

PATENT SPECIFICATION

(11) 1 218 781

DRAWINGS ATTACHED

1 218 781

- (21) Application No. 26927/68 (22) Filed 6 June 1968
- (45) Complete Specification published 13 Jan. 1971
- (51) International Classification H 01 r 3/06
- (52) Index at acceptance
H2C 2
F2G 24D1 R
- (72) Inventor DAVID MARSHALL



(54) EARTHING ELECTRODE

(71) We, AUSTRALIAN INSULATOR IRONWORKS PTY. LIMITED, a Company incorporated under the laws of the State of New South Wales, of 86 Liverpool Street, Sydney, New South Wales, Australia, do hereby declare that the invention, for which we pray that a patent may be granted to us and the method by which it is to be performed to be particularly described in and by the following statement:—

The present invention has been devised to provide an efficient form of earthing electrode which is strong and durable, and affords increased solidity for driving purposes; and where the parts are tightly engaged together and cannot become detached; and good electrical contact assured as well as axial reinforcement throughout the length of the electrode. Such electrodes can be made to suit any length requirement, and are simpler to manufacture than those of known forms and production costs are reduced.

The present invention provides an earthing electrode comprising a steel rod member formed of sheathed rod sections formed for assembly together in lengthwise manner, said rod sections having means at their ends for connecting said sections together, said means including a connecting pin between adjacent rod sections for engagement in recesses on the ends of said adjacent sections and coupling sleeves for overlying the joints formed by said adjacent rod sections, the arrangement being such that when endwise pressure is applied to an assembly of rod sections, the connecting pins effect an expansion of the rod sections at each joint so as to lock the coupling sleeves in place together with the adjacent rod sections.

The invention is hereinafter described with reference to the accompanying drawings wherein:—

Figure 1 is an exploded sectional view [Price 5s. 0d. (25p)]

of an electrode of rod sections before engagement together of parts at a joint is effected and showing a driving head tool in place;

Figure 2 is a sectional view of a rod section showing a coupling tool positioning a coupling sleeve in place and effecting a preliminary expansion of the end of said section to secure said sleeve in place for assembly of the other parts of the joint;

Figure 3 is a sectional view of the electrode of Figure 1 in its assembled and complete form;

Figure 4 is a cross section on line 4-4 of Figure 3; and

Figure 5 is a fragmentary cross section of a modified construction.

The earthing electrode comprises any number of rod sections each consisting of a steel rod 5 having a copper sheath or cladding 6 (hereinafter termed copper sheath 6) and said rod sections 5-6 each have an axially bored hole 7 therein extending in from the extremities to a suitable extent governed by the length of the locating and expanding pins 8, and in some cases it is necessary to provide for end clearance so that said pins 8 do not bottom in their holes 7 to interfere with the pressure required to effect the expansion of an expandable sealing member 11 later described.

These said holes 7 are adapted to register in line on assembly of the rod sections 5-6 and are each provided with a mouth recess 9 suitably shaped as shown in the drawings.

The pins 8 are of steel rod or any other material suited to the purpose, and may have tapered or chamfered ends.

The coupling sleeves 10 are of cylindrical form and of copper and of a length to overlap the joints where they are placed, and to extend along the rod sec-

tions 5-6 to a suitable extent to form a firm connection.

The expandable sealing member 11 is of soft copper of bush-like form and may be outwardly curved or bowed towards the ends as shown in Figure 1 to facilitate the expansion thereof, and its bore is such as to fit over a pin 8.

The earth penetration or driving member 12 of pointed form has a stem 13 whereby it is affixed in an end hole 7 of a rod section 5-6 and may be a driving fit therein so that it is securely retained in place.

To facilitate the assembly of the coupling sleeves 10 in place a coupling or locating tool as shown in Figure 2 is provided and consists of a flanged head 14 the flange of which is of a diameter to extend beyond that of a coupling sleeve 10 and it has a rod-like engaging stem 15 adapted to loosely pass through the bore of a coupling sleeve 10 and having its end shaped at 16 for engagement in the mouth recess 9 of a rod section 5-6. This coupling tool 14-16 in use in the assembly of the rod sections 5-6, is inserted in one end of a coupling sleeve 10 which is forced over a rod section 5-6 as seen in Figure 2 so that it is suitably positioned thereon for a joint to be completed and pressure applied to the coupling tool 14-16, the recessed end of the related rod section 5-6 is expanded causing said section to be tightly engaged with said coupling sleeve 10 and retain same in place.

