

[54] **ELECTRIC WIRE SUSPENSION CLIP**
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[58] **Field of Search**..... **24/250 R, 250 HE, 24/258**

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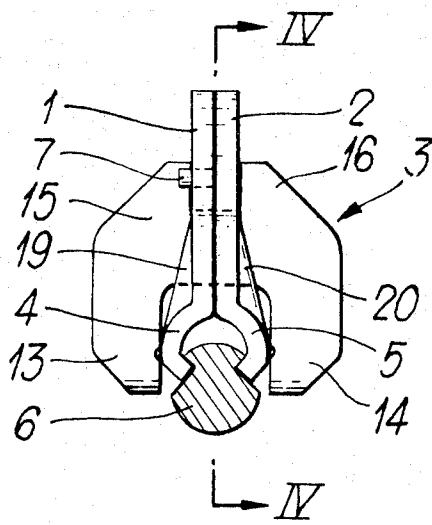
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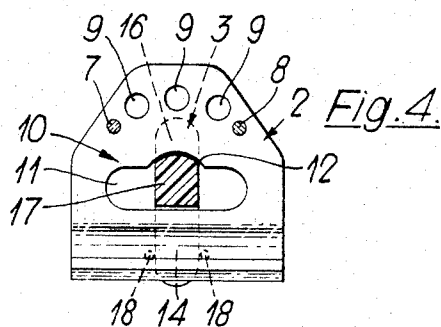
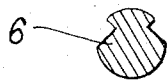
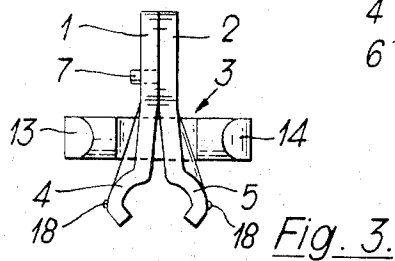
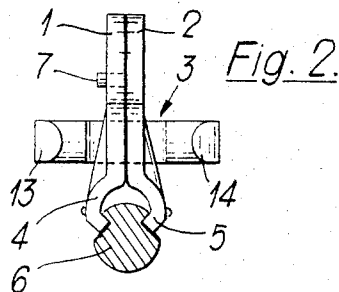
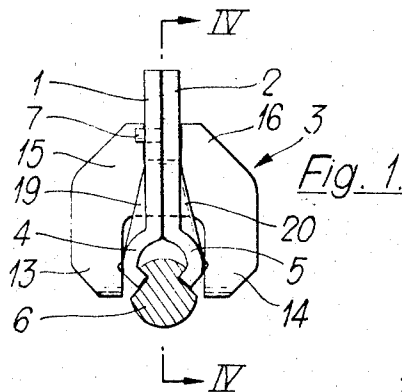
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[57] **ABSTRACT**
A clip suitable for use in supporting an overhead contact wire of an electric traction system is made from a hard, resilient plastics material and comprises a pair of clamping plates having aligned apertures to receive a locking member. The clamping plates are shaped to provide co-operating clamping jaws on one side of the aligned apertures and to provide mutual abutments at least on the opposite side thereof. The locking member passes through the aligned apertures and has a first pair of limbs engageable with the clamping jaws to urge them towards one another and a second pair of limbs simultaneously engageable with outer faces of the clamping plates in the vicinity of their mutual abutments.

5 Claims, 4 Drawing Figures





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ELECTRIC WIRE SUSPENSION CLIP

This invention relates to clips which are suitable, inter alia, for use in supporting the overhead contact wires of electric railways or other electric traction systems from catenary wires or other supports.

In most high speed overhead-conductor electric traction systems in use at the present time the contact wire is supported by "droppers" (or "hangers") connected by contact wire clips to the contact wire and by catenary clips to a catenary wire or to an auxiliary catenary wire which is itself supported by a main catenary wire. Clips in accordance with the present invention are suitable for use either as contact wire clips or as catenary clips; they can also be used to support a contact wire of a "trolley" system directly from fixed, but preferably resilient, supports, and for other purposes.

