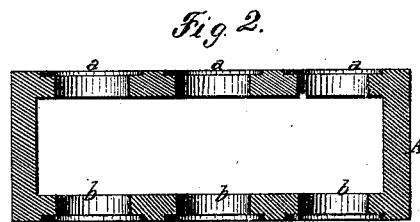
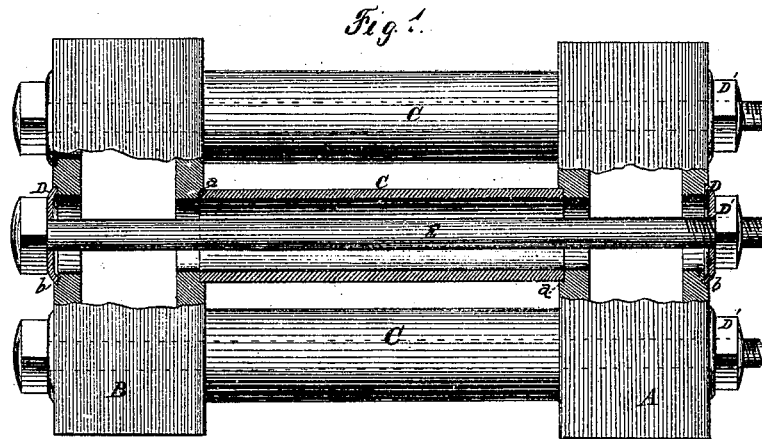


Sharp & Griffing,
Sectional Boiler.
No. 106,965, *Patented Aug. 30. 1870.*



Witnesses
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THOMAS SHARP AND CHARLES S. S. GRIFFING, OF SALEM, OHIO.

Letters Patent No. 106,965, dated August 30, 1870.

IMPROVEMENT IN STEAM-GENERATORS.

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

To all whom it may concern:

Be it known that we, THOMAS SHARP and CHARLES S. S. GRIFFING, both of Salem, in the county of Columbiana and State of Ohio, have invented certain Improvements in Steam-Generators; and we do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the annexed drawing making part of this specification, in which—

Figure 1 is a plan view of a section of the water-chambers and tubes of a steam-generator, a portion being broken away to show the manner of securing the tubes, the elastic washers which form the joints around the bolts, and the apertures in the water-chambers, through which a tool may be inserted for cleansing the interior of the tubes upon removing the bolts.

Figure 2 is a longitudinal central section of one of the water or steam-chambers, showing the recesses for the packing at the ends of the tubes, and the elastic washers around the bolts, which hold the parts together.

Figure 3 is a plan view of one of the bolts used in securing the parts in position, and showing also a modified form of elastic washer to be used under its head and nut.

Corresponding letters refer to corresponding parts in the several figures.

This invention relates to that class of steam-generators which are composed of a series of tubes, with water-chambers, or with water and steam-chambers at their ends; and

It consists in so constructing the chambers as that, by removing any one of the bolts which pass through the tubes, a suitable instrument may be inserted through the chamber into the tube, for the purpose of removing any foreign substance which may have been deposited thereon, without breaking the joints between such tube and chambers; and

It further consists in providing an elastic washer, to be used under the heads and nuts of the bolts which hold the parts in position, in order that, when a fire is first kindled in the furnace, and the flues are expanded by its heat, the excessive strain which would otherwise come upon such bolts, as a consequence of such expansion, may be avoided.

It is well known that one of the greatest objections to the employment of this type of generators is the great difficulty of cleaning the interior surfaces of the tubes when they become coated with the earthy or mineral substances held in solution by the water.

It is also well known that the connecting-bolts used in this type of generators are subjected to excessive strain, from the fact that they have their nuts screwed down sufficiently tight, when the parts are all cold, to make the joints between the ends of the tubes and the chambers, at their ends, tight, and, conse-

quently, when a fire is kindled, and the flue or tube becomes heated, a large additional amount of strain is thrown upon the bolts, in consequence of the fact that the tube becomes heated, and consequently expanded, much sooner than the bolt, owing to its being surrounded by water.

The object of this invention is to provide a remedy for the above-recited difficulties.

To enable those skilled in the art to make and use our invention, we will proceed to describe its construction and operation.

A B refer to chambers, which may be in the form shown in the drawing, or of any other desired form, and of any length which it may be desirable to make the sections of a generator. These chambers we prefer to make of cast-iron, but they may be made of wrought metal; in either case they are to have spaces within them, of sufficient area to admit of a free supply of water to the tubes, or to receive the steam generated in such tubes. They are also to be provided with apertures, of a diameter about equal to that of the interior of the tubes.

They are also to be provided with recesses *a a* around such apertures, equal in diameter to the outer diameter of such tubes, so that, as the parts are put together, the ends of the tubes may enter such recesses, and rest upon any suitable packing placed therein.

Through the outer surfaces or sides of these chambers apertures *b b* are to be formed, of a diameter about equal to that through the interior surface thereof, the object of which is two-fold: first it forms a passage for the bolt, which secures the parts in position, as shown in fig. 1. Another, and the more important office of these apertures is, to permit the passage through them of a scraper or tool for removing the scale which in use forms upon the interior of such tubes.

This cleaning operation may be performed at any time, in a generator constructed as this is, by removing one bolt at a time, and inserting any suitable instrument for that purpose, and, after the scale has been removed, replacing the bolt, and removing another, which method will prevent the liability of breaking the joints between the ends of the tubes and the chambers. This large opening forms one of the distinguishing features of this invention, as, when generators of this type are made without them, the only way in which the flues or tubes can be cleaned is to take the sections apart, and clean the tubes after they have been taken out of their seats, thus causing great delay and expense.

C C refer to the tubes or flues, of which there may be any desired number in one section of a generator, so that, as a series of these sections is placed side

by side, and the proper connections are made between them, they shall form a complete generator, or, if preferred, a single section may constitute such generator.

D D refer to washers, which are to be of a concavo-convex form, as shown in fig. 1, their outer edge fitting into recesses formed in the surface of the chambers, there being one upon each chamber, so that the head of the bolt, as well as the nut, shall rest upon such washer. Any suitable packing may be used to form tight joints between them and the chamber and nuts or bolt-heads.

D' D' refer to the nuts upon the bolts, the position which they occupy being shown in fig. 1.

E refers to the bolts, which pass through the chambers and the flue or tubes, and confine them together.

Having thus described our invention,

What we claim, and desire to secure by Letters Patent, is—

1. The combination of the chambers A B, flues or tubes C, and bolts E, when so arranged that, by removing any one of the bolts from a flue or tube, an unobstructed passage will be left for the passage of a scraper through the same, substantially as and for the purpose set forth.

2. The combination of the chambers A and B, having the enlarged apertures in their outer surfaces, the concavo-convex washers D, the tubes C, and bolts E, substantially as and for the purpose set forth.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

THOMAS SHARP.
C. S. S. GRIFFING.

Witnesses:

THOMAS KENNETT,
EDWARD KENNETT.