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D. E. STEARNS
CONNECTOR FOR ELECTRODES

2,497,804

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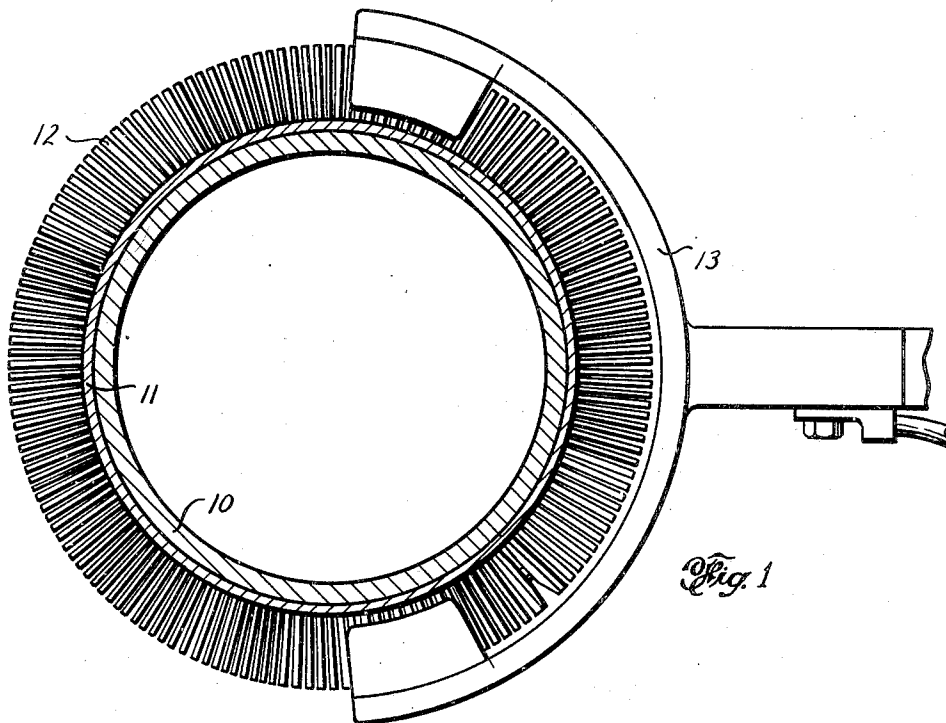


Fig. 1

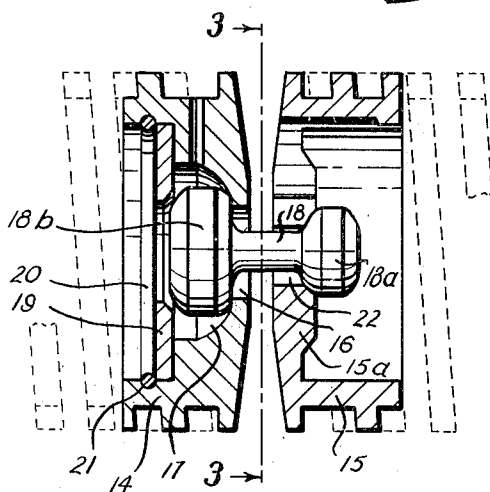


Fig. 2

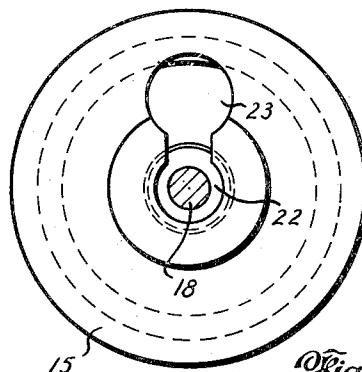


Fig. 3

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CONNECTOR FOR ELECTRODES

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4 Claims. (Cl. 24--222)

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This invention relates to connectors for electrodes such as are used in insulation testing devices and particularly those shown in my Letters Patent No. 2,332,182 and my co-pending application Serial No. 735,259.

Electrodes of this type are particularly useful in testing the insulating coating on a member of substantially circular cross section such as, for example, a pipe line. Such pipe lines are ordinarily made of iron or steel coated with an insulating coating to protect the metal from deterioration due to electrolysis or the like when such pipes are embedded in the ground or during exposure to the weather while resting on the ground. Such an insulating coating, to be completely effective, must be free from cracks, breakages, flaws, or similar defects known as holidays, as it has been found that a slight defect in such insulating coating is actually more harmful than if there were no coating on the pipe, because more current flows through the defective part per unit of area than would flow through any part of the pipe per unit of area if it had no coating. In other words, the corrosive effect of electrolysis is greatly increased at the locality of any break in the enamel coating.

In my above-mentioned patent and co-pending application, I have described and claimed electrical means for testing an insulating coating of the nature referred to, and the present application relates more particularly to the means for connecting together the ends of the electrode used in such testing means when the electrode is brought into substantially circular conformation.

