United States Patent

Bloch et al.

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[54] **SPACER-DAMPER FOR ELECTRICAL POWER LINES**

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[30] **Foreign Application Priority Data**

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[51] **Int. Cl.**.....**H02g 7/14,** H02g 7/12

[58] **Field of Search**.....174/40 R, 42, 43, 146, 149 R

[56] **References Cited**

UNITED STATES PATENTS

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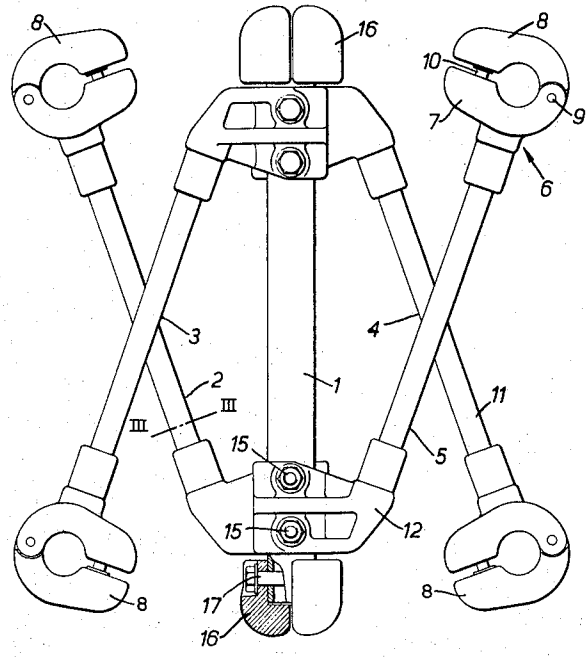
[57] **ABSTRACT**

This invention concerns a line conductor spacer including a plurality of spacer arms one for each conductor and preferably formed from one or more stranded cables, relatively movable jaws on each arm to engage and clamp onto its respective conductor, a spacer arm carrying member from which the spacer arms extend, and weight means secured to the arm carrying member for damping movements of the conductors.