One type of clip that can be used for the purposes referred to is described in the Complete Specification of United Kingdom Patent No. 783,796 and comprises a pair of clamping plates and a shaped locking bar which passes through aligned apertures in the two clamping plates and is rotatable between a locking position in which it urges the clamping plates towards one another and a free position in which the clamping plates can be opened sufficiently to allow the release of the gripped member. In this known form of clip, the components are of metal, in practice always copper or a high-conductivity copper alloy (in order to avoid electrolytic corrosion) and it is an object of the present invention to provide a clip of the same general type which can be made of a less expensive material.

The clip in accordance with the present invention is made of a hard, resilient plastics material and comprises a pair of clamping plates having aligned apertures to receive a locking member, the clamping plates being shaped to provide co-operating clamping jaws on one side of the said aligned apertures and to provide mutual abutments at least on the opposite side of the said aligned apertures, and a locking member passing through the said aligned apertures and having a first pair of limbs engageable with the clamping jaws to urge them towards one another and a second pair of limbs simultaneously engageable with outer faces of the clamping plates in the vicinity of their mutual abutments. The locking member is moveable to a release position and may also if desired be moveable to a third position in which the first pair of limbs is disengaged but the second pair is engaged, such a third position producing a light grip allowing easy adjustment.

The mutual abutments between the clamping plates are preferably surface abutments, which may extend over the whole area of the clamping plates on the said one side of the aligned apertures. The clamping movement of the jaws may be obtained by flexing of the clamping plates or by relative rocking movement. Preferably the clamping plates are connected together, and if so the connecting means must allow the necessary relative movement of the jaws; since the clamping plates are resilient, it will often be sufficient to locate the connecting means at a sufficient distance from the jaws, and when this is done the third position of the locking member will not normally be required. In a preferred arrangement, each clamping plate has a projecting stud which is a force fit in a corresponding aperture in the other clamping plate; if necessary the stud may

have a head and a shank which is narrower than the head and moves freely in the aperture if increased movement of the jaws is needed.

Contiguous parts of one or both of the clamping plates and of the locking member are preferably so shaped that the locking member will enter its locking position with a snap action, and it may also be made to snap into the third position (if provided) in a similar way.

The invention will be further illustrated, by way of example, by a description of a preferred form of clip in accordance with the invention, which is shown in the accompanying drawings in which

FIGS. 1-3 are end views of the clip in three different conditions and

FIG. 4 is a cross-section on the line IV-IV in FIG.

1. The clip comprises two identical clamping plates 1 and 2 and a locking member 3 all injection-moulded from the acetal copolymer sold under the Trade Mark "Kematal," or alternatively from nylon or other hard resilient plastics material. The plastics material may be filled with chopped glass fibres to increase its strength. The clamping plates are flat and of uniform thickness except that along one edge they are shaped to define spaced clamping jaws 4, 5 appropriate to the contact wire 6 or other article to be gripped. The clamping plates are secured together by an integral stud 7, 8 on each of them which is force-fitted in a corresponding hole in the other (for clarity, stud 8 has been omitted from FIGS. 1-3), the spacing of these studs from the jaws 4, 5 being sufficient to allow the necessary opening of the jaws by flexing of the clamping plates, as shown in FIG. 3. At their edge opposite the jaws the clamping plates are provided with apertures 9 (FIG. 4) for a dropper wire.

In the central parts of the clamping plates are aligned apertures 10 each comprising a round-ended slot 11 extending parallel to the jaws and an arcuate recess 12 in the side of the slot further from the jaws.

