

PAIGE & REYNOLDS.
Steam Heater.

No. 103,492.

Patented May 24, 1870.

Fig 1.

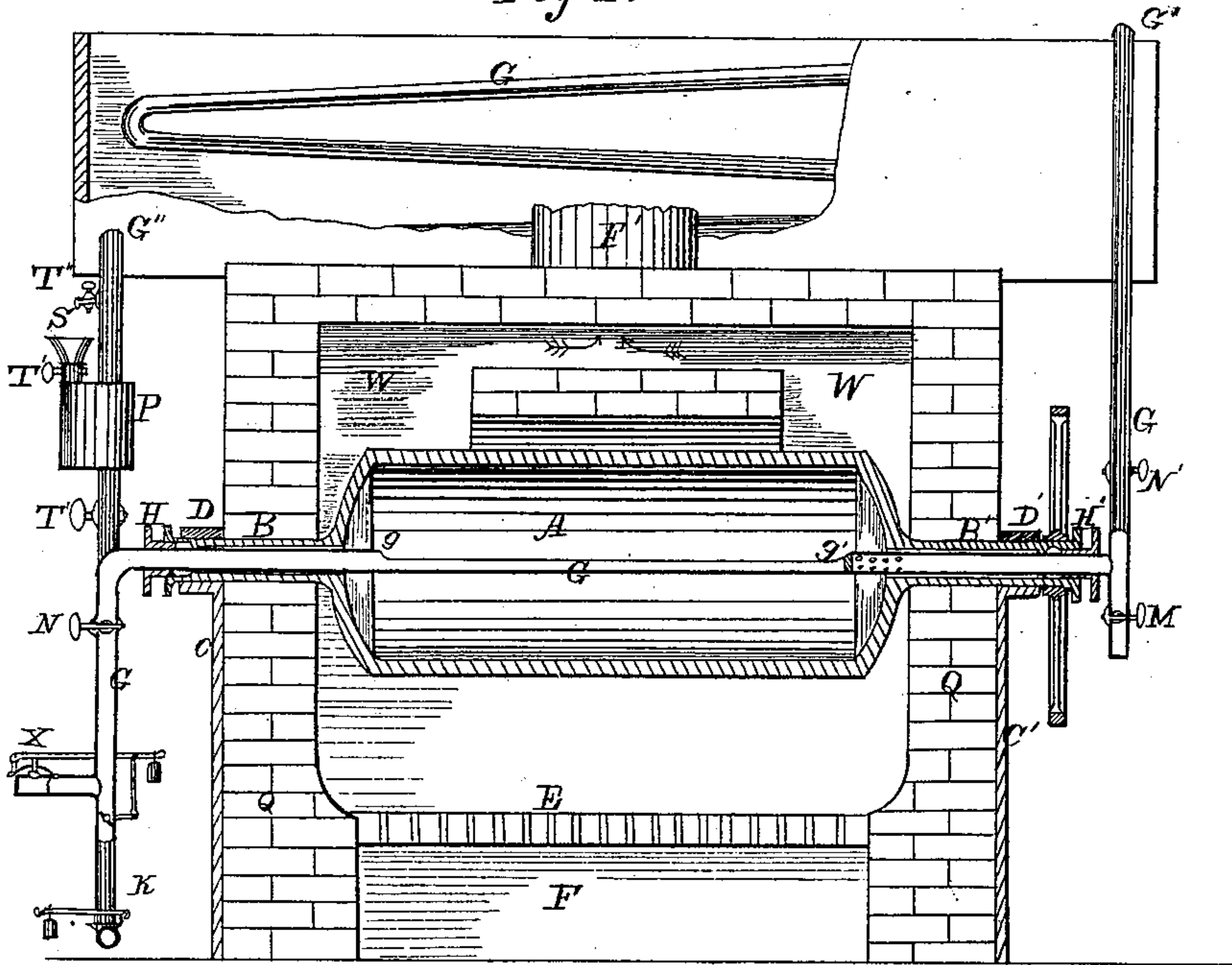


Fig 2.