5 Claims, 3 Drawing Figures



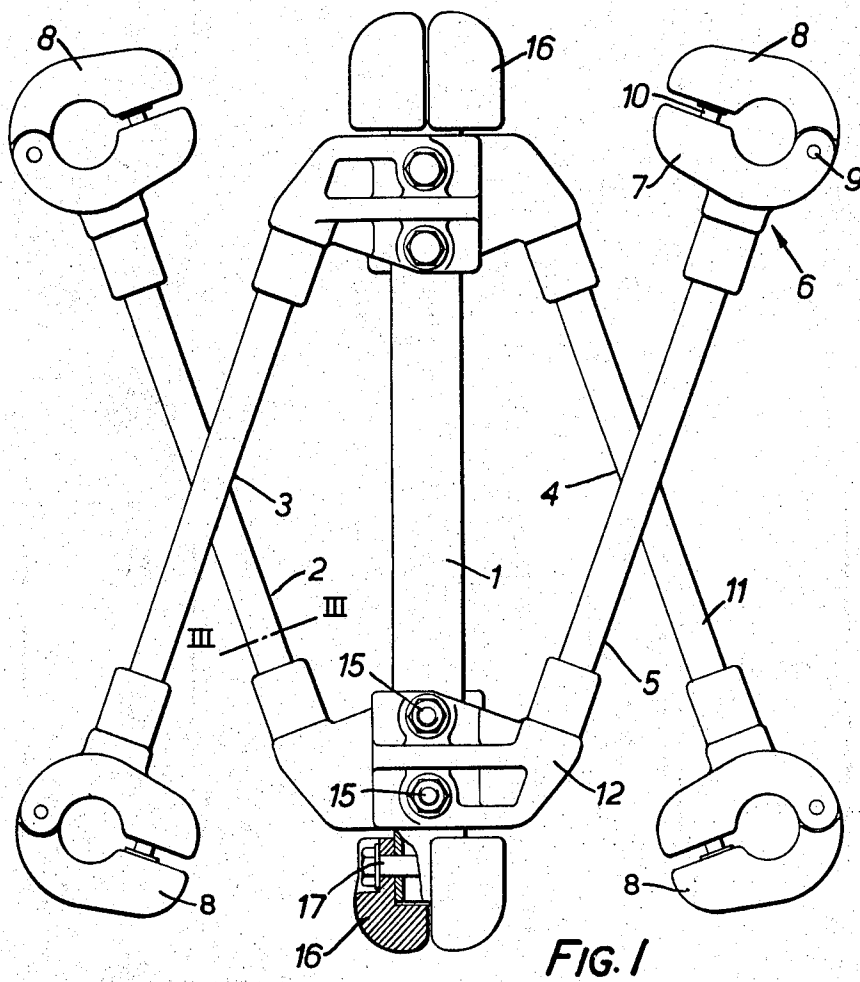


FIG. 1

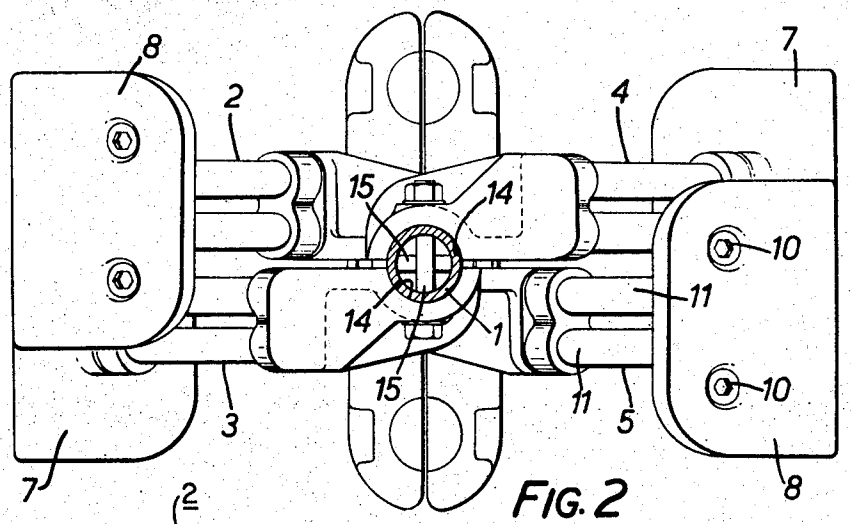


FIG. 2

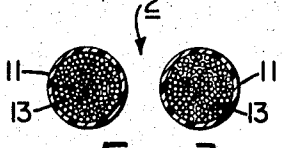


FIG. 3

SPACER-DAMPER FOR ELECTRICAL POWER LINES

This invention relates to spacers for spacing apart overhead electric power line conductors.

It is desirable with overhead conductors that not only are they spaced apart but also that provision should be made to inhibit movement of conductors in the subspan between spacer fixing points.

According to the invention, there is provided a spacer for spacing a plurality of line conductors, the spacer including a plurality of spacer arms one for each conductor, relatively movable jaws on each arm to engage and clamp on to its respective conductor, an arm carrying member from which the spacer arms extend, and weight means secured to the arm carrying member for damping movements of the conductors.

An embodiment of the invention will now be described by way of example only with reference to the accompanying drawings in which:

FIG. 1 is a part sectioned elevation of a spacer according to the invention for four conductors,

FIG. 2 is a plan view of the spacer of FIG. 1, and

FIG. 3 is a section on the line III—III of FIG. 1.

Referring to the drawings, the spacer comprises a central support tube 1 to which are bolted four spacer arms 2, 3, 4 and 5. Each arm includes a clamping head 6 comprising a pair of jaws 7, 8, jaw 7 of which carries a pivot pin 9 about which jaw 8 may be pivoted. A pair of clamping bolts 10 serve to draw the jaws together so that a respective one of four conductors may be clamped therebetween. Each head 6 also includes a pair of parallel bores in each of which is received an end of a respective one of a pair of comparatively flexible elongate members, such as stranded steel cables 13, and an end margin of a sheath 11 which encases its respective elongate member and stops short of the end of the stranded cable 13. The sheaths provide protection of the elongate members from the natural elements and may be selected from materials including polyvinylchloride, cross-linked polyethylene, butyl rubber and chlorosulphonated polyethylene. Each head is compressed by for example compression crimping on to the cable and sheath end to secure the head to the elongate member and also to seal the end of the sheath 11. Alternatively, the sheath end may not extend into its respective bore but may be sealed on to the outer annular surface of that portion of the head defining the bore.

