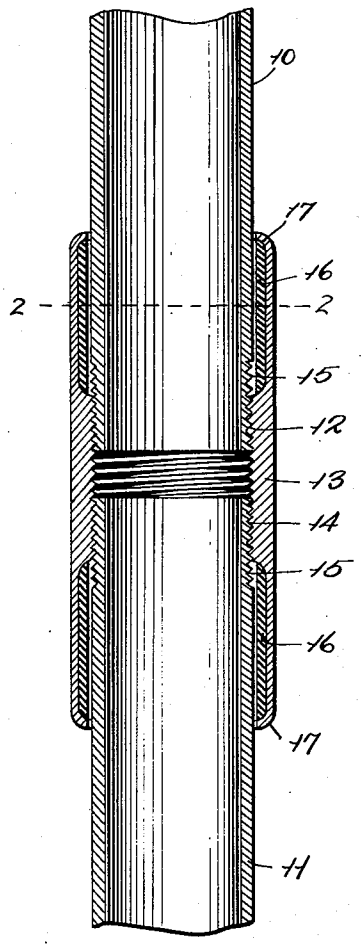
Oct. 25, 1927. 1,646,736

R. VAN A. MILLS

ELECTROCHEMICAL MEANS FOR PREVENTING CORROSION

Original Filed July 21, 1924

Fig. 1



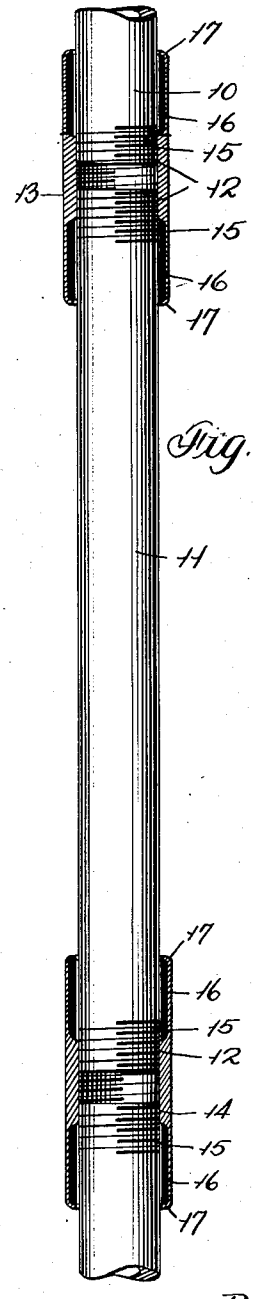


Fig. 4.

Fig. 2

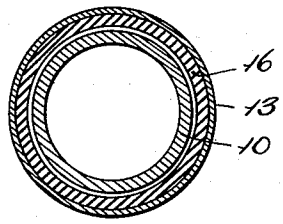
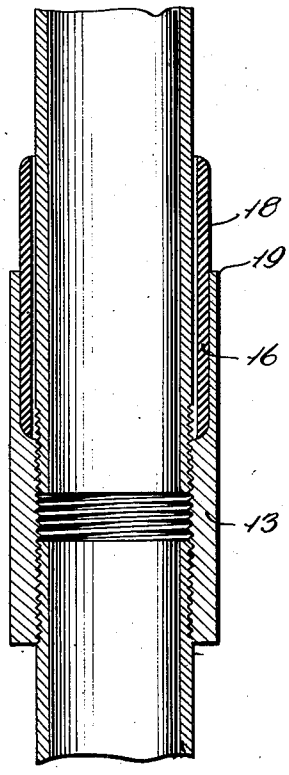


Fig. 3.



Inventor.
Ronald Van Auken Mills.
By Munson H. Lane.
Attorney

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UNITED STATES PATENT OFFICE.

RONALD VAN AUKEN MILLS, OF SANDY SPRING, MARYLAND, ASSIGNOR TO PETER Q. NYCE, OF WASHINGTON, DISTRICT OF COLUMBIA.

ELECTROCHEMICAL MEANS FOR PREVENTING CORROSION.

Original application filed July 21, 1924, Serial No. 727,395. Divided and this application filed November 19, 1924. Serial No. 750,807.

The invention relates broadly to an electro-chemical means for preventing corrosion, and more particularly for preventing corrosion of well casing, tubing, and like apparatus, especially oil well apparatus, which is very subject to corrosion due to the presence of saline or other corrosive fluids which come in contact with the tubing, casing or other apparatus, and set up electrolytic or galvanic action, which is especially marked at the tubing or casing joints.

The present application is a division of my application, Serial No. 727,395, filed July 21, 1924, for electro-chemical method of preventing corrosion.

It is well known that corrosion is essentially an electro-chemical process largely dependent upon galvanic action, and that corrosion occurs on electro-positive surfaces, that is to say, the surfaces from which an electric current leaves a metal and passes into an electrolyte like salt water.

By providing an electro-positive material that will corrode in preference to the iron or other metal in the equipment, corrosion of the equipment itself is prevented.

According to the present invention I provide zinc or other metal which is electro-positive to iron in close proximity to the tubing, casing or other equipment, whereby the apparatus to be protected is rendered electro-negative, and corrosion takes place on the surface of the zinc or other protecting substance.

It is not necessary that the zinc extend the full length of the tubing or casing, but it is sufficient to provide such protecting material at intervals along the length of the tubing or casing.

A further object of the invention is to protect the relatively soft zinc against abrasion, and to this end it is desirable to have an outer steel shell which will prevent the zinc from being struck as the tubing or casing to which it is applied is lowered into the well.

