(No Model.)

W. B. BULL.

DEVICE FOR PREVENTING INCRUSTATION IN STEAM BOILERS.

No. 383,795. Patented May 29, 1888.

Fig. 1.

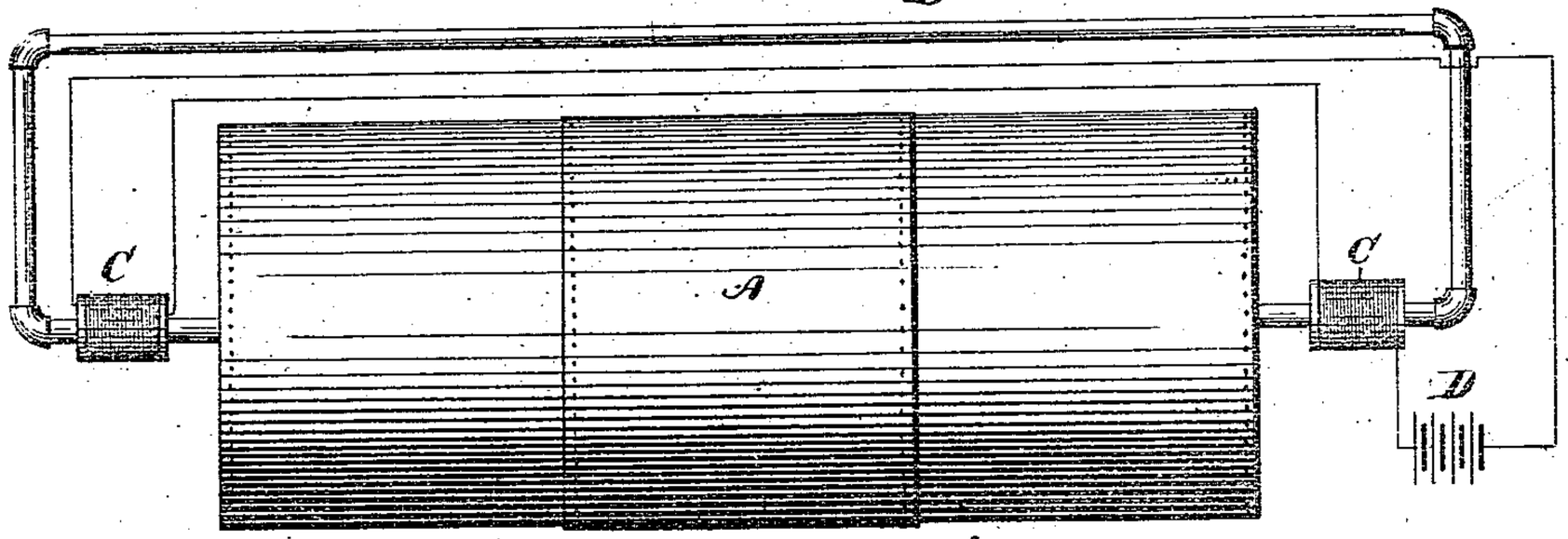


Fig. 2.