The locating tool 14-16 is then withdrawn and the locating pin 8 with the expandable member 11 sleeved thereover dropped into the hole 7 in the end of the rod section 5-6 as shown in Figure 1 and the next and second electrode rod section 5-6 is placed in position with the said pin 8 entered in the hole 7 of said second section. When the assembly of two or more rod sections of an electrode is completed endwise pressure is exerted on the said electrode to force the adjacent ends of the rod sections towards one another so that the expandable member 11 is compressed between them and expands outwardly as shown in Figure 3 against the coupling sleeve and at the same time flowing into the mouth recesses 9 of the holes 7. Simultaneously the endwise pressure exerted on the pins 8 causes same to outwardly expand the rod ends which tightly engage with the said coupling sleeve 10 thereby securely locking the parts together at the joint ensuring good electrical contact throughout the length of an electrode. The rod pins 8 form an axial reinforcement and the drive is taken along the centre of said electrode.

To exert pressure on assembled elec-

trode sections a convenient tool termed a driving head may be provided and is shown in Figure 1 and consists of a head portion 17 having a circular recess 18 leading in from the underside and of a diameter to fit over the top end of a rod section 5-6 and a driving pin 19 is axially affixed in said recess 18 and is adapted to slidably fit in a rod hole 7, and pressure can be applied to such driving head by a hand hammer or other suitable means to effect the bonding together of the electrode sections as before explained after which said driving head is removed. This driving head 17-19 can be used to drive an electrode into the ground.

In the case of mechanical driving, pneumatic or power driven tools may be used and driving pins provided to suit the particular tool used.

The electrode rod sections 5-6 may be formed in uniform lengths for assembly of same, or made in varied interchangeable lengths to provide for length adjustment, and the copper sheathing may be effected in any suitable known manner.

The coupling sleeves 10 may in some cases be of capillary fitting type adapted to be fused in place by heat application to improve the joint, although this is not thought necessary.

In some cases the rod section may be reduced in diameter, as shown by reference numeral 21 in Figure 5, at and adjacent the location of fitting together so that when the copper coupling sleeves are fitted in place the outer peripheral surface is not substantially enlarged and a flush or near flush effect is obtained at the joints. In this figure the end of the rod hole 7 is shown with an enlargement into which the rod 8 expands when the electrode is assembled and axially compressed.

The sheath and coupling may be formed of copper, titanium, stainless steel, aluminium or any other suitable non-corrosive conductor.

WHAT WE CLAIM IS:—

1. An earthing electrode comprising a steel rod member formed of sheathed rod sections formed for assembly together in lengthwise manner, said rod sections having means at their ends for connecting said sections together, said means including a connecting pin between adjacent rod sections for engagement in recesses on the ends of said adjacent sections and coupling sleeves for overlying the joints formed by said adjacent rod sections, the arrangement being such that when endwise pressure is applied to an assembly of rod sections, the connecting pins effect an expansion of the rod sections at each joint so as to lock the coupling sleeves in place together with the adjacent rod sections.



tions 5-6 to a suitable extent to form a firm connection.

The expandable sealing member 11 is of soft copper of bush-like form and may be outwardly curved or bowed towards the ends as shown in Figure 1 to facilitate the expansion thereof, and its bore is such as to fit over a pin 8.

The earth penetration or driving member 12 of pointed form has a stem 13 whereby it is affixed in an end hole 7 of a rod section 5-6 and may be a driving fit therein so that it is securely retained in place.

To facilitate the assembly of the coupling sleeves 10 in place a coupling or locating tool as shown in Figure 2 is provided and consists of a flanged head 14 the flange of which is of a diameter to extend beyond that of a coupling sleeve 10 and it has a rod-like engaging stem 15 adapted to loosely pass through the bore of a coupling sleeve 10 and having its end shaped at 16 for engagement in the mouth recess 9 of a rod section 5-6. This coupling tool 14-16 in use in the assembly of the rod sections 5-6, is inserted in one end of a coupling sleeve 10 which is forced over a rod section 5-6 as seen in Figure 2 so that it is suitably positioned thereon for a joint to be completed and pressure applied to the coupling tool 14-16, the recessed end of the related rod section 5-6 is expanded causing said section to be tightly engaged with said coupling sleeve 10 and retain same in place.

