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ELECTROCHEMICAL METHOD FOR PREVENTING CORROSION

Original Filed July 21, 1924

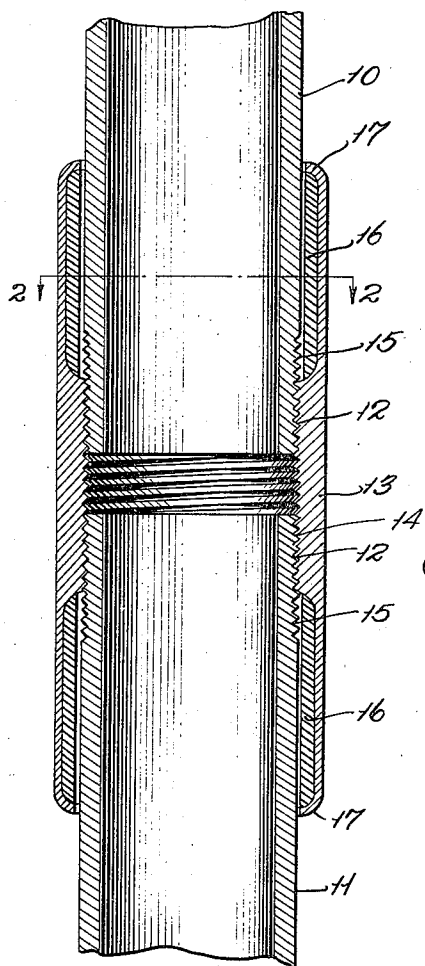


Fig. 1

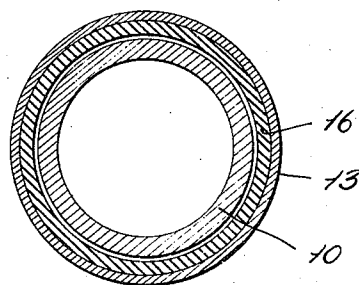


Fig. 2.

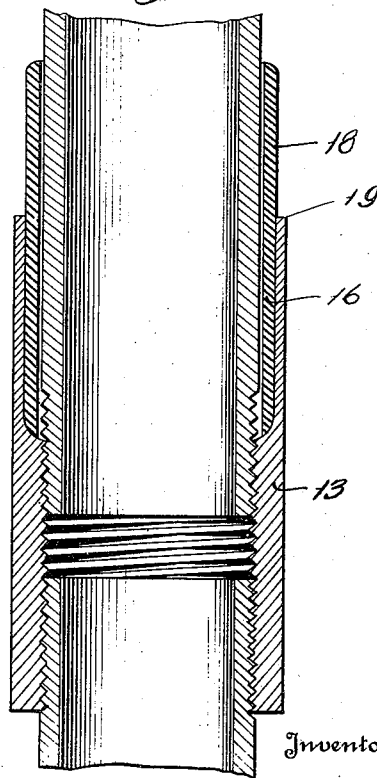


Fig. 3.

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UNITED STATES PATENT OFFICE.

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ELECTROCHEMICAL METHOD FOR PREVENTING CORROSION.

Application filed July 21, 1924, Serial No. 727,395. Renewed September 3, 1926.

The invention relates broadly to an electro-chemical method of 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 liquids 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.

It is well known that corrosion is essentially an electrochemical process 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 from surface of the zinc or other protecting substance.

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

It is further desirable to avoid direct electrical contact between the tubing or casing and the zinc or other protecting material except for a limited distance. The disadvantages of the direct contact are two-fold. First, protection is localized, only the surface immediately in the vicinity of the zinc being protected, whereas when the zinc is spaced apart from the equipment it has been found that a much larger portion of the tubing is electrically affected, and corrosion consequently prevented. Secondly, short circuiting or contact action takes place between the iron and zinc where the two are placed in direct contact, which gives rise to rapid consumption of the zinc.

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 col-

lars 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 but preferably spaced therefrom to avoid short circuiting.

The casing or tubing collar serves to protect the entire equipment to a large extent, and is especially effective in preventing corrosion of the exposed threads of the joint.

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 zinc ring of substantial thickness which will withstand corrosive action for a considerable period, and which is spaced away from the tubing or casing to avoid short circuiting. Furthermore, 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.

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 portions 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 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.

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 casings. 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 any desired number of such protecting elements may be employed.

The claims of the present application are drawn to the process, the apparatus being covered in my copending application, Serial No. 750,807.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. The method of protecting well tubing against corrosion, which consists in providing a collar upon said tubing, said collar having a zinc ring in close proximity to the tubing but spaced therefrom.

2. The method of protecting tubing against corrosion which consists in applying collars at the joints between adjacent lengths of tubing, each collar being provided with an internal ring of metal which is electro-positive with respect to the tubing.

In testimony whereof I affix my signature.

RONALD VAN AUKEN MILLS.