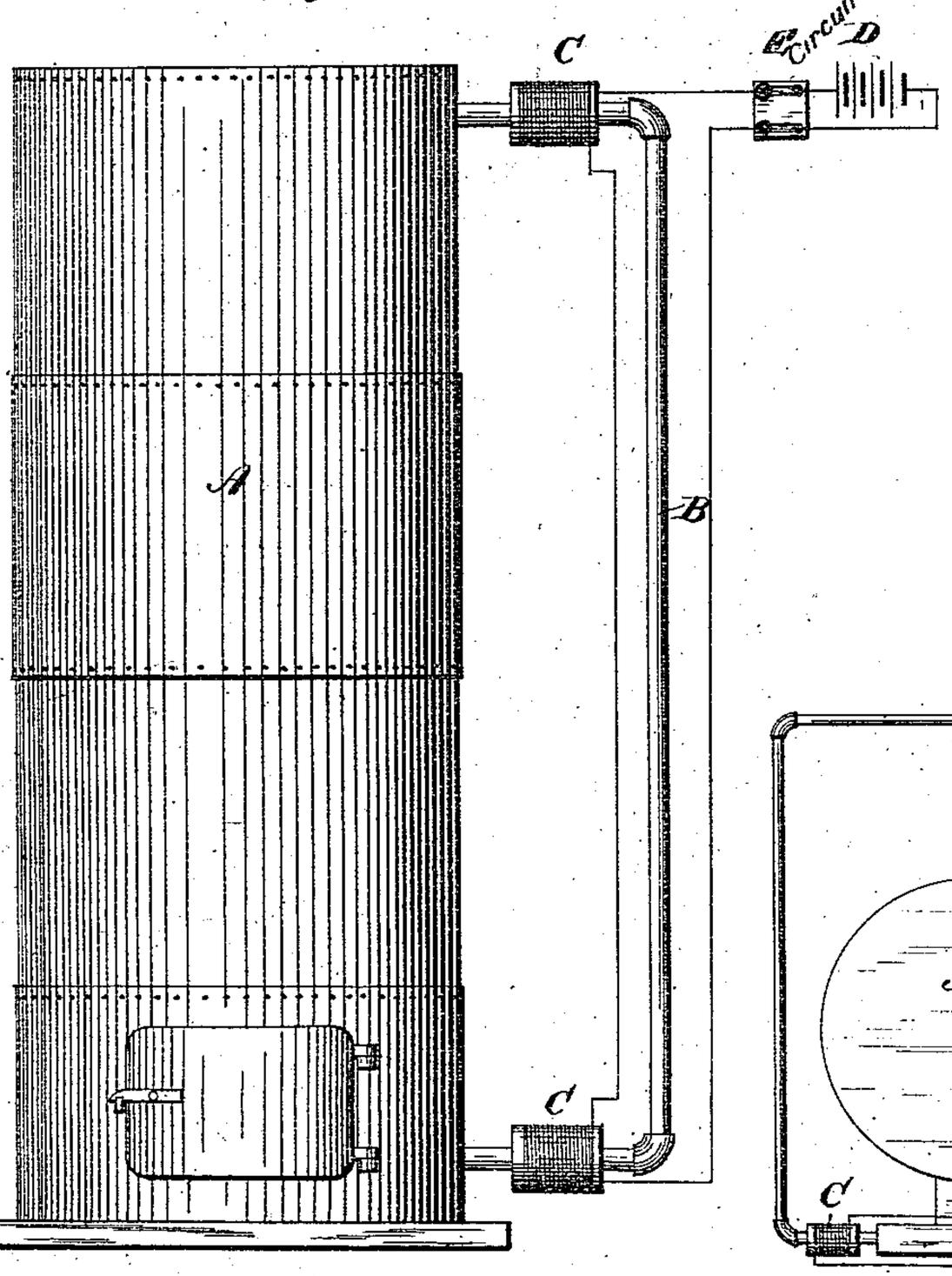
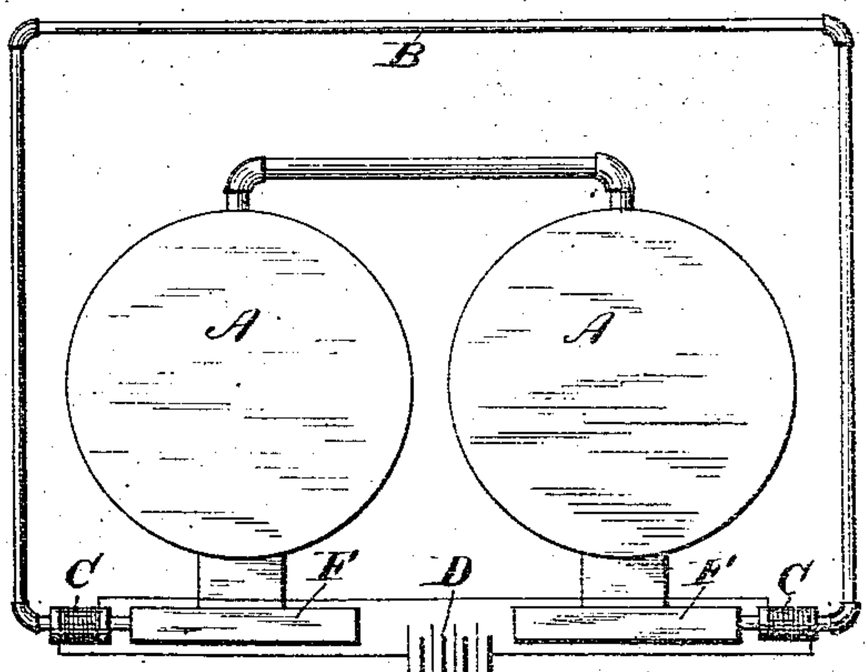


Fig. 3.



Witnesses.
Chas. R. Burr.
A. J. Stewart.

Inventor.
William B. Bull
by Church & Church
his Attorneys.

