United States Patent [19]

de Mecquenem

[11] **3,716,650**

[45] **Feb. 13, 1973**

[54] **CLAMP WITH RESILIENT GRIPPING UNIT FOR USE WITH OVERHEAD CONDUCTOR SPACERS AND A SPACER INCLUDING THE SAME**

[76] Inventor: **Robert de Mecquenem,** Chateau de la Roare, Roche la Moliere, France

[22] Filed: **May 28, 1971**

[21] Appl. No.: **147,793**

[30] **Foreign Application Priority Data**

May 29, 1970 France.....7018891

[52] **U.S. Cl.** .....**174/42,** 24/125 K, 24/135 R, 24/262 R, 174/146

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

[58] **Field of Search** .....174/40 R, 42, 146, 155; 24/125 K, 132 CS, 135 R, 135 K, 262 R

[56] **References Cited**

FOREIGN PATENTS OR APPLICATIONS

1,554,379	12/1968	France	174/146
1,042,699	11/1958	Germany	24/135 R
718,384	10/1966	Italy	174/146
396,125	1/1966	Switzerland	174/146

Primary Examiner—Laramie E. Askin

Attorney—Waters, Roditi, Schwartz & Nissen

[57] **ABSTRACT**

A spacer for overhead conductors is disclosed. The spacer comprises a unit for resiliently gripping directly about the conductor, the unit being constituted essentially by a pair of jaws adapted to be encircled about the conductor and connected one to another by clamping means. Pads of flexible and resilient material are arranged onto half-sheaths made of metal which directly encircles the conductor.

The jaws are provided with recesses having an eccentric bottom surface which differs from the external surface of the pads whereby the pads are engaged in a compression effect when they are inserted therein, and the jaws are brought together by one or more clamping means.

8 Claims, 8 Drawing Figures

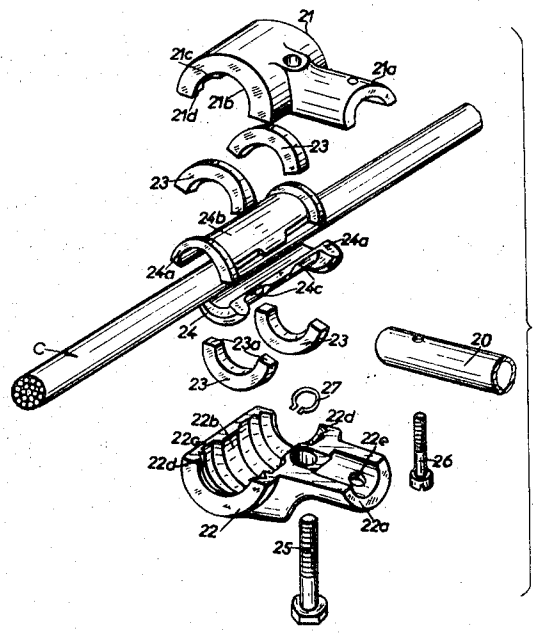
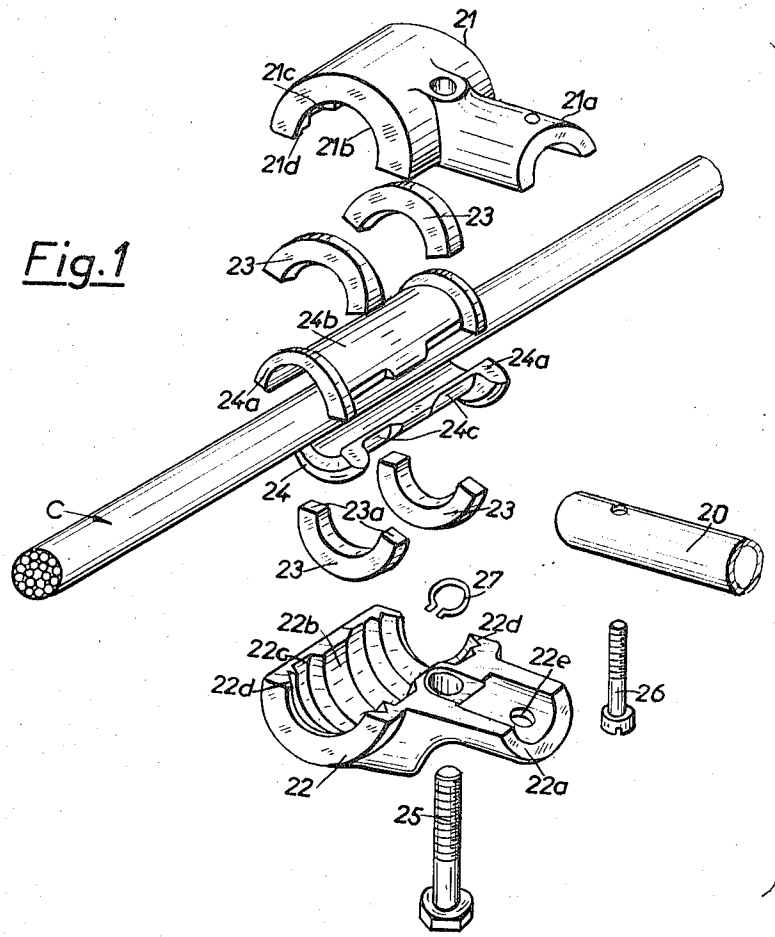