One object of this invention is to provide a swivel connection between the ends of a substantially circular electrode, whereby such electrode may freely roll upon a pipe or the like during testing operations without kinking or tightening in a portion only of its coil because of obstructions or uneven surfaces encountered.

Another object of this invention is to provide an electrode formed of a series of coils of resilient material, the ends of which may be joined together or to the co-acting ends of an electrode, by means permitting relative movements of any portion of the electrode to adapt itself to passage over surfaces of varying degrees of roughness, size or the like.

A further object of this invention is to provide a swivel connection for electrodes or the like wherein a substantially dumbbell-shaped connecting link is arranged between connectors carried

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by adjacent portions of the electrode or the like, whereby either connector is free to turn upon or move slightly longitudinally along such link to relieve strains.

Other objects and advantages of this invention will become apparent from the following description taken in connection with the accompanying drawings illustrating a presently preferred embodiment, and wherein similar reference numerals designate similar parts throughout the several views.

In the drawings:

Fig. 1 is a cross-section through an insulated pipe surrounded by my improved electrode in position for rolling movements along such pipe, with a portion of a testing machine shown in position for rolling the electrode;

Fig. 2 is an enlarged longitudinal section through the ends of the electrode, showing the swivel connection for joining such electrode ends; and

Fig. 3 is a vertical section taken substantially on the line 3—3 of Fig. 2, looking in the direction of the arrows.

Referring now to the drawings, the numeral 10 designates a pipe, such as is commonly used in pipe lines for conducting fluids for comparatively great distances. Such pipe 10 is coated with an insulating coating 11, as enamel, plastics or the like, to inhibit the destructive effects of electrolysis, due to various currents flowing in the earth or other destructive influences, and tests preferably are made to discover any cracks, breakages, flaws or other defects in such coating, as the pipe line is laid, to insure the maintenance of a pipe line of sufficient strength to withstand the pressures carried therein. An electrode 12, forming a part of a testing apparatus for locating defects in the coating 11 is illustrated as surrounding the coated pipe 10 with adjacent portion 13 of such testing apparatus in position for rolling the electrode along the pipe. Such testing apparatus is described and claimed in my prior patent and co-pending application above referred to and need not be fully described herein. The electrode 12 is herein shown as comprising a coiled metallic spring in the opposite ends of which are threaded connectors 14 and 15 respectively (Fig. 2). The connectors 14 and 15 are of the same external diameter as the spring and the threads thereon are shaped to conform with the cross section of the metal forming the spring, which in the illustrated embodiment is substantially square in cross section.

Connector 14 is formed with a front end plate

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having a rounded or convex front face and substantial thickness. This end plate is provided centrally with an aperture 16 and a socket 17 rearwardly of and of greater diameter than such aperture. Aperture 16 is of sufficient diameter to permit the passage therethrough of the smaller end portion 18a of a substantially dumbbell-shaped swivel link 18, the opposite end portion 18b whereof is of greater diameter than the aperture 16 and rounded on its inner face for rolling motion upon the rounded surface of socket 17. Means are provided for retaining the swivel link 18 within connector 14 so that it may not be accidentally displaced or readily detached therefrom, but is free to move therein in substantially any direction. As herein shown, such means comprises an apertured plate or washer 19 adapted to abut the rear face of the end wall of connector 14 and be held in such abutting position by the resilient split snap ring 20 fitting in a suitable groove 21 in the inner periphery of connector 14.

Connector 15 is formed with an end plate of lesser thickness than the end plate of connector 14, but which may be reinforced adjacent its central portion, as at 15a. The end plate of this connector also has a rounded convex surface. A central aperture 22 of lesser diameter than either end portion of the swivel link 18 is formed in the end wall of connector 15 and the thickened portion 15a surrounding the rear portion of the aperture 22 is rounded to form a socket in which the rounded inner face of the smaller end 18a of the swivel link may seat, turn or tilt during the functioning of the electrode. A substantially keyhole-shaped slot 23 is formed in the end plate of connector 15 with its larger circular portion adjacent the periphery of the connector and its smaller slot portion leading into the central aperture 22. The larger portion of the keyhole-shaped slot 23 is of sufficient diameter to pass the smaller end 18a of the swivel link 18, and the smaller slot portion of the keyhole-shaped opening 23 is of sufficient width to permit the passage of only the central neck portion of the swivel link.

In use, the connector 14 is preliminarily assembled with swivel link 18 in substantially the position shown in Fig. 2, the smaller end 18a of the swivel link having been passed through the central aperture 16 from the rear of the connector and the forward motion of the swivel link continued until the rounded inner surface of the larger end 18b thereof contacts socket 17. Retaining plate 19 and snap ring 20 are then positioned from the rear of the connector to prevent accidental separation of the swivel link 18 from connector 14. The connectors 14 and 15 are then secured within the opposite ends of the spring electrode 12, which may be soldered thereto for purposes of anchoring the connectors and insuring an electrical contact between the connector parts and the spring so that the connector parts themselves become a part of the test electrode.

