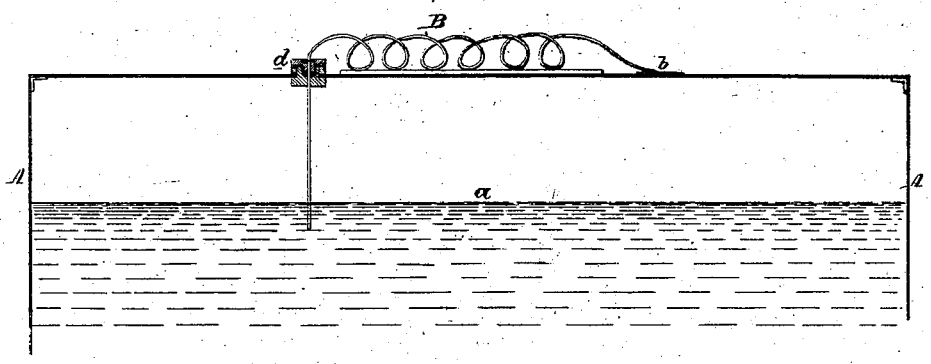
C. J. A. Dick

# Preventing Incrustation in and Corrosion of Boilers and other Vessels.

110553

PATENTED DEC 27 1870




WITNESSES { Wm. A. Steel. John Parker

C. J. A. Dick
by his Attys
Howson and Sons

# UNITED STATES PATENT OFFICE.

CHARLES JAMES ADOLPH DICK, OF PARIS, FRANCE.

Letters Patent No. 110,553, dated December 27, 1870.

## IMPROVEMENT IN PREVENTING INCRUSTATION OF STEAM-BOILERS.

The Schedule referred to in these Letters Patent and making part of the same.

I, CHARLES JAMES ADOLPH DICK, of Paris, France, but at present residing in Philadelphia, county of Philadelphia, State of Pennsylvania, have invented a Mode of Preventing Incrustation in and Corrosion of Boilers and other vessels, of which the following is a specification.

My invention consists in preventing incrustation in and corrosion of boilers and other vessels containing water or other liquids by continuously or intermittently feeding into the same, while under pressure or heated, (or in any appropriate vessel or chamber in connection therewith,) zinc, or other equivalent metal or alloy.

With the view of preventing incrustation in and corrosion of steam-boilers, zinc and other metals more oxidizable than that of the boiler have been used, as, for instance, in the English patent of B. G. Babington, No. 13,322, of 7th November, 1850, and the brevet taken out by the same person in France on 28th November, 1861, No. 52,082.

I have discovered that the want of success of this plan, as hitherto practiced, has been that the zinc, or other metal of the same electrical properties as to the metal of the boiler, becomes coated in a very short time with layers of oxide and scale, by which it is completely insulated from the water.

Voltaic action is consequently of short duration, ceasing within a few days after the introduction of the metal.

When applied to boilers, the feed-water of which is acidulated or corrosive, the metal used for protecting the same is either destroyed or becomes insulated, as above, in an equally short space of time.

In order to obviate this difficulty, I feed into the boiler or vessel, while under pressure or heated, either continuously or intermittently, a wire or ribbon of zinc, or other metal or alloy more oxidizable than the metal of the boiler, or acquiring when thus applied, the same electrical properties with respect to the said metal as has zinc, so as to produce a regular and continuous voltaic current or tension.

In the accompanying drawing—

A represents a portion of a steam-boiler, and

*a*, the level of the water in the same.

B is a coil of a zinc wire, one end of which is so secured to the shell of the boiler at *b* as to insure its being in electrical contact therewith; the other end being passed through a small stuffing-box, *d*, secured to the shell of the boiler, and into the latter, so that it shall project below the water-line.

This wire has to be slowly fed into the boiler, either continuously or intermittently. It may be fed for instance, by and between rollers caused to revolve slowly, or it may be fed automatically by other appliances which may serve the purpose, or it may be thrust through the stuffing-box by hand from time to time.

No determined speed with which the wire should be fed into the boiler can be given, as it must vary in accordance with the feed-water, some qualities of which will cause a more rapid oxidization of the wire and deposit of scale thereon than others, and consequently demand a faster feed of the wire, so as to always insure sufficient electrical contact between the wire and the water into which it is being fed. The continuous voltaic action thus maintained effectually prevents the formation of scale on the metal of the boiler, and removes such as has been already formed.

When the feed-water is acidulated or corrosive, the presence of the wire and the consequent voltaic current or tension will prevent corrosive action of the water on the metal of the boiler.

I prefer to so construct the stuffing-box and make it of such material, that when the wire passes through it, it shall be insulated from the metal of the boiler, as this will enable me to apply to the wire a galvanometer for testing the voltaic action within the boiler.

Although results partially effective may be produced even when a continuously-closed voltaic current, as above indicated, is not maintained, such, for instance, as by feeding the wire through an insulated stuffing-box into the water, without its being, on the other hand, in electrical communication with the shell of the boiler, except through the water into which it is being fed, or also by feeding the wire into the steam-room of a boiler without its touching the water, and connecting it, on the other hand, electrically with the shell of the boiler, by far the best results are obtained under the circumstance related above.

Although I have described my invention as applied to a steam-boiler, it may be used in connection with other metallic vessels in which water or other liquid is heated, for preventing incrustation and corrosion, and it may be applied to appropriate auxiliary vessels or chambers *o* of a boiler; a feed-water heater, for instance, or a vessel or chamber especially constructed and used for the present purpose, the necessary electrical connections being made so as to benefit the metal of the boiler, as if the zinc were fed directly into the same; and although I have alluded to zinc as the metal to be fed into the boiler, it should be understood that any other metal or alloy, having or acquiring, when thus ap-

plied, the same electrical properties as to the metal of the boiler or vessel, as has zinc, may be employed.

*Claim.*

Preventing incrustation in and corrosion of boilers and other vessels containing water or other liquids, by continuously or intermittently feeding into the same, while under pressure or heated, (or into any appropriate vessel or chamber in connection therewith,) zinc or other equivalent metal or alloy.

In testimony whereof I have signed my name to this specification in presence of two subscribing witnesses.

C. J. A. DICK.

Witnesses:
WM. A. STEEL,
HARRY SMITH.