

Dec. 13, 1949

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METHOD OF PROTECTING SUBTERRANEAN
METALLIC STRUCTURES
Filed Oct. 16, 1944

2,491,225

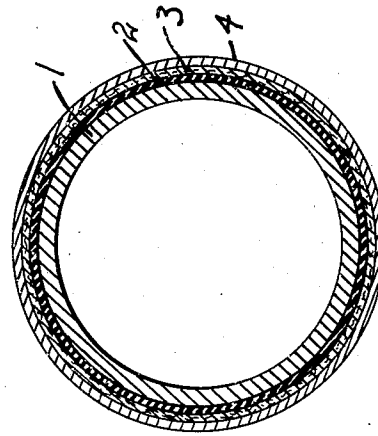
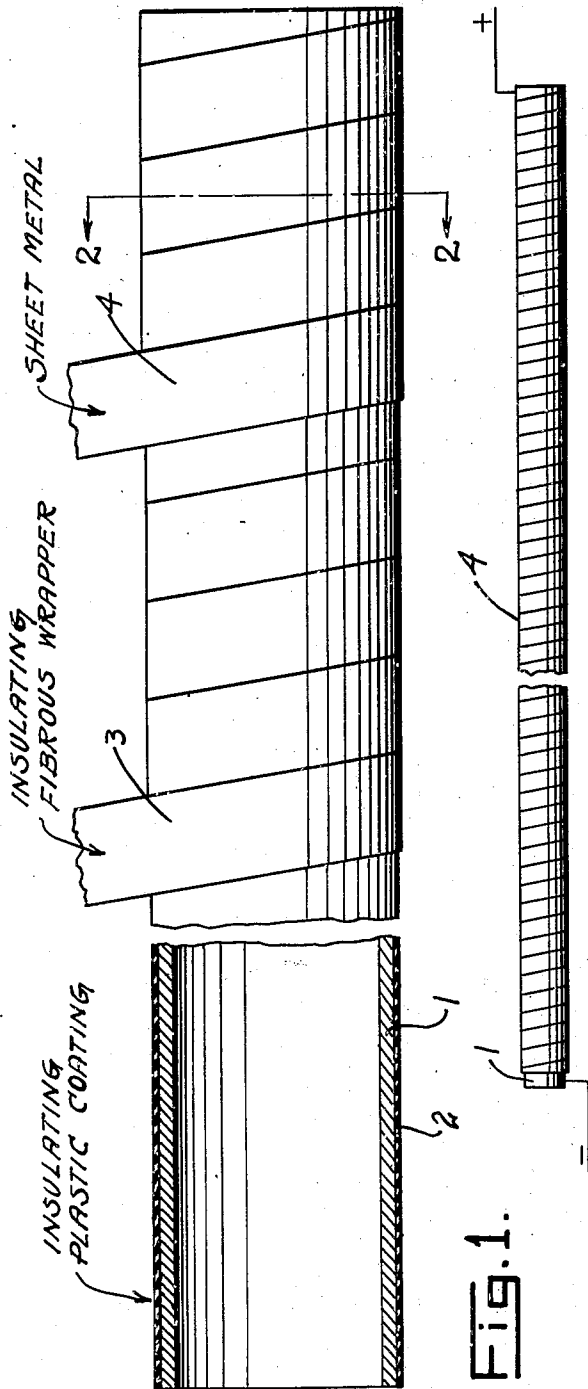


Fig. 3.

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2,491,225

METHOD OF PROTECTING SUBTERRANEAN METALLIC STRUCTURES

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Application October 16, 1944, Serial No. 558,924

5 Claims. (Cl. 204—147)

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This invention relates to method and means of protecting subterranean or buried metallic structures from electrolysis and corrosion due to local action.

It is common practice to prevent such electrolysis and corrosion of subsurface structures such as pipe lines or the like by applying to the structure a direct current voltage of such polarity as to cause the current to flow in a direction to make deposit on the pipe line rather than to take material from the pipe line or other structure. Such structures are usually coated with an insulating material but such insulation either has or develops weak spots at which accelerated corrosion or electrolysis takes place and the electrical protection just referred to tends to stop or at least effectively inhibit the deterioration of the pipe line or other structure at such defective spots in the insulation.

In applying such a voltage to a subterranean structure, the present custom is to install an anode at a substantial distance away from the pipe line so that direct current induced to flow from the anode to the pipe line will be spread over a substantial length of the pipe line. Because of the relative nearness of the conventional anode to the pipe line as compared to the extent of the pipe line over which protection from corrosion is desired, there is substantial wastage of electrical energy between the two extremities (of the pipe line section under protection) receiving the critical amount of potential required for protection. Efforts have been made with a degree of success towards increasing over-all efficiency by using several smaller units over a given extent of pipe line rather than having only one unit therefor. At best, however, the protection units with the present system must be placed every few miles along a pipe line or similar structure in order to give the necessary protection and even then the protection afforded is not uniform and is unreliable.

As an example of one of the problems encountered with the presently used system, there is a result known as "interference" which occurs where two structures, one of which is protected by the usual method, approach or cross each other. Some of the current from the buried anode will flow to an adjacent portion of the other structure, thence along that structure to the point of nearest approach of the two structures, and then across to the structure being protected. This does not hurt the structure being protected, but will quickly eat away or corrode the other structure and destroy it.

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The present invention has for its principal and general object the provision of fully adequate and reliable protection for a pipe line or similar structure buried in the earth or otherwise made subject to corrosion due to electrolysis and local electrochemical action.