Fig.1


21
21c
21a
21d
21b
23
23
24b
24a
24a
24c
24
C
23a
23
23
20
27
22b
22d
22c
22e
22d
26
22
22a
25

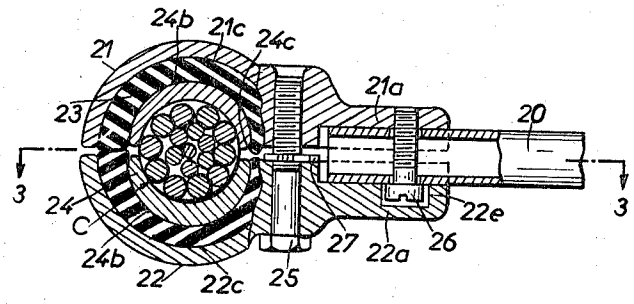

24b
21c
24c
21
21a
23
20
3
24
C
22e
3
24b
22
22c
25
27
22a
26

Fig.2

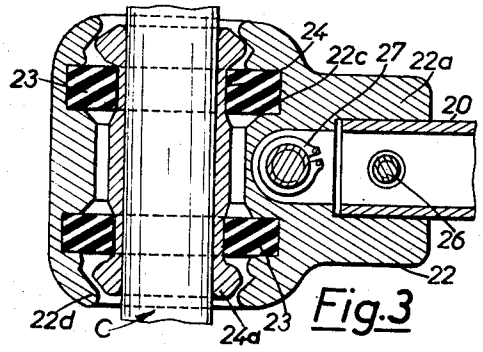


Fig.3

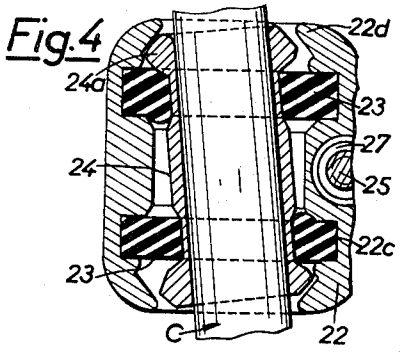


Fig.4

Fig.5

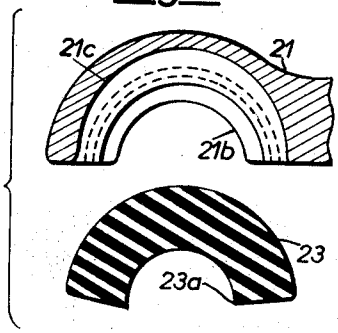


Fig.6

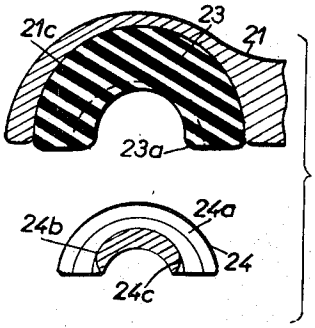


Fig.7

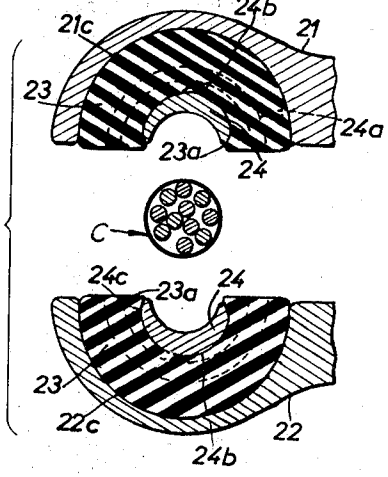
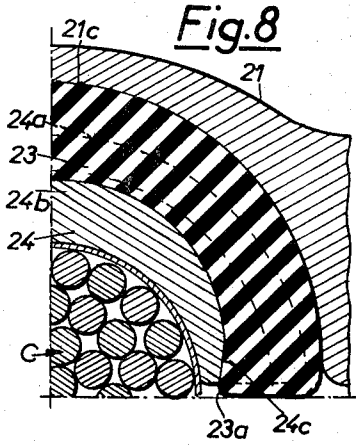


Fig.8



CLAMP WITH RESILIENT GRIPPING UNIT FOR USE WITH OVERHEAD CONDUCTOR SPACERS AND A SPACER INCLUDING THE SAME

The invention relates mainly to a spacer for overhead conductors having an improved unit for resiliently gripping electrical cables, and notably the cables of high-voltage electrical lines comprising a plurality of conductors.

Spacers of this type are required not only to maintain the spacing of the cables but additionally to damp vibrations and oscillations, while at the same time preventing the deterioration of the cables, in particular at the points of attachment.

Such spacers are mainly characterized in that they comprise a connecting and spacing means or portion and a unit having at least means or jaws for attachment and resilient gripping directly about the cable, the unit being constituted essentially by pads of elastomeric material or flexible and resilient material, subjected to suitable compression interposed between the cable and the jaws which are brought together by one or more clamping or gripping means.

The elastomer is employed in the form of at least two half-elements of a sleeve of appropriate length, or possibly a plurality of angular fractions of the said sleeve, each of the half-elements or fractions being adhesively secured, moulded or otherwise secured on a corresponding sheath made of metal, or a rigid substance or material, and which directly contacts the cable, the profile and external dimensions of the half-elements or fractions of elastomeric material being so established as to afford a fit within corresponding hollow profiles of the jaws, the said hollow or recessed profiles optionally being "different" from the elastomer, at the same time making provision for uniform and suitable compression of the half-elements or fractions of the elastomer, during gripping or tightening.