These apertures receive the locking member 3 which is an asymmetrical H-shape providing a first pair of limbs 13, 14 having a spacing slightly less than the nominal measurement across the widest part of the jaws in their closed position (FIG. 1) and a second pair of limbs 15, 16 having a spacing substantially equal to the combined thickness of the abutting flat parts of the clamping plates. The outside corners of the limbs are chamfered to allow insertion of the locking member through the slot, and the face of the cross-piece 17 of the H between the limbs of the second pair is rounded to facilitate rotation from the release position shown in FIGS. 2 and 3 to the locking position shown in FIG. 1 in which the jaws 4, 5, are urged together by engagement with the inner faces of the limbs 13, 14 and those limbs are buttressed by engagement of the limbs 15, 16 with the abutting flat parts of the clamping plates. Very small pips 18 (enlarged in the drawing for clarity) on the outside of the jaws engage the limbs 13, 14 of the locking member so that it snaps into the locking position and will not work loose if subject to moderate vibration. Alternatively pips on the inner faces of the limbs 15, 16 may enter corresponding indentations in the clamping plates to produce a similar snap action. Ribs 19, 20 stiffen the clamping plates.

In a modification, the ribs 19, 20 are omitted so that the locking member can be moved to a third position

in which the second pair of limbs engage the clamping plates adjacent the end of the slots 11 but the first pair of limbs are disengaged; in cases where the clamping plates are not connected together or are only loosely connected this position provides a partial grip which permits the clip to slide freely along the contact wire, but not to be readily detached from it.

In one size of clip of the form illustrated, the clamping plates have a uniform thickness (apart from the ribs 19, 20) of 3mm and the diameter across the widest part of the jaws is 16mm. The thickness of the locking member is 8mm, each limb has a width of about 10mm at its base, and the width of the cross-piece is about 10mm measured to the midpoint of its curved surface. This size of clip is suitable for use with a shaped 100mm² contact wire.

Besides a considerable cost advantage, the clip in accordance with the invention is easier to operate than the clip of U.K. Patent Specification No. 783,796; in some cases it may be possible to operate the locking member by hand rather than with a spanner or equivalent tool. It is also less liable to corrosion and, because it avoids metal-to-metal contact, may allow the use of droppers and catenary wires of a metal other than copper.

What I claim as my invention is:

1. A clip suitable for use in supporting an overhead contact wire of an electric traction system, made from a hard, resilient plastics material and comprising

- a. two clamping plates each having opposed inner and outer faces, assembled in face-to-face relation with said inner faces contiguous with one another and having aligned apertures therein providing a through passage between the outer faces of said clamping plates, the clamping plates each being shaped to provide a respective one of a pair of co-operating clamping jaws spaced in a first direction from said aligned apertures, said clamping plates touching one another at least at a place spaced

from said aligned apertures in the direction opposite to said first direction, and

- b. an integral locking member comprising a cross-piece passing through said aligned apertures and first and second pairs of limbs; the limbs of said first pair extending in the same direction from said cross-piece to engage respective outside faces of said clamping jaws thereby urging them towards one another; the limbs of said second pair extending from said cross-piece in the same direction as each other and the opposite direction to the limbs of the first pair to engage the respective outer faces of said clamping plates in the vicinity of said place where the clamping plates touch one another; each limb of said first pair being stiffly connected with a respective limb of said second pair, the limbs so connected lying on the same side of said clamping plates; and said locking member being rotatable about an axis extending longitudinally of said cross-piece to disengage the limbs of said first pair from said jaws said clamping plates are connected together by means permitting relative movement of the jaws.

2. A clip as claimed in claim 1 in which the said connecting means comprises a stud on one clamping plate having a head that is forced through a corresponding aperture in the other clamping plate and a shank that is narrower than the head and moves freely in the said corresponding aperture.

3. A clip as claimed in claim 1 in which the said clamping plates touch over a substantial contact area.

4. A clip as claimed in claim 3 in which the said contact area extends over the whole area of the clamping plates to the said one side of the said aligned apertures.

5. A clip as claimed in claim 1 in which contiguous parts of one or both of the clamping plates and of the locking members are so shaped that the locking member will enter its locking position with a snap action.

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