According to the present invention, I have accordingly provided special casing or tubing collars, located at the joints of successive lengths of the casing or tubing. These collars are composed partly of metal, such as zinc, which is electro-positive with respect to the tubing or casing, the zinc being in close proximity to the metal surface to be protected. The collars are provided with an outer steel shell to prevent abrasion of the zinc.

This type of casing or tubing collar serves to protect the entire equipment against corrosion, and is especially effective in preventing corrosion of the exposed threads at the joints.

The inventor recognizes the well-known art of galvanizing metal to prevent corrosion. Galvanizing, however, possesses certain disadvantages which are eliminated by the present invention. These disadvantages are:—(1) The thinness of the protecting coat of zinc. The protection lasts only so long as the zinc remains intact. Under the action of corrosive brines the zinc quickly corrodes away and is dissolved and removed from the iron leaving the latter unprotected. (2) The thin coating of zinc on galvanized iron is easily scratched or otherwise removed, thus exposing the iron. This permits the formation of a galvanic couple between the iron and zinc and stimulates the rapid consumption of the zinc.

The present invention eliminates these disadvantages by providing a collar having a zinc ring of substantial thickness which will withstand corrosive action for a considerable period. Furthermore, in the protection of well tubing, the collar which carries the protective ring may be readily replaced at a small cost when the zinc has finally corroded away.

The invention will be more clearly understood by reference to the accompanying drawings:—

Fig. 1 is a view partly in longitudinal section and partly in elevation showing the protective collar applied to a tubing or casing joint.

Fig. 2 is a sectional view of the same taken on line 2—2 of Fig. 1.

Fig. 3 is a view similar to Fig. 1 showing a modification and

Fig. 4 is a diagrammatic view showing the collar applied to successive lengths of tubing or casing.

Two lengths or separate units of well tubing or casing are shown at 10—11, each being externally threaded as at 12, and adapted to be screwed into a collar 13 which is internally threaded at 14 to receive the corresponding threaded portion 12 of the tubing or casing.

At each joint there are a number of threads as 15 on the tubing or casing which are not engaged in the collar and are consequently exposed to corrosive action where the ordinary form of collar is employed. According to the present invention, corrosion of the tubing or casing and particularly of the exposed threads is prevented by providing zinc castings 16 inside the collar and extending beyond the threaded portion of the collar. The ends 17 of the outer steel or iron shell of the collar may be beveled and turned in to securely hold the zinc in place, and to protect the zinc against abrasion.

The zinc which is electro-positive with respect to the iron, surrounds the unengaged threads 15 and by its electro-positive property with respect to iron and its close proximity to the tubing or casing and the exposed threads thereof, protects them against corrosion.

In Fig. 3 is shown a modified collar which may be applied to either tubing or casing. In this modification, the zinc extends for some distance beyond the steel shell as at 18 and serves to protect the body of the tubing as well as the threads of the joint. If preferred, the zinc may terminate at 19 at the end of the shell of the collar. In this construction but one protecting element 16 is shown instead of two, as in Fig. 1. Obviously more than one such protecting element may be employed.

While the term "tubing collar" is used in the following claims, it will be understood that this term is intended to apply to either tubing or casing, as the collar can obviously be applied to either.

What I claim is:—

1. A device for protecting iron or steel tubing or casing comprising a collar adapted to be applied to said tubing and having an iron or steel shell threaded for a portion of its length and provided with a zinc ring of substantial thickness, extending beyond the threaded portion of the collar.

2. A device for preventing corrosion of iron or steel tubing consisting of a collar adapted to be applied to said tubing and comprising an iron or steel shell internally threaded for a portion of its length, and provided with a metal electro-positive to iron extending beyond the threaded portion of the collar.

3. A device for preventing corrosion of iron or steel tubing consisting of a collar adapted to be applied to said tubing and comprising an iron or steel shell internally threaded for a portion of its length, and provided with internal end castings of zinc extending beyond the threaded portion of the collar, and provided with end flanges for protecting the zinc against abrasion.

4. A device for preventing corrosion of iron or steel tubing consisting of a collar adapted to be applied to said tubing and comprising an iron or steel shell threaded for a portion of its length and provided with an internal ring of zinc extending beyond the threaded portion.

5. A device for preventing corrosion of iron or steel tubing consisting of a collar adapted to be applied to said tubing and comprising an iron or steel shell internally threaded for a portion of its length and provided with a metal electro-positive to iron extending beyond the threaded portion of the collar.

6. A device for preventing corrosion of iron or steel tubing consisting of a collar adapted to be applied to said tubing and comprising an iron or steel shell internally threaded for a portion of its length and provided with internal end castings composed of metal which is electro-positive with respect to iron, extending beyond the threaded portion of the collar.

7. A device for preventing corrosion of iron or steel tubing consisting of a collar adapted to be applied to said tubing and comprising an iron or steel shell internally threaded for a portion of its length, and provided with internal end castings composed of metal which is electro-positive with respect to iron, extending beyond the threaded portion of the collar and provided with end flanges for protecting said electro-positive metal against abrasion.

8. A device for protecting tubing or casing against corrosion comprising a collar adapted to be appled to said tubing and provided with a ring of substantial thickness in close proximity to said tubing or casing, but spaced therefrom, said ring being composed of metal which is electro-positive with respect to said tubing or casing.

9. Means for preventing corrosion comprising in combination with well tubing or casing composed of a plurality of lengths, protective collars connecting successive lengths of the tubing or casing, each collar being provided with a ring of substantial thickness in close proximity to, but spaced from said tubing or casing, and composed of metal which is electro-positive with respect to the metal of which the tubing or casing is composed.

In testimony whereof I affix my signature.

RONALD VAN AUKEN MILLS.