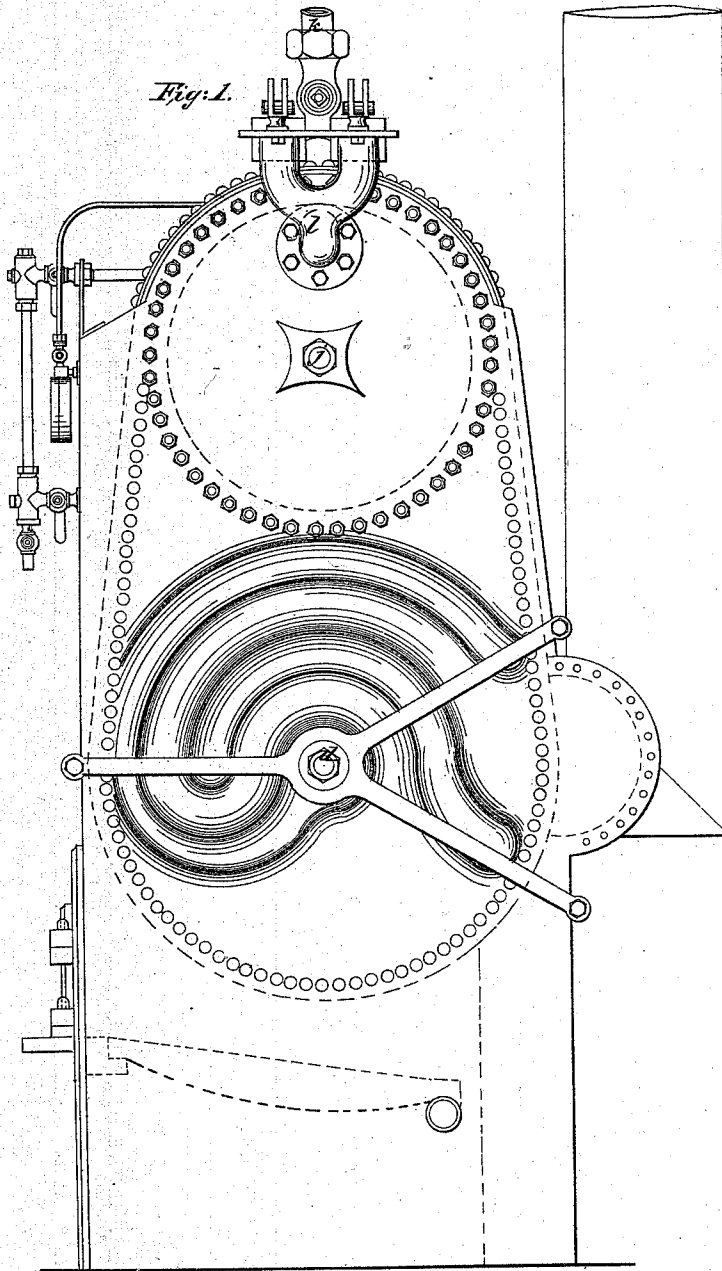


J. A. FANSHAW & J. A. JAQUES.  
STEAM GENERATOR.

No. 35,595.

Patented June 17, 1862.



Witnesses:

