UNITED STATES PATENT OFFICE.

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METHOD FOR PREVENTING THE FORMATION OF BOILER-SCALE.

No. 925,283. Specification of Letters Patent. Patented June 15, 1909.

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To all whom it may concern:

Be it known that I, THEODOR BRÁZDA, inspector of the Austrian State Railway, a subject of the Emperor of Austria-Hungary, and a resident of Amstetten, Lower Austria, in the Empire of Austria-Hungary, have invented a new and useful Method for Preventing the Formation of Boiler-Scale; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to use the same.

The subject-matter of the present invention is a method for preventing the formation of boiler scale, or in other words, for preventing the formation of incrustation on the walls of steam boilers and other receptacles under pressure. The method differs from chemical and mechanical processes, or methods known heretofore, as the feed water is introduced into the boiler without admixture of chemicals and in a definite form in which it prevents the formation of scale.

The method consists in boiling the feed water without any admixture of chemicals, and at the same time vigorously stirring the same by means of steam introduced into the feed water or by a mechanical stirring apparatus. The feed water while being thus acted upon is contained in a closed receptacle, partially filling the same, the receptacle being free from the pressure of the feed pump and the pressure of the boiler. This treatment causes a part of the hardening agents contained in the feed water, the bicarbonates particularly, to be precipitated in the form of a very fine, light powder making the water appear cloudy. The precipitate, either with or without the feed water from which it was obtained, is then introduced into the boiler. This preliminary heating or boiling of the feed water, is usually at a temperature of over 100° C. under pressure, the feed water being vigorously stirred during the heating. If the feed water contains a large quantity of the hardening agents, the process can be carried out at a lower temperature than 100° C.

The feed water may be heated while being vigorously stirred by directly mixing steam with the feed water, the steam being allowed to enter the feed water at many places so as to form eddies, the water being intimately mixed with the steam while in a state of ebullition, and the bicarbonates being precipitated as insoluble material.

In order to obtain the proper degree of fineness of the precipitates, for the success of the method, it is necessary that the boiling water should be vigorously stirred so as to whirl the particles of water together while the precipitates are forming. The very fine particles of the precipitate are only visible when magnified about 1000 times. These precipitates should be brought into the finest form of powder and care must therefore be taken that the process be not stopped too soon.

If the feed water, together with the matter thus precipitated, be introduced into the steam boiler or other receptacle under pressure, it mixes with the water in the boiler and forms, as experience has shown, an effective remedy for preventing the deposit of solid boiler-scale and the formation of gas bubbles on the walls of the boiler. This result may be explained as follows:—The easily movable solid but very fine particles which are suspended in the water in the boiler, by continuously rubbing against the precipitates, such as sulfates, etc., which are still forming in the boiler, as well as on the walls of the boiler, prevent the scale, bubbles, etc. from coming into a state of quiescence, thus preventing their adhering to the walls of the boiler. The same result is secured when the precipitate obtained by this process is separated from the feed water in the form of powder or pulp, and is then introduced by itself into a boiler or the like.

What I claim as my invention and desire to secure by Letters Patent is:

1. A method for preventing the formation of incrustation in boilers and other receptacles, consisting in partially filling with feed water a receptacle closed on all sides and shut off from the feed pump and the boiler, the contents of the receptacle being at the start, free from pressure above that of the atmosphere, in vigorously stirring the feed water in the receptacle, in simultaneously heating the feed water in the receptacle, and continuing the stirring and heating until the feed water is thoroughly boiled and the temperature of the feed water equals that of the water in the boiler, whereby a part of the hardening agents is precipitated in the form of very fine powder, and in then introducing this feed water together with the

powder into the boiler or other receptacle, substantially as described.

2. A method for preventing the formation of incrustation in boilers and other receptacles, consisting in partially filling with feed water a receptacle closed on all sides and shut off from the feed pump and the boiler, the contents of the receptacle being at the start free from pressure above that of the atmosphere, in vigorously stirring the feed water in the receptacle, in simultaneously heating the feed water in the receptacle and continuing the stirring and heating until the feed water is thoroughly boiled and the temperature of the feed water equals that of the water in the boiler, whereby a part of the hardening agents is precipitated, and then introducing the precipitates into the water in a boiler or other receptacle, substantially as described.

3. A method for preventing the formation of incrustation in boilers and other receptacles owing to the feed water containing a large quantity of temporary hardening agents, consisting in subjecting the feed water in a closed receptacle free from pressure above that of the atmosphere, to the action of steam to vigorously agitate the feed water and to thoroughly boil the same, to produce a precipitate of the hardening agents in the form of a fine light powder the preliminary heating of the feed water being continued until the temperature of the feed water equals the temperature of the water in the boiler, and then introducing the precipitates into the water in a boiling or other receptacle.

4. A method for preventing the formation of incrustation in boilers and other receptacles, consisting in introducing the feed water into a closed receptacle free from pressure above that of the atmosphere, introducing steam into the receptacle in such manner as to vigorously agitate the feed water in said receptacle, to impart to the water a whirling motion, and at the same time subjecting the feed water to a preliminary boiling by the steam heat, whereby a precipitate in the form of a very fine powder is obtained giving the water a cloudy appearance, continuing the boiling until the temperature of the feed water equals the temperature of the water in the boiler, and then introducing the feed water with the precipitate into a boiler or other receptacle.

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

THEODOR BRÁZDA.

Witnesses:
FRANZ REITER,
AUGUST FUGGER.