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SPACER FOR TWIN AND MULTIPLE CONDUCTORS OF HIGH VOLTAGE AERIAL TRANSMISSION LINES

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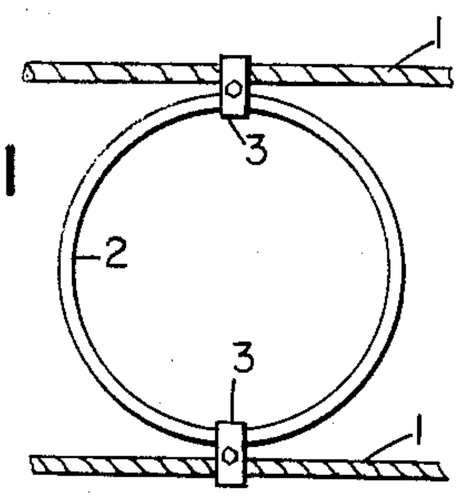

FIG.1

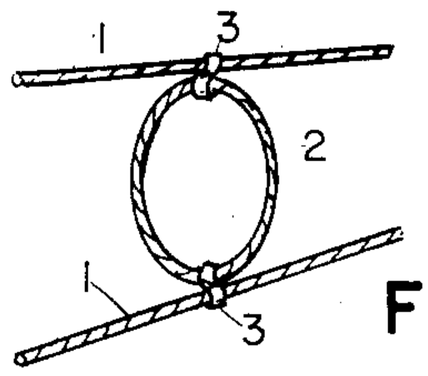

FIG.2

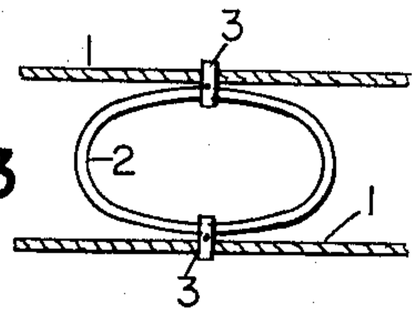

FIG.3

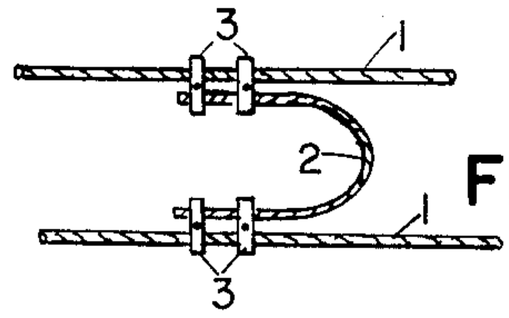

FIG.4

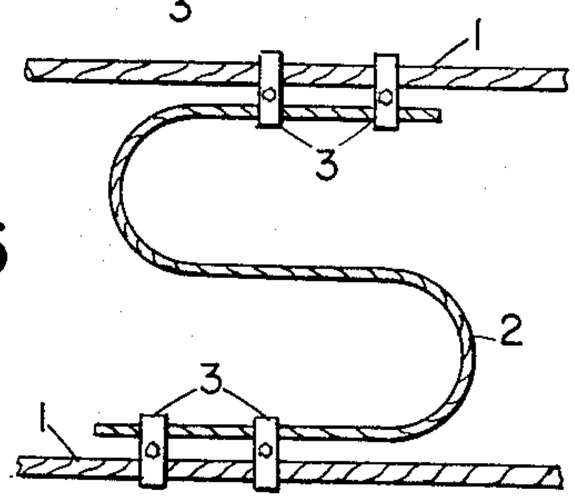

FIG.5

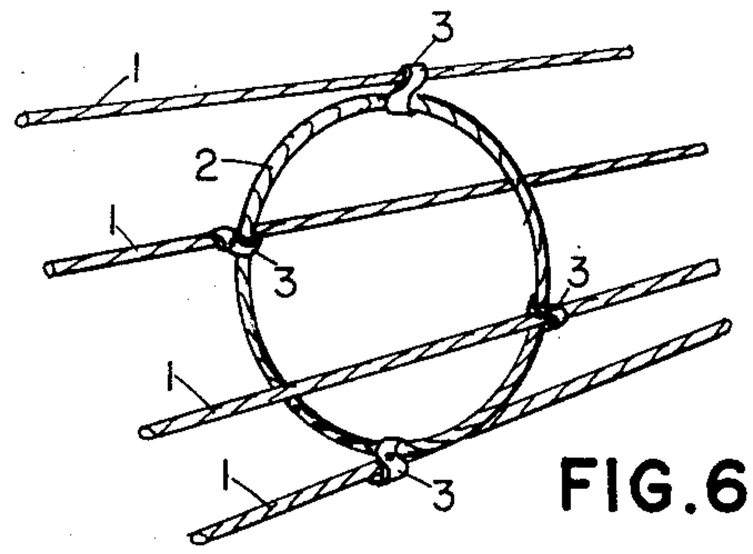

FIG.6

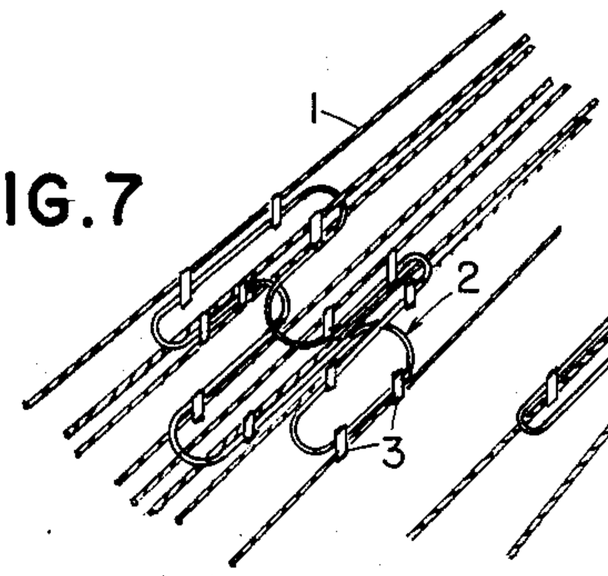

FIG.7

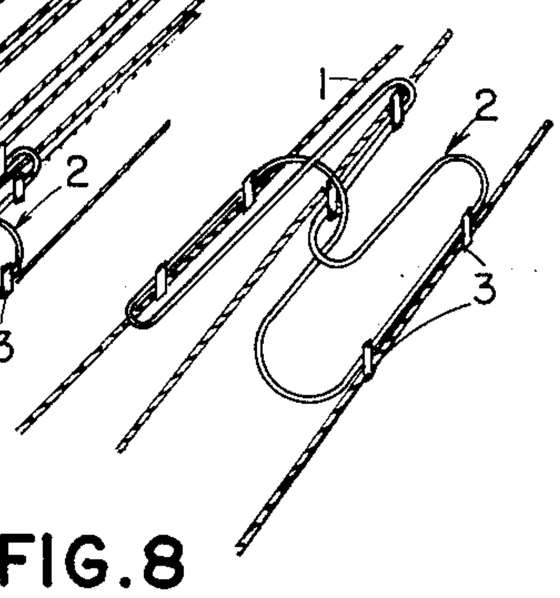

FIG.8

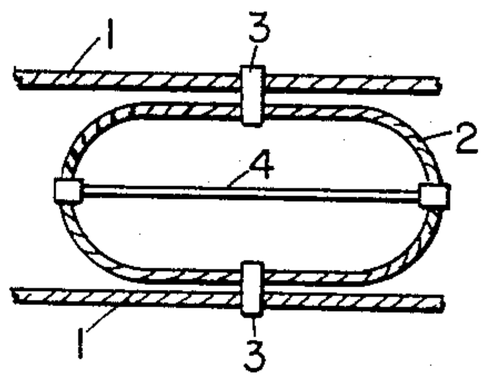

FIG.9

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SPACER FOR TWIN AND MULTIPLE CONDUCTORS OF HIGH VOLTAGE AERIAL TRANSMISSION LINES

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In the employ of twin and multiple conductors for great power aerial high voltage transmission lines it is necessary to use suitable spacers which, spacing the single conductors from each other, act also as an electrical bridge.

In said spacers it is very important to prevent the conductors from being damaged at the point of connection to said bridge.

In the conventional spacers such damages occur, as it is known, owing to the rigidity of the connection between the conductors as a consequence of the movements of a conductor in respect to the other ones due to electrodynamic stresses, different elongation, wind action, ice muff accumulation and other external impulses of mechanical nature.

The present invention relates to spacers for twin of multiple conductors of aerial high voltage transmission lines, designed to permit the elastic movements and displacements of the conductors in every direction and to maintain the electrical connection between them all, whilst eliminating the above mentioned drawbacks.

The spacer according to the invention substantially consists of a flexible deformable metallic curvilinear element, combined with dependable clamps to be connected with the conductors. Said metallic curvilinear element can have any sort of shape, either closed or open.

According to a further feature of the invention, means can, however, be provided for counteracting the deformation of the spacers beyond pre-established limits.

The invention is illustrated in some embodiments thereof in the enclosed drawings, in which:

Fig. 1 shows an annular metallic spacer for a twin conductor.

Figs. 2 and 3 show two alternatives to the preceding solution.

Figs. 4 and 5 show an open type spacer for twin conductors.

Fig. 6 shows a closed type spacer for quadruple conductors.

Figs. 7 and 8 show a spacer for multiple conductors.

Fig. 9 illustrates a spacer for twin conductors with limited flexibility.