When it is desired to utilize the testing apparatus, the ends of the electrode are brought into proximity with one another after the electrode has been bent around the pipe 10 to be tested. The smaller end 18a of the swivel link is passed through the circular end of the keyhole-shaped slot 23 from the front of connector 15, and then the central neck portion of the swivel link is moved inwardly through the straight portion of slot 23 into central aperture 22 in the connector 15, where the rounded inner surface of smaller end 18a of the swivel link seats within the socketed rear portion of such central aperture 22.

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The tension exerted by spring electrode 12 tends to maintain the end portions of the swivel link 18 in constant engagement with the cooperating socket portions of the connectors 14 and 15, but either connector is free to turn upon the swivel link should one end of the electrode be deformed by reason of passage over uneven surfaces or the like, or twisted, as when a portion of the electrode is advanced faster than the remaining portions of the electrode.

The connectors 14 and 15 may give slightly by moving toward each other, or tilt relatively to each other in substantially any direction due to the length of link 18 and the confronting rounded faces of the connectors. In other words, substantially all movements ordinarily encountered in the use of a testing electrode are permitted either connector, without substantial deformation of the electrode and thus provide a substantially continuous annular test electrode surface exposed to the insulating coating under test as the electrode is rolled along the pipe.

The swivel link 18 may either turn with one connector with relation to the other connector or permit both connectors to turn relatively to the swivel link.

To detach the electrode ends, the connectors are moved toward each other until the portion 18a of the swivel link is unseated from its socket, during which movement member 19 limits rearward movement of link 18 relative to connector 14, whereupon the link 18 may be readily moved radially to enable passage of its smaller end 18a through the large circular portion of slot 23.

While the illustrated embodiment is believed to adequately fulfill the objects and advantages herein stated, it is to be understood that the invention is susceptible to modification and variation within the scope of the subjoined claims.

Having described my invention, I claim:

1. Means for swivelly connecting adjacent members comprising a pair of connectors adapted to be secured to said members, one of said connectors having a central aperture and a larger interior socket portion coaxial with such aperture, and the other connector provided with a smaller central aperture and socket rearwardly thereof, a substantially dumbbell-shaped swivel link having rounded end portions of different diameters, the smaller end portion of the swivel link being arranged to pass through the central aperture of the first-mentioned connector and to seat in the socket of the second-mentioned connector, and the larger extremity of the swivel link being arranged to seat in the socket of the first-mentioned connector, said second-mentioned connector being provided with a substantially keyhole-shaped slot leading into its central aperture through which the smaller end of the swivel link may pass to and from its seat in the socket of said connector.

2. Means for swivelly joining adjacent members comprising a pair of connectors respectively secured in said members, one of said connectors having a central aperture and an interior coaxial socket of larger diameter, a substantially dumbbell-shaped swivel link having rounded end portions of different diameters, the smaller end portion of the swivel link being arranged to pass through said aperture in the connector and the larger end portion of the swivel link being adapted to seat in said socket, means for loosely and removably retaining said swivel link within said connector, and the second connector having a central aperture therein of lesser diameter than the

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smaller end of said swivel link and a socket there-
behind for seating the smaller end of the swivel
link, said second connector having a slot therein
through which the smaller end of said swivel link
may be passed to and from seating position within
said second connector.

3. Connector means adaptable for use in con-
junction with a coil spring to join the ends thereof
together, to provide a substantially continuous
annular contact surface when the spring is rolled
along a conduit about which the spring may be
fastened, said connector means comprising two
connector members having circular peripheries of
metal, means carried by each connector member
adapted to secure the members respectively to
the ends of a spring of the same outer diameter
as said circular peripheries and establish con-
nection therebetween, and a link having a uni-
versal swivel connection with one of the mem-
bers and having a readily releasable ball and
socket connection with the other member.

4. Connector means for use in conjunction with
a coil spring to join the ends thereof together
to provide a substantially continuous annular

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contact surface when the spring is rolled along
a conduit about which the spring may be fas-
tened, said connector means comprising two con-
nector members having circular peripheries of
metal, means carried by each connector member
adapted to secure the members to the ends of a
spring of the same outer diameter as said circular
peripheries and establish contact therebetween,
the faces of the connector members which are
adapted to confront each other in service hav-
ing convex contours and a link having a uni-
versal swivel connection with one of the mem-
bers substantially at its axis and having a readily
releasable universal swivel connection with the
other member substantially at its axis.

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REFERENCES CITED

The following references are of record in the
file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,332,182	Stearns	Oct. 19, 1943