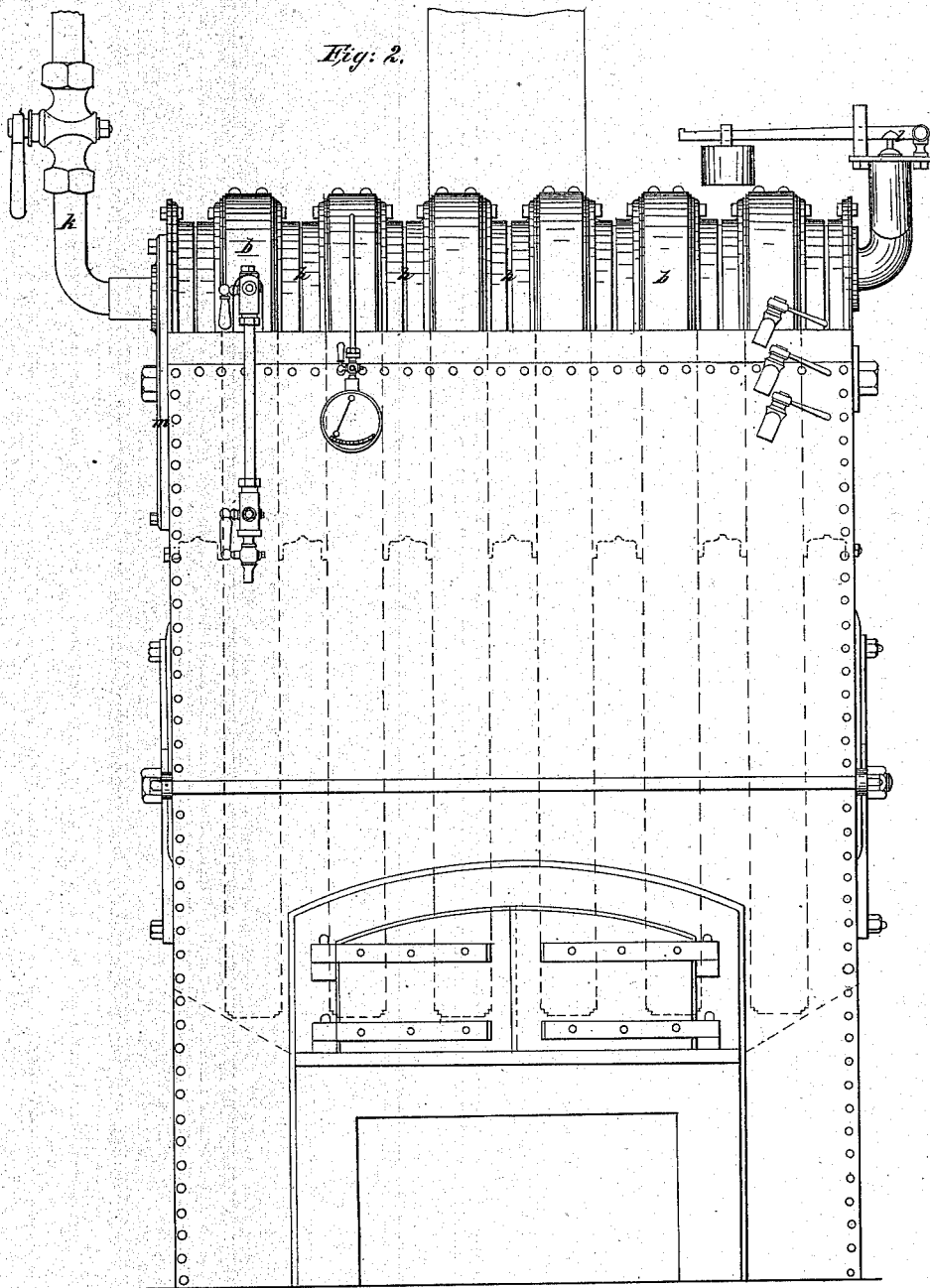
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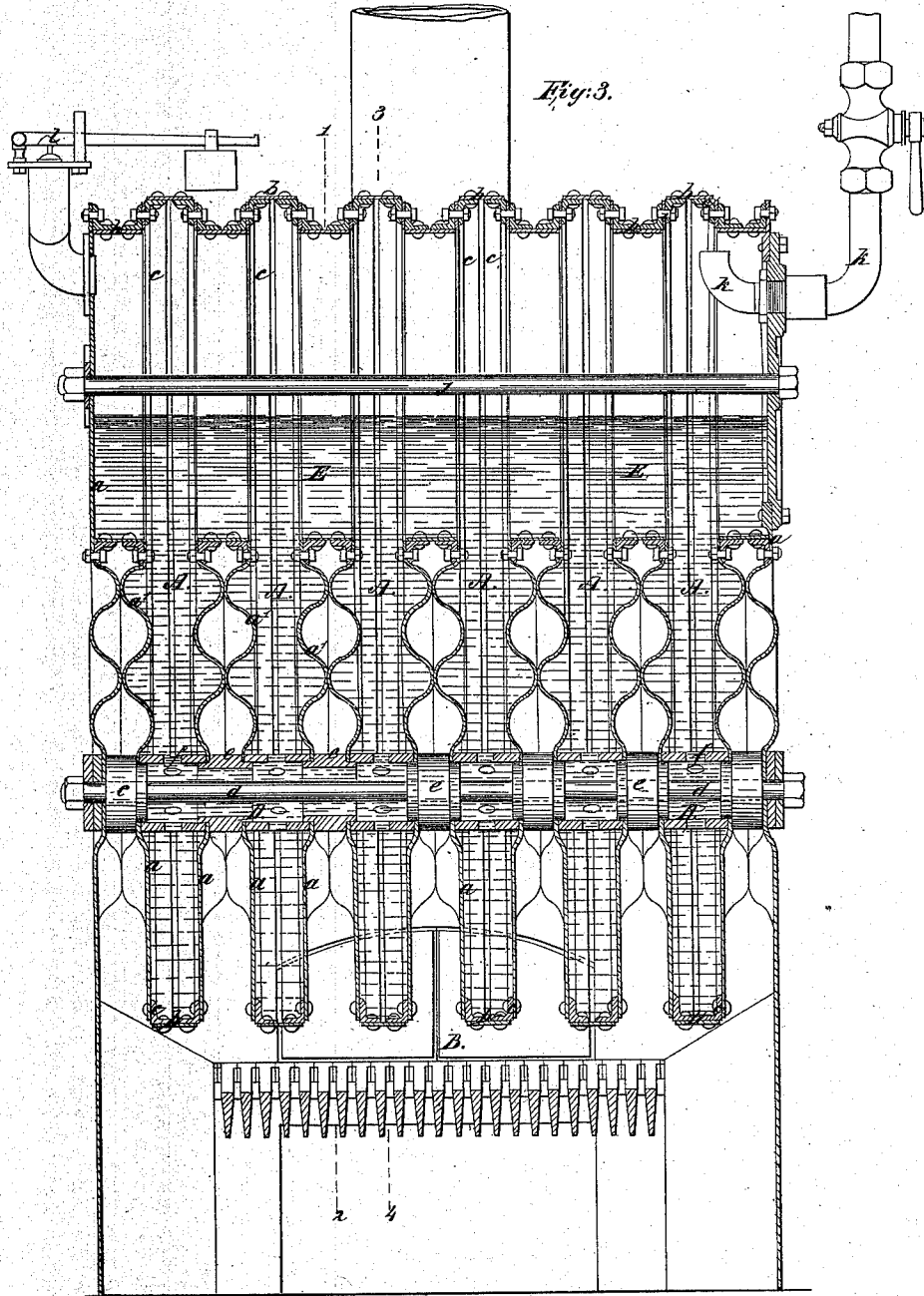
*Hobbes  
W. Paul*