At the end of each pair of sheathed members remote from their respective heads is a respective one of four bases 12 each having bores for receiving and engaging the sheathed members in like manner to the head. Each base also includes a semi-cylindrical recess 14 to receive the tube 1 and two bores for receiving securing bolts 15.

The bases of two arms are bolted by bolts 15 to diametrically opposite sides of the tube at each end of the tube, 3 and 4 at one end, 2 and 5 at the other end, the arms on like sides of the tube (2, 4 and 3, 5) being oppositely directed.

To each end of the tube are secured weights 16 by bolts 17, the weights serving to dampen any movement of the conductors. The weights 16 in association with the flexible elongate members are designed so that the natural resonances of the spacer lie outside the critical range of vibration of the overhead line conductors thereby allowing a much better frequency response with respect to damping to be achieved than has hitherto been attainable.

The above described spacer can be modified to suit the requirements of each individual spacer application. Thus the total weight of the spacer may be adjusted to alter the extent to which the spacer inhibits or breaks up vertical oscillations of the conductors, and the angle subtended by the arms with respect to the longitudinal axis of tube 1 may be altered to vary the sensitivity of the spacer to vertical and horizontal oscillations of the conductors. The spring rate of the flexible elongate members may also be altered in conjunction with the mass and inertia of the weights 16 to vary the overall response of the spacer to conductor movements; further the center to center spacing of the conductor clamping heads 6 can be altered to allow a spacer suitable for a given conductor size to be arranged to suit a multiplicity of conductor spacings.

Although the above spacer has been described in connection with four conductors it is clear that the spacer is suitable for spacing two or more conductors.

In place of tube 1, an elongate thin plate may be used; also, a single elongate member may be employed in place of the two elongate members described above for each head 6.

Stops (not shown) may be provided to engage the heads 6 and hence limit the inward motion of the spacer arms, particularly as a result of a short circuit on a line conductor; the stops may be positioned in the region of the weights 16 or may be combined with the weights.

The construction described above provides a simple robust spacer and damper.

We claim:

1. In a spacer-damper for spacing a plurality of substantially parallel overhead electrical line conductors and damping out vibrations therein, said spacer-damper comprising a plurality of elongate and inextensible spacer arms, one for each conductor, a clamp means on each arm for clamping onto its respective line conductor, and a spacer arm carrying member of elongate tubular form and comprising an inertial mass and from which the spacer arms extend, the improvement according to which said member comprises an inertial mass selected to maintain the natural resonances of said spacer outside the critical range of vibrations of said line conductors, and at least one of the spacer arms clamped to two adjacent conductors is resiliently flexible over a substantial portion of its length transversely to said conductors so as to permit said conductors to move towards and away from one another against said resilience.

2. A spacer-damper as claimed in claim 1, wherein a pair of spacer arms extend from opposite sides of the arm carrying member.

3. A spacer-damper as claimed in claim 2, wherein the said pair of spacer arms extend from the arm carrying member in the same direction relative to the longitudinal axis of the arm carrying member.

4. A spacer-damper as claimed in claim 2 including two pairs of spacer arms extending in opposite directions relative to the longitudinal axis of the arm carrying member.

5. In a spacer-damper for spacing a plurality of substantially parallel overhead electrical line conductors and damping out vibrations therein, said spacer-damper comprising a plurality of elongate and inextensible spacer arms, one for each conductor, a clamp means on each arm for clamping onto its respective line conductor, and a spacer arm carrying member comprising an inertial mass and from which the spacer arms extend, the improvement according to which each spacer arm comprises two flexible stranded-wire cables arranged side-by-side with the two cables of at least one of the arms defining a plane parallel to the line conductors so that the arm is more flexible in a plane perpendicular to the line conductors than in said plane parallel thereto.

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