J. G. BAKER.

Steam-Generator.

No. 206,998. Patented Aug. 13, 1878.

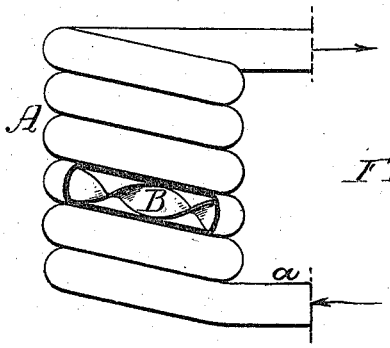


FIG. 1

FIG. 2.

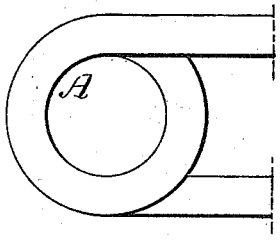


FIG. 3.

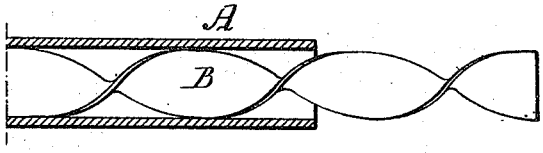


FIG. 6.

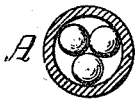


FIG. 4.


FIG. 5.

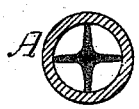


FIG. 7.

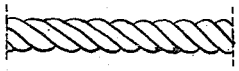


FIG. 8.

Witnesses,
John H. Deemer
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Inventor,
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by his Attorneys
Howson and Howson

# UNITED STATES PATENT OFFICE.

JOHN G. BAKER, OF PHILADELPHIA, PENNSYLVANIA.

## IMPROVEMENT IN STEAM-GENERATORS.

Specification forming part of Letters Patent No. **206,998**, dated August 13, 1878; application filed May 28, 1878.

*To all whom it may concern:*

Be it known that I, JOHN G. BAKER, of Philadelphia, Pennsylvania, have invented a new and useful Improvement in Steam-Generators, of which the following is a specification:

The main object of my invention is to make an economical and safe steam-generator, by combining a coiled or zigzag tube or tubes with retarding devices contained within the tubes, that perfectly dry steam will be generated, as explained hereinafter.

In the accompanying drawing, Figure 1 is a side view, partly in section, of my improved generator in its simplest form; Fig. 2, a plan view; Fig. 3, an enlarged longitudinal section of part of the tube with its internal twisted ribbon; Fig. 4, a transverse section of Fig. 3; and Figs. 5, 6, 7, and 8, views illustrating modifications of my invention.

The steam-generator shown in Fig. 1 consists of a simple continuous coil, A, of tubing, preferably copper tubing, and a twisted strip or ribbon, B, of thin metal contained within the coiled tube, the feed-water being, in the present instance, introduced at the lower projecting end, *a*, of the coil, and the steam being conveyed from the upper end of the same directly to the point where it has to be utilized, either in driving an engine or in the performance of other duties, no steam-drum being required, for reasons explained hereinafter.

It should be understood that this continuous coil, with its internal twisted ribbon, is not an adjunct to a steam-boiler, but constitutes the entire generator or body of the generator.

It has not been deemed necessary to illustrate or describe any specific form of setting for the generator, as that will depend, in a measure, on the kind of fuel used, and this being determined, appropriate setting will readily suggest itself to those familiar with steam-boilers.

The effect of this combination of coiled tube with the twisted ribbon contained in the same may be best explained by giving the following account of tests which I have recently made. A plain tube, twenty-four feet long, having a bore of half an inch, was coiled to a diameter of about seven inches and furnished with a small supply of water. On subjecting this coil to heat it was found that the steam generated within it was discharged from the upper end of the coil in such a saturated condition that it was not available for driving an engine. A second tube, twelve feet long, was procured, a twisted ribbon introduced into it, and both were coiled together. On furnishing this coil with a small supply of water and subjecting it to heat, perfectly dry steam was discharged from its upper end, although the tube was but half the length of that used in making the first test.

I attribute the difference in result of the two tests to the following causes: In the first coil there was nothing to retard the free upward course of the water displaced by the steam through the tube, within which such a foaming took place that the steam discharged at the outlet was necessarily accompanied with more or less water. In the second coil the internal twisted ribbon had a retarding influence on the water which the steam had a tendency to displace—in other words, the ribbon formed within the tube circuitous passages, which so retarded the progress of the displaced water that the latter was converted into steam before it had pursued its upward circuitous course to any great extent.

Another influence, it is believed, tended to the rapid conversion of water into steam. The water, as it was impelled upward by the force of the steam, received a whirling motion by its contact with the twisted ribbon, and hence the water was forced against the heated inner surface of the tube with such violence that it submitted more readily to the steam-generating influence of the heat than if it pursued the clear passage through the coil the boiler-heads $B$ $B^3$ $B^4$, between which jacket in the first test. At the same time the water, being forced against the side of the tube, permitted the free course of the steam through the center of the same.

The discharge of perfectly dry steam from the coil in the second test was due, it is believed, to this rapid conversion into steam of the displaced water before the latter could reach the upper convolutions of the coil, which consequently served the purpose of a superheater for drying the steam, and also as a steam-reservoir.

It should be understood that a comparatively small quantity of water was introduced into the coils in both tests; and I may remark here that while I do not intend to use the coil as an instantaneous or flashing generator, I propose in all cases to use a much less supply of water in proportion to the capacity of the generator than is used in an ordinary steam-boiler.

In carrying out my invention, I prefer to introduce the ribbon into the tube while the latter is straight, the ribbon readily accommodating itself to the tube when it is coiled.

A twisted bar of cruciform section, as shown in Fig. 5, may be introduced into the tube, so as to form four spiral passages in the latter, instead of the two formed by the twisted ribbon; or a twisted bar having three, or more than four, ribs may be used.

Other devices may be placed in the tube for retarding the upward progress of the displaced water and compelling it to pursue a circuitous course. Solid spheres, for instance, as shown in Fig. 6, may be employed for this purpose; but spheres or other solid retarding devices will detract from the capacity of the generator.

Loosely-twisted strands of wire, as shown in Figs. 7 and 8, may be introduced into the tube; but I prefer the twisted ribbon, because it insures the imparting of a definite whirling motion to the displaced water, and is the most economical, both as regards the consumption of material and labor in making the generator.

It is not essential that the ribbon should pass through the entire length of the coil, the upper portion of which may, in some cases, be free from internal retarding devices.

It will be understood that the generator is to be furnished with safety-valve and other adjuncts common to other steam-boilers.

The drawing illustrates my improved generator in its simplest form, and consists of one continuous coil only; but a number of these coils, arranged one within another or otherwise, may be combined so as to form a generator of any desired capacity; but no matter how many coils are used, each coil must be continuous.

While I prefer to use tubes coiled in the manner shown in Figs. 1 and 2, they may be bent to a zigzag form.

I claim as my invention—

1. A steam-generator consisting of a continuous coiled or zigzag tube combined with an internal retarding device or devices, substantially as described.

2. A steam-generator in which a coiled or zigzag tube is combined with an internal twisted ribbon of thin metal, as set forth.

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

JOHN G. BAKER.

Witnesses:
HARRY A. CRAWFORD,
HARRY SMITH.