The subject of the invention is related to the technical sector concerned with installations involving cables or electrical lines and, if appropriate, also other cables or the like.

According to the invention, it has been endeavoured to very substantially improve the qualities in respect of strength and service life of the spacers, and also the behavior of the electrical lines.

For this purpose, it has been endeavored to improve and limit the molecular working of the elastomer or flexible material under the forces resulting from the angular displacements of the cables subjected to such gripping action, in such manner as to preserve for a long period of time the resilient damping properties thereof, without thereby producing destructive mechanical forces which the elastomer will not be able to withstand and which do not comply with the properties thereof.

It has also been desired to provide optimum conditions with respect to assembly and positioning of the spacers, at the same time achieving a gripping or clamping effect which is more uniform and perfectly distributed, circularly, about the cable.

According to a major feature of the invention, the half-sheaths interposed between the elastomer and the cable to be gripped have their ends profiled in the form of external projections for co-operation with the corresponding end seating portions of the jaws which have

stops for the said profiled ends of the sheaths, in such manner as to limit the deformation and compression effect of the sleeves or rings made from elastomeric or other flexible and resilient material.

According to yet a further feature, half-rings made of elastomeric or flexible and resilient material are used, the end seating portions of the jaws being formed with corresponding positioning recesses.

A further feature resides in the eccentricity of the bottom or of the seating portions of the rings or sleeves, in such manner that the half-rings or half-sleeves are engaged in the seating portions under compression, their ends being approached to each other.

According to yet a further feature, the external faces of the half-sheaths have, near the diametral junction plane and starting from the said plane, inclined flats which converge on the inner side of the half-sheaths, and the purpose of which it is to co-operate, with a retaining effect, with the approached ends of the half-rings or half-sleeves.