The locating tool 14-16 is then withdrawn and the locating pin 8 with the expandable member 11 sleeved thereover dropped into the hole 7 in the end of the rod section 5-6 as shown in Figure 1 and the next and second electrode rod section 5-6 is placed in position with the said pin 8 entered in the hole 7 of said second section. When the assembly of two or more rod sections of an electrode is completed endwise pressure is exerted on the said electrode to force the adjacent ends of the rod sections towards one another so that the expandable member 11 is compressed between them and expands outwardly as shown in Figure 3 against the coupling sleeve and at the same time flowing into the mouth recesses 9 of the holes 7. Simultaneously the endwise pressure exerted on the pins 8 causes same to outwardly expand the rod ends which tightly engage with the said coupling sleeve 10 thereby securely lacking the parts together at the joint ensuring good electrical contact throughout the length of an electrode. The rod pins 8 form an axial reinforcement and the drive is taken along the centre of said electrode.

To exert pressure on assembled elec-

trode sections a convenient tool termed a driving head may be provided and is shown in Figure 1 and consists of a head portion 17 having a circular recess 18 leading in from the underside and of a diameter to fit over the top end of a rod section 5-6 and a driving pin 19 is axially affixed in said recess 18 and is adapted to slidably fit in a rod hole 7, and pressure can be applied to such driving head by a hand hammer or other suitable means to effect the bonding together of the electrode sections as before explained after which said driving head is removed. This driving head 17-19 can be used to drive an electrode into the ground.

In the case of mechanical driving, pneumatic or power driven tools may be used and driving pins provided to suit the particular tool used.

The electrode rod sections 5-6 may be formed in uniform lengths for assembly of same, or made in varied interchangeable lengths to provide for length adjustment, and the copper sheathing may be effected in any suitable known manner.

The coupling sleeves 10 may in some cases be of capillary fitting type adapted to be fused in place by heat application to improve the joint, although this is not thought necessary.

In some cases the rod section may be reduced in diameter, as shown by reference numeral 21 in Figure 5, at and adjacent the location of fitting together so that when the copper coupling sleeves are fitted in place the outer peripheral surface is not substantially enlarged and a flush or near flush effect is obtained at the joints. In this figure the end of the rod hole 7 is shown with an enlargement into which the rod 8 expands when the electrode is assembled and axially compressed.

The sheath and coupling may be formed of copper, titanium, stainless steel, aluminium or any other suitable non corrosive conductor.

WHAT WE CLAIM IS:—

1. An earthing electrode comprising a steel rod member formed of sheathed rod sections formed for assembly together in lengthwise manner, said rod sections having means at their ends for connecting said sections together, said means including a connecting pin between adjacent rod sections for engagement in recesses on the ends of said adjacent sections and coupling sleeves for overlying the joints formed by said adjacent rod sections, the arrangement being such that when endwise pressure is applied to an assembly of rod sections, the connecting pins effect an expansion of the rod sections at each joint so as to lock the coupling sleeves in place together with the adjacent rod sections.



3
2. An earthing electrode as claimed in Claim 1 in which a sealing member in the form of a metal sleeve is positioned on each connecting pin before assembly so
5 that when endwise pressure is applied to the electrode, the said sealing member is compressed between the adjacent ends of the rod sections and the metal sleeve expands outwardly towards the coupling
10 sleeve.

3. An earthing electrode as claimed in Claim 2 in which the ends of the rod sections around the connecting pins and recesses are each provided with a niche to
15 receive part of the sealing member as it is compressed.

4. An earthing electrode as claimed in Claim 2 or 3 in which the sealing member is outwardly curved between its ends.
20

5. An earthing electrode as claimed in any preceding Claim in which the rod section which is at the lowermost end of an assembly of rod sections has an earth driving member of pointed form affixed
25 thereto.

6. An earthing electrode as claimed in any preceding Claim including a driving head for effecting the joining together of the rod sections, such driving head containing a cavity to fit over one end of a
30

rod section of an assembly, and a pin in said cavity arranged to engage in said recess of the rod section.

7. An earthing electrode as claimed in Claim 3 including a coupling sleeve joint-
35 ing member having an enlarged driving head for engagement with one end of the coupling sleeve and a projection entering said sleeve for engagement with the niche for receiving the sealing member upon
40 compression so that upon the application of pressure to the rod section it is deformed outwardly thereabout against the coupling sleeve.

8. An earthing electrode as claimed in Claim 1 in which the recess for receiving the connecting pin has an enlargement towards its end and into which the connecting pin expands when the electrode is assembled and axially compressed.
50

9. An earthing electrode substantially as hereinbefore described with reference to the accompanying drawings.

W. REID SHARP & CO.

Penthouse Suite,
Gunner House,
Neville Street,
Newcastle-upon-Tyne.