More specifically it is an object of the present invention to provide more adequate protection for such a structure with a smaller number of units than now necessary and to make it possible to place such units at the most convenient points on the structure.

Another object of the present invention is to provide a means for more adequately controlling the current flow by which the protection is secured, as compared with inadequate current control of the methods heretofore used.

Another object is to avoid the "interference" above described.

Other objects and advantages of this invention will become apparent from the following description taken in connection with the accompanying drawing wherein is set forth by way of illustration and example one embodiment of this invention.

In the drawing:

Fig. 1 is a view partly in elevation and partly in longitudinal cross section through a pipe line, illustrating the apparatus employed and the method of carrying out the present invention.

Fig. 2 is a transverse cross section taken along the line 2—2 of Fig. 1.

Fig. 3 is a diagrammatic illustration showing the application of the protective voltage to a pipe or similar object to be protected in accordance with this invention.

Referring more in detail to the drawing, the numeral 1 illustrates a pipe line which in this particular instance is the structure to be protected. This pipe line is provided with an insulating coating 2 which may generally speaking be of the type presently employed on such structures such as enamels or coatings having a coal-tar base or any other suitable coating material. Such a coating 2 may, if desired, be wrapped in a manner such as now employed with a suitable fibrous insulating wrapper such as indicated at 3.

It will be understood that up to this point the practice described is the same as that employed in connection with the present protection of buried pipe lines.

In accordance with the present invention, there is added to the coatings on the structure to be protected, a sheathing or wrapping of sheet metal or metal foil 4. This sheet metal or metal foil

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may be of any suitable material but is preferably of some very light and thin material such as aluminum foil and is preferably of such a nature as to cover the entire or substantially the entire surface of the exterior of the insulated structure.

With a pipe line or other structure coated or wrapped as just described, it is put in place in the ground or in such other position as would subject it to electrolysis and local action, and the negative pole of a direct current voltage is applied to the structure to be protected the same as in the present system of protecting such structures. However, instead of connecting the other pole to an electrode buried at a substantial distance from the structure to be protected, the other pole is connected directly to the sheathing 4 which covers substantially the entire surface of the insulation over the structure to be protected.

Inasmuch as the sheathing 4 is made of metal, and preferably of a metal which has a very low electrical resistance, it will assume substantially the same potential throughout its extent, because unless there are holes in the insulating coating underneath this sheathing, there will be substantially no flow of current. Even if there is a considerable flow of current, the extent of the metal sheathing provides a substantial path for the flow of current and hence would tend to minimize any voltage drop due to such flow.

Inasmuch as the protective voltage is applied substantially uniformly over the entire surface of the structure to be protected, and at a position closely adjacent such structure, the protection afforded will be uniform and the voltage for providing such protection may be substantially lower than that which has heretofore been employed. Furthermore, due to the excellent path provided for current flow and the fact that the anode extends along, substantially parallel to and in close proximity to the structure to be protected, only a relatively few points of application of the voltage will be necessary and these may be located more nearly where they may be conveniently tended. Also since the sheath which forms the anode is close to the structure protected at all points and is between that structure and any adjacent structure, there will be no possibility of "interference" such as above described.

Although the method and means for protecting subterranean structures has been described as applied to buried pipe lines or the like, it will be appreciated that it may also be applied to other structures such as buried tanks, cables and in fact any structure which is in such a location that it is subjected to corrosion due to electrolysis and local action.

It will also be appreciated that by the apparatus and method just described there has been provided a means for carrying out and accomplishing all of the objects and advantages sought by this invention.

Having described my invention, I claim:

1. The method of protecting buried metallic structures from corrosion due to electrolysis and local action, which comprises coating the same with an electrical insulator, placing a metal foil sheath of electrically conductive material over substantially the entire outside surface of such coating in close relation thereto, and applying the positive and negative poles of a source of di-

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rect current electric voltage to said sheath and metallic structure respectively.

2. The method of protecting buried metallic structures from corrosion due to electrolysis and local action, which comprises coating the same with an electrical insulator, sheathing the insulated coating of such structure with an electrically conductive sheath of sheet metal of foil thickness in close relation thereto, and applying the positive and negative poles of a source of direct current electric voltage to said sheath and metallic structure respectively.

3. The method of protecting buried metallic structures from corrosion due to electrolysis and local action, which comprises coating the same with an electrical insulator, wrapping the coated structure with a thin metallic sheathing of foil thickness applied spirally over substantially the entire exterior surface of the structure in close relation thereto, and applying the positive and negative poles of a source of direct current electric voltage to said wrapping and said metallic structure respectively.

4. The method of protecting a pipe line of electrically conducting material to be buried in the ground from corrosion due to electrolysis and local action comprising the steps of coating the pipe line exteriorly with insulating material, applying a thin sheet of metal surrounding the insulating material in close relation thereto and applying the positive and negative poles of a source of direct current electric voltage to the sheet and pipe line, respectively.

5. The method of protecting a pipe line of electrically conducting material to be buried in the ground from corrosion due to electrolysis and local action comprising the steps of coating the pipe line exteriorly with insulating plastic material, then wrapping the coated pipe line spirally with a fibrous wrapper, then wrapping the thus coated pipe line with a metal wrapper of foil thickness in close relation with the fibrous wrapper and then applying the positive and negative poles of a source of direct current electric voltage to the metallic wrapping and pipe line, respectively.

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