According to yet a further feature, the outer faces of the half-sheaths, bearing against the half-rings or half-sleeves, are eccentric relative to the inner faces and to the ends which are profiled in the form of projections.

These features and still further features will be clear from the following description.

In order to render the subject of the invention specific without, however, limiting it, in the accompanying drawings:

FIG. **1** shows, in separate perspective views, before assembly, a mode of embodiment of the various means of the device for the resilient gripping of the cables at the spacer ends;

FIG. **2** is a longitudinal axial section through the device for the resilient gripping of a cable, at one end of the spacer;

FIGS. **3** and **4** are similar views in plan and in section as seen along the line 3—3 of FIG. **2**, showing, respectively, the cable in the normal position between the jaws and the cable angularly displaced;

FIG. **5** shows a lateral view of a half-ring and a cross-section through a jaw, before assembly thereof;

FIG. **6** shows the half-ring engaged in the recess in the jaw and the half-sheath in section, shown before fitting;

FIG. **7** illustrates the half-sheaths fitted in the half-rings and the jaws, before the approaching together of the said jaws and securing on the cable;

FIG. **8** is a partial section, drawn to a larger scale, illustrating the conditions in respect of mutual engagement of the jaw, the ring and the sheath.

The subject of the invention is rendered more specific by describing it in the form of the embodiment illustrated non-limitatively in the figures of the drawings.

FIGS. **1**, **2** and **3** show the end of a single clamp bar **20** which may be tubular.

At each end of the spacer bar or bars **20** there are to be mounted pairs of jaws **21**, **22** for the gripping and resilient securing of cables C.

The said jaws have, mainly, half bearing faces **21***a*, **22***a* for assembly and securing on the end of the bar **20**, and half end seating portions **21***b*, **22***b*.

The end portions **21***b*, **22***b* are formed with recesses **21***c*, **22***c* having the shape of an annulus and the pur-

pose of which it is to seat and to ensure positioning of the half2rings **23** made of an elastomer or a flexible and resilient material having suitable properties. The use of a plurality of rings may improve the resilient damping effect.

Recesses in the half-rings **23** are intended to receive half-sheaths **24** made from metal, a rigid substance or material, bearing about the cable C to be gripped.

The half-sheaths **24** have ends **24a** profiled in the form of external projections for co-operation with projecting portions **21***d*, **22***d* constituting stops near the ends of the end portions **21***b* **22***b*.

In this way, the limitation is achieved (as illustrated in FIG. 4) of the deformation and compression effect of the rings **23**, in such manner as to cause the said rings to act solely as damping means, without ever subjecting them to destructive mechanical forces which the elastomer would not withstand and which do not suit the properties thereof.

The conditions involved in mounting and positioning the spacers on the electrical cables (and optionally other cables) have been improved substantially — with achievement of an improved clamping or tightening effect. In this arrangement the bottom or end face of the recesses **21***c*, **22***c* designed to receive the half rings **23** is eccentric in such manner that, as it will be seen notably in FIG. **5**, the bottom or end face is deeper than it would be if it were concentric with the other circular profiles of the jaws.

Consequently, when the half-rings **23** are so positioned within the bottom of the recesses **21***c*, **22***c*, the ends **23***a* of said half-rings **23** must be approached to each other slightly. Due to the resilient reaction effect, the rings are thus firmly positioned and retained in the recesses **21***c*, **22***c*.

On the other hand, the external faces **24***b* of the half-sheaths **24** contacting the half-rings **23** is eccentric in such manner that the thickness of the sheaths is increased relative to what it would be if the faces **24***b* were concentric to the other semi-circular profiles of the sheaths.

Formed on the faces **24***b*, starting from the diametral junction plane, are flats **24***c* inclined to converge on the inner side of the sheaths.