In all the shown embodiments, **1** are the conductors, whilst **2** indicates the flexible deformable metallic elements connected to the conductors **1** by means of clamps **3** so as to form an electrical bridge between said conductors, keeping them yieldingly interspaced. Said flexible deformable metallic elements have the shape of a circular ring in the embodiment according to Figs. 1 and 2, but, whilst in Fig. 1 they are arranged in the same horizontal plane of the conductors, they are located at right angles to the plane of the conductors in the embodiment of Fig. 2.

In Fig. 3 the flexible deformable metallic elements are oval in shape and are arranged on the same vertical plane of the conductors.

In the embodiments according to Figs. 4 and 5, the flexible deformable metallic elements have the shape of

an open curve and, more particularly, they have a C-shape on Fig. 4 and an S-shape on Fig. 5. In both said figures each one of the outer branches of the metallic flexible and deformable element **2** is connected to the respective conductor **1** by means of two clamps **3**.

In the embodiment of Fig. 6 relating to the case of quadruple conductors the flexible deformable metallic element **2** connecting said conductors **1** is in the shape of a circular ring, said ring being arranged on a plane at right angles to the conductors axes.

In the embodiments of Figs. 7 the flexible deformable metallic element has the shape of a closed mixed line, all the rectilinear portions of which are connected to the conductors **1** by means of clamps **3**, whilst the curvilinear portions consist in half-rings interconnecting alternatively opposite pairs of extremities of the rectilinear portions, the structure of said spacer deriving from that shown in Fig. 4.

The embodiment according to Fig. 8 is analogous to the one of Fig. 7, but for the fact that the spacer derives its structure from the one shown in Fig. 5, whereby between each pair of conductors there is a free rectilinear portion of the spacer.

Finally, Fig. 9 shows a flexible deformable metallic element consisting in a circular ring **2**, which is limited in its flexibility by means of a rod **4** fixed on two diametrally opposite points of said ring. Said rod can also be formed so as to be capable of lengthwise automatic adjustment.

As regards the structure of the metallic curvilinear elements, it can consist either of a suitably curved rod or of a rope with free or interlaced spires. The closed ring type can particularly be formed by a single steel wire wound up on itself in a spiraloid form.

In these cases the flexibility of the flexible deformable metallic elements will depend not only on the shape thereof and the nature of the material employed for their manufacture, but also on the number, pitch and section of the spires.

Of course, the invention is not limited to the embodiments above described and shown in the drawings by way of example, but it comprises all the possible modifications thereof, without departing from the scope of the invention.

What we claim is:

1. In combination with a plurality of conductors of a high voltage high power aerial transmission line, a spacer comprising a flexible deformable metallic curvilinear element constituted by a wire rope positioned between said conductors, said rope forming an open loop whereby the said conductors are held in spaced apart relation by elastic forces of the said rope, and electrically conductive clamp means on said element firmly connecting each of the said conductors to an adjacent portion of said element.

2. The combination according to claim 1 wherein said element has a semi-annular shape.

3. The combination according to claim 1 wherein said element has an S-shape.

4. In combination with a plurality of conductors of a high voltage high power aerial transmission line, a spacer comprising a flexible deformable metallic curvilinear element constituted by a wire rope positioned between said conductors, said rope forming a closed loop whereby the said conductors are held in spaced apart relation by elastic forces of the said rope, and a plurality of electrically conductive clamps on said element firmly connecting each of the said conductors to an adjacent portion of said element.

5. The combination according to claim 4 wherein said element is of annular shape.

6. The combination according to claim 4 wherein said element is disposed in a plane at right angles to the axes of said conductors.

7. The combination according to claim 4 wherein said rope is in the shape of a ring and wherein a rod extending parallel to said conductors is fixed to diametrically opposed points of said ring for limiting the flexibility of said ring.

8. The combination according to claim 4 wherein said element is of an annular shape, and wherein said rope is formed by a single steel wire wound up on itself in a spiraloid form, said spacer being disposed in the plane of the axes of said conductors.

9. Spacer for twin and multiple conductors of high voltage, high power, aerial transmission lines; said spacer comprising a flexible, deformable, resilient, metallic, curvilinear element constituted by a wire rope positioned between said conductors; said element having a normal, unstressed shape conforming to a closed ring and being elastically deformable in response to forces imposed thereon by the conductors; and electrically conductive clamp means on said element adapted to firmly connect each of the conductors to an adjacent portion of said element.

10. Spacer according to claim 9 wherein said element is of annular shape.

11. Spacer according to claim 9 wherein said element is of oval shape.

12. Spacer according to claim 9 wherein a rod is fixed to diametrically opposite points of said ring intermediate said clamp means.

13. Spacer according to claim 9 wherein said rope is formed by a single steel wire wound up on itself in a spiraloid form.

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