UNITED STATES PATENT OFFICE.

WILLIAM B. BULL, OF QUINCY, ILLINOIS.

DEVICE FOR PREVENTING INCRUSTATION IN STEAM-BOILERS.

SPECIFICATION forming part of Letters Patent No. 383,795, dated May 29, 1888.

Application filed January 19, 1886. Renewed April 5, 1888. Serial No. 269,716. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM B. BULL, of Quincy, in the county of Adams and State of Illinois, have invented a certain new and useful Improvement in Devices for Preventing Incrustation in Steam-Boilers; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the figures and letters of reference marked thereon.

Heretofore numerous attempts have been made to prevent the deposition upon the inside of steam-boilers of the lime and other materials held in solution in the water used in making the steam, which forms a scale or crust therein and is extremely troublesome and annoying, preventing the proper and successful operation of the boiler. Some of the attempts to remedy this incrustation have resulted in the invention of devices, in some of which the boiler itself is placed in an electric circuit, and in others an electro-magnet having a bar for a core, with one pole only in contact with the boiler-shell, is employed, the idea being that the whole boiler-shell will be magnetized by this contact with the magnet, while in reality the only effect from the magnet will be in close proximity to this pole, the greater portion of the boiler not being affected in the least. My invention, however, has for its object to prevent this incrustation on the entire inner surface of the boiler and flues by placing the whole mass, or the greater part thereof, between the poles, and hence within the field of force of the magnet; and it further consists in changing the polarity of this magnet constantly or at intervals, or in breaking the circuit entirely, or in producing a rise and fall of tension in the current, or in manipulating the current in any manner so as to vary the condition of the magnet, all as I will now proceed to describe.

In the drawings, Figure 1 represents a view of a horizontal steam-boiler, showing the application of my invention thereto. Fig. 2 is a view showing its application to an upright boiler and a circuit-breaker or pole-changer interposed in the magnet-circuit. Fig. 3 is a view showing the application of my invention to a battery of two boilers.

Similar letters of reference in the several figures denote the same parts.

A represents the boiler, and B the magnet-core, consisting of a long piece of iron or steel, preferably iron pipe, having its ends in contact with the ends of the boiler, and having near each end coils C C in circuit with the generator of electricity D, located at any suitable point. It will be seen that the current from the generator will energize the core B and transform its two ends into north and south poles, respectively, and as they are in contact with the opposite ends of the boiler-shell, the latter will be magnetized, and, as it is situated entirely within the field of force, is subjected to the maximum effect.

The theory on which my invention and others of this class are supposed to operate is, that by the magnetization of the boiler-shell its molecules are moved or wrenched from their normal position relative to each other, and while in this changed position the scale will not be deposited. Acting upon this theory that the position of the molecules is changed when the shell is magnetized, I employ a generator delivering an interrupted current, or insert in the circuit with the generator and magnet-coils a circuit-breaker, E, the function of which is to break the circuit and create a rise and fall of tension therein, so that if the molecules of the boiler-mass have a normal position and by magnetization this position is changed, it follows that a rapid making and breaking of the circuit would tend to keep them in motion and more effectually prevent any deposit from the water. In order to provide for a greater movement or change of position of the molecules, a generator producing an alternating current, or a pole-changer, may be employed in place of the circuit-breaker, so there will be three positions which they can assume—one when the current is broken, another when a positive current is passing through the coils, and a third when a negative current is passing.

In Fig. 3 I have shown an arrangement whereby my invention can be applied to a battery of two or more boilers, F representing the mud-drums of the boilers, and the ends of the magnet being applied to these, the whole mass of both boilers of the battery is within the field of force of the magnet.

I have found by practical experiment that within certain limits the length of the yoke connecting the two magnets may be greatly increased without impairing the effectiveness of the operation of the magnet, so that three, or even more, boilers may be acted upon by the same magnet with good results.

Having thus described my invention, I claim as new—

1. The combination, with a steam-boiler, of a device for preventing incrustation therein, consisting of an electric generator, an electro-magnet in circuit therewith, having its poles in contact with said boiler, and a device in said circuit for varying the current from the generator, substantially as described.

2. The combination, with a steam-boiler, of a device for preventing incrustation therein, consisting of an electric generator, an electro-magnet in circuit therewith and having its poles in contact with the boiler at points widely separated, so as to include the mass of the boiler between them, and a device for varying the current in said circuit, substantially as described.

WILLIAM B. BULL.

Witnesses:
EDWARD PRINCE,
RICHARD M. SMITH.