These arrangements produce the following effects:

it is possible to force-engage the half-sheaths **24** between the ends **23***a*, which are only slightly approached to each other, of the half-rings **23** (FIG. **6**). The ends **23***a* close resiliently on the flats **24***c* and the sheaths are retained perfectly with the rings **23** and their jaws (FIG. **7**). The manipulations involved in the assembly of each jaw for positioning about the cables are thus facilitated, without any risk of losing members or means during such manipulations;

the compression of the half-rings **23** is effected in rational fashion, in two stages: (a) placing the half-sheaths **24** in position, the ends **23***a* are compressed (FIG. **7**); (b) assembling the jaws by gripping with the aid of a bolt **25** and due to the effect of the eccentricity of the recesses **21***c*, **22***c* and of the faces **24***b* (FIG. **2**), firm, uniform compression, satisfactorily circularly distributed entirely about the rings **23**, is achieved.

Furthermore, in order to ensure convenience of mounting and assembly of the end of the bar **20** and the jaws **21**, **22**, according to the non-limitative example illustrated there is provided a screw **26** extending through the end of the bar **20** and screwed into the half bearing face **21***a*.

The face **22***a* of the other jaw is formed with a recess **22***e* the purpose of which it is to enclose, with the necessary clearance, the head of the screw **26** while affording the relative axial positioning of the spacer and the jaw. Other positioning means or arrangements could be adopted.

At least one bolt **25** is provided for the assembly of the jaws in their thick, strong portions.

The bolt **25** extends freely through the jaw **22** and co-operates by screwing in the jaw **21**.

In order to facilitate manipulation and mounting or assembly, a retaining means such as a clip ring **27** surrounds the bolt **25** (shown in FIG. **1** in detached condition) and prevents the separation thereof from the jaw **22**.

Similarly, the previous assembly of the bar **20** and of its jaws **21**, **22** on the cable C facilitates the operations involved in the assembly of the further jaws, which are frequently of rod-stud type.

It will be observed that the assembly bolt **25** is a double-acting bolt, effecting:

the gripping under compression of the jaws and elastomeric rings, and the locking of the cable C;

a resilient reaction for supporting and locking the bearing faces **21***a*, **22***a* against the end of the bar **20**.

The resilient reaction for compressing the rings **23** on the bolt **25** guarantees that the latter cannot become loose.

Of course, this mounting of the jaws is applied to the electrical lines and cables.

The significance and the advantages of these arrangements are clear from the description and drawings.

The invention is in no way limited to that one of the modes of application thereof nor to those of the modes of carrying the various parts thereof into effect which have more especially been discussed; on the contrary, it covers all variants.

What is claimed is:

1. A clamp for overhead conductors, comprising, a resilient gripping unit for encircling a longitudinal portion of a conductor, said unit including means for compression and attachment of the same directly about the conductor, a pair of jaws connected one to another, and pads of flexible and resilient material interpositioned between said jaws and adapted to be subjected to compression between said conductor and said jaws, said unit further including half-sheaths mounted between said pads and having their ends profiled so as to define external projections, said jaws including cooperating seating portions and stop portions near the extremities of said seating portions, cooperating with said projections, for limiting the deformation and the compression effect of said pads.

2. The clamp as defined in claim **1**, wherein said pads are half-rings, and said seating portions have corresponding positioning recesses receiving said half-rings.

3. The clamp as defined in claim **2**, wherein said recesses have eccentric bottom portions engaged with said half-rings, the latter having their ends adjacent each other and being compressed one to another between said recesses.

4. The clamp as defined in claim 3, wherein the outer faces of said half-sheaths have, near the diametral junction plane and starting from said plane, inclined retaining flats which converge on the inner sides of said half-sheaths, co-operating with said adjacent ends of the half-rings.

5. The clamp as defined in claim 4, wherein said half-sheaths include inner faces, and said outer faces bearing against said half-rings are eccentric relative to said inner faces and to said external projections of the half-sheaths.

6. The clamp as defined in claim 5 in combination with a spacer bar member, wherein said jaws include bearing faces and one end has a hole therein receiving a connecting screw; said spacer bar member having one end thereof assembled with said bearing face of one of said jaws by said screw, the bearing face of the other jaw having a recess receiving the head of said screw with some clearance.

7. The combination as defined in claim 6, wherein said pair of jaws is interconnected by at least one bolt constituting part of said means for compression and attachment, said bolt extending freely through one of said jaws and being screwed into the other jaw.

8. The combination as defined in claim 7, wherein said bolt is fitted with a retaining clip ring adjacent to said bearing face of the jaw which carries it.

* * * * *