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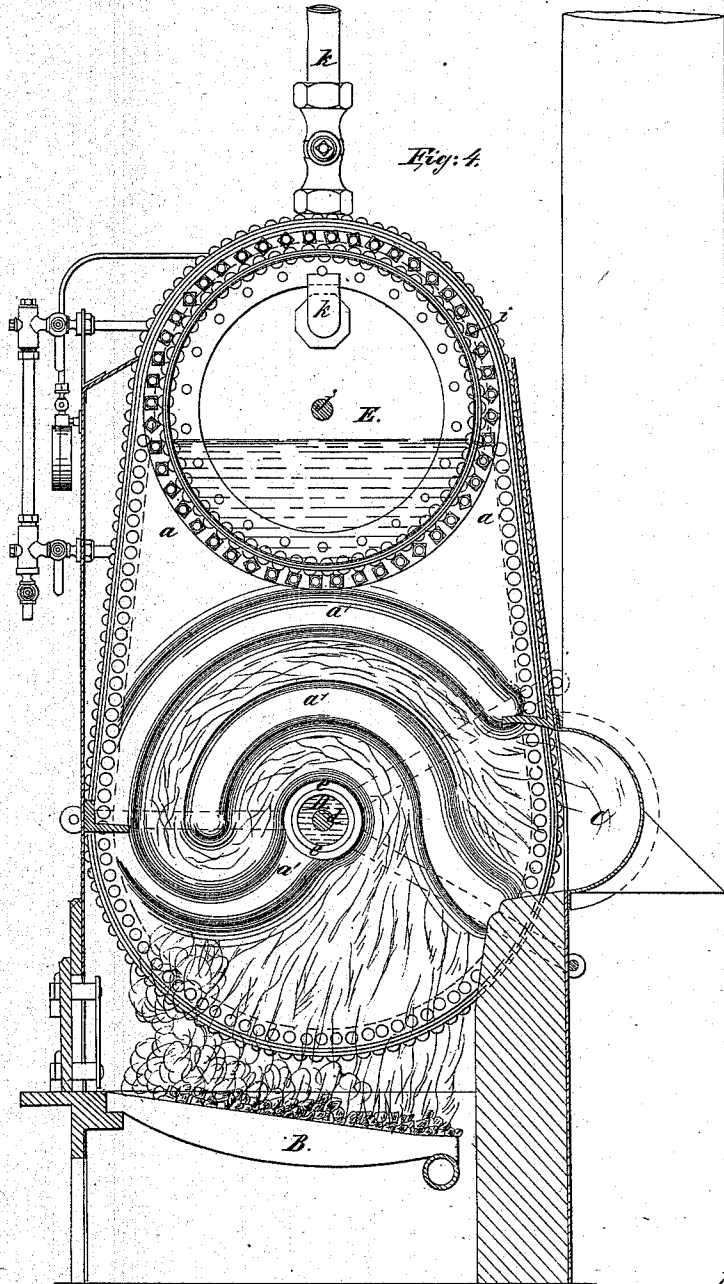
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Witnesses:

