles such as is illustrated in Figures 1 to 6 of the accompanying drawing of which Figures 1 and 2 illustrate embodiments of the present invention, while Figure 3 illustrates an equivalent circuit for the filters shown in Figures 1 and 2 and Figures 4, 5 and 6 illustrate further modifications for attaining a band filter effect. The Figures 1 and 2 represent filters with the substitution circuit according to Figure 3, whereby the dependence on the frequency of the suppression of the covering waves is given by the filter characteristic between the points A and B. As can be seen from the figures, a blocking cup 7 serves as a parallel tuned oscillatory circuit 37, while the series tuned structures 36, 39 are represented by the rods 8, 9, referred to above and which are relatively displaced preferably by 90°. Figure 2 differs from Figure 1 only in that cup 7 is inverted so the outer surface can act as a part of the radiator. Further possibilities are shown in the Figures 4 to 6 in which the band effect is realized either by differently tuned short circuit organs 17, 18, 19 (Figure 4) spaced at equal distances, or by blocking cups 27, 28, 29 (Figure 5), or by equally tuned reactances arranged at different distances (Figure 6). The distances in Figure 6 are hereby slightly below, and slightly above $\lambda/2$.

It is obvious that in an identical manner high-pass, low-pass, or band pass filters may be employed whose characteristics are to be adapted in accordance with the existing conditions. As blocking organs, rods of $\lambda/2$ in length may hereby be employed and as short circuit organs, $\lambda/2$-cups may be used which, in part, can be connected, for instance, to the inner conductor of the cable so that at the same time there will be obtained together with the band filter action of the organs for the covering waves, a band filter action of the antenna. In the same manner counterweight plates may also be employed.

I claim:

1. An arrangement for suppressing the propagation of a band of wavelengths along the outside of a conductor, including resonant means for presenting a high impedance to the flow of current along said conductor for wavelengths within said band, and further resonant means presenting a shunt path to earth for wavelengths within said band at each end of said first means.

2. An arrangement for suppressing the propagation of a band of wavelengths along the outside of a conductor, including resonant means for presenting a high impedance to the flow of current along said conductor for wavelengths within said band, said means comprising a shell surrounding said conductor and open at one end, said shell being connected to said conductor at a distance equal to a quarter wavelength within said band from said open end, and further means presenting a shunt path to earth for wavelengths within said band at each end of said first means.

3. An arrangement for suppressing the propagation of a band of wavelengths along the outside of a conductor including means for presenting a high impedance to the flow of current along said conductor for wavelengths within said band, said means comprising a shell surrounding said conductor and open at one end, said shell being connected to said conductor at a distance equal to a quarter wavelength within said band from said open end, and further means presenting a shunt path to earth for wavelengths within said band at each end of said first means, said further

means comprising conductors each having a length equal to a quarter of the operating wavelength within said band, some of said conductors being connected at one end to the open end of said shell and the others to said first named conductor adjacent said open end.

4. An arrangement for suppressing the propagation of a band of wavelengths along the outside of a conductor, including means for presenting a high impedance to the flow of current along said conductor for wavelengths within said band, said means comprising a shell surrounding said conductor and open at one end, said shell being connected to said conductor at a distance equal to a quarter wavelength within said band from said open end, and further means presenting a shunt path to earth for wavelengths within said band at each end of said first means, said further means comprising conductors each having a length equal to a quarter wavelength within said band, said conductors being disposed radially with respect to the longitudinal axis of said first conductor.

5. An arrangement for suppressing the propagation of a band of wavelengths along the outside of a conductor, including means for presenting a high impedance to the flow of current along said conductor for wavelengths within said band, said means comprising a shell surrounding said conductor and open at one end, said shell being connected to said conductor at a distance equal to a quarter wavelength within said band from said open end, and further means presenting a shunt path to earth for wavelengths within said band at each end of said first means, said further means comprising conductors each having a length equal to a quarter wavelength within said band, some of said conductors being connected at one end to the open end of said shell and the others to said first named conductor adjacent said open end, said conductors being disposed radially with respect to the longitudinal axis of said first conductor.

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