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J. A. Jaques*

Inventors:

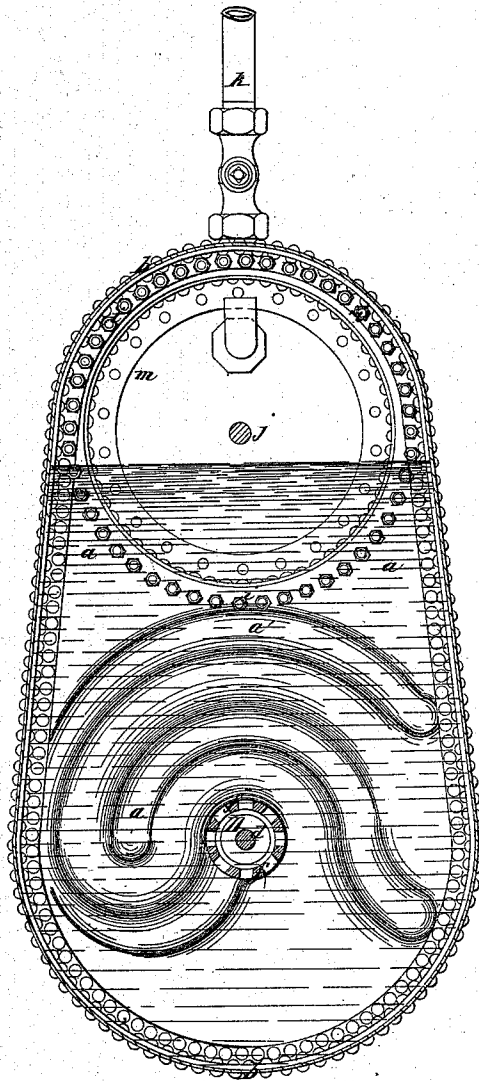
*J. A. Fanshawe  
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Attys*

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*Fig. 5.*



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*Inventor:*  
*J. A. Fanshawe*  
*J. A. Jaques*  
*by*  
*Munn & Co.*  
*Attys.*

# UNITED STATES PATENT OFFICE.

JOHN A. FANSHAW AND JAMES A. JAQUES, OF TOTTENHAM, COUNTY OF MIDDLESEX, ENGLAND.

## IMPROVED STEAM-GENERATOR.

Specification forming part of Letters Patent No. 35,595, dated June 17, 1862.

### *To all whom it may concern:*

Be it known that we, JOHN AMERICUS FANSHAW, of Tottenham, in the county of Middlesex, in that part of the United Kingdom of Great Britain and Ireland known as England, engineer, and JAMES ARCHIBALD JAQUES, of the same place, chemist, have invented new Improvements in the Construction of Steam-Generators, (for which Letters Patent were granted in Great Britain bearing date the 31st day of October, 1861,) and we do hereby declare that the following is a full and exact description of our said invention.

Our invention of improvements in the construction of steam-generators has for its object to construct steam-generators in such a manner that they may be made much stronger than heretofore. The water-spaces and flues or smoke-passages are also so arranged and combined that as much as possible of the caloric contained in the heated gases that are evolved from the ignited fuel may be absorbed by the water contained in the generator, so that a considerable economy of fuel may be effected.

To this end the generator is subdivided into several narrow water-compartments, between which flues of a convolute or serpentine form are arranged, so that the heat may be absorbed from the gases as they pass from the fire-place through the convolute or serpentine flues to the chimney. The flues or passages for the heated gases may be formed of narrow widths of wrought or plate iron rolled up into a convolute or serpentine form, and when they are placed between the narrow water-spaces (of which there may be any convenient number, according to the size or capacity which it is desired to give to the boiler) the narrow water-spaces, with the convolute or serpentine flues or passages between them, are firmly bolted together, or are secured in a suitable framing; or, if preferred, the plates *a* may be bulged out or corrugated at certain parts, so that when brought together they will form passages or spaces along which the gases from the fire-place may be conducted. By this means a greatly-increased length of flue is obtained and more time than usual is allowed for the water to absorb the heat from the gases as they pass from the fire to the chimney. The fur-

nace is placed either below or at the side of the generator, so that the flame and heated gases therefrom may be conducted with facility into the convolute or serpentine flues, and while traversing these flues will part with their caloric and will issue, at a greatly-reduced temperature, into a flue that is common to all, and from whence they may be conducted direct to the chimney or passed through a pipe placed in the steam space above. By adopting this latter arrangement the steam in the steam-space will become superheated by the heat given off from the flue, and the gases (reduced in temperature) will ultimately escape into the atmosphere. The narrow water-spaces are constructed of such form and dimensions as to have a steam-space at their upper parts, and this steam space may be made to communicate with a common steam-chamber, through which the exit-flue of the furnace may be conducted, if desired.

In the accompanying drawings, Figure 1, Sheet I, is an end elevation of one of our improved steam-generators. Fig. 2 is a side elevation of the same. Fig. 3, Sheet II, is a longitudinal vertical section of the boiler. Fig. 4 is a transverse vertical section in the line 1 2 of Fig. 3, and Fig. 5 is a similar view taken in the line 3 4 of Fig. 3.

The boiler is composed of a series of narrow compartments, *A A A A*, which are the water-spaces. These compartments are composed of side plates, *a a a a' a' a'*, and narrow rings *b b b*, which pass all round the compartments *A*, and are secured to the side plates, *a a a'*, by means of angle-iron *c c* and rivets, as seen in Figs. 3 and 5.

The side plates, *a a*, are corrugated at the lower part at *a' a'*, so that when two compartments *A A* are brought together, as shown in the drawings, the corrugated parts will form a curved convolute or serpentine flue or passage for the gases from the furnace or fire-place *B* to the common exit-flue *C*. A central hole, *D*, is made through all the compartments, and through this hole is passed a solid or tubular tie-rod, *d*, provided with screw-nuts at one or both ends, so that by screwing up the nuts on the tie-rod all the compartments *A* may be held tightly together. The external spaces between the holes or openings in the compart-

ments are filled up by hollow rings *ee*, through which the tie-rod *d* passes, and the internal spaces round the tie-rod are made good by other rings *ff*, which are perforated all round, so as to allow the water from one compartment *A* to flow into the next, and so on throughout the series, in order that a proper circulation of water may be kept up throughout the boiler.

If desired, the tie-rod *d* may be made tubular and branch tubes therefrom may be made to dip nearly to the bottom of each water-space, so as to keep up a circulation of water in the lower parts of the compartments, and prevent the accumulation of sediment or solid matters which would otherwise form an incrustation in the boiler, or, if desired, the boiler may be supplied with water through the tubular tie-rod.

The upper parts of the compartments *A A*, together with the intervening spaces *E* between the several compartments, are made to form one large water-space from end to end of the boiler, and common to all the compartments *A* by forming large circular openings in the sides of the latter, as shown in the sectional view, Figs. 4 and 5. The intervening spaces *E* between the compartments *A* are closed by means of wrought-iron rings *h h*, which are secured to the sides *a a* of the water-spaces by means of angle-iron and rivets and bolts *ii*, as seen in Figs. 3, 4, and 5. The upper parts of the compartments *A* are further held together and strengthened by the longitudinal tie-rod *j*, which extends from end to end of the boiler and is secured upon the end plates by screw-nuts, as shown in the drawings. A considerable space above the water-level is left for steam, as shown in the sectional views; but in addition to this we sometimes propose to place a steam-chamber above the boiler, and

instead of allowing the heated gases from the furnace to pass direct into the chimney, and from thence into the atmosphere, we conduct them along a return flue, which is placed in the steam-space above the boiler, in order to dry and superheat the steam before it is allowed to pass to the working-cylinder. When no additional steam-chamber is employed, a steam-pipe, *k*, provided with suitable stop-cocks, is adapted to the end plate of the boiler, as seen in Figs. 3, 4, and 5. A safety-valve, *l*, is adapted to a steam-pipe fixed in the end plate at the opposite end of the boiler.

When it is desired to obtain access to the interior of the boiler, the tie-rod *j* may be loosened and the man-hole cover on one of the end plates removed. A man can then get inside and can remove the nuts *i* of any of the compartments *A*, so that the latter may be taken out, if required, after removing the tie-rods *d* and *j*.

What we claim as our invention, and desire to secure by Letters Patent of the United States of America, is—

The constructing of steam-boilers with a series of distinct narrow water spaces or compartments combined together side by side and having provided between them convolute, curved, or serpentine flues or fire and gas passages, substantially as herein specified.

In witness whereof we, the said JOHN AMERICUS FANSHAWE and JAMES ARCHIBALD JAQUES, have hereunto set our hands and seals the 15th day of March, in the year of our Lord 1862.

JOHN A. FANSHAWE. [L. S.]  
JAS. A. JAQUES. [L. S.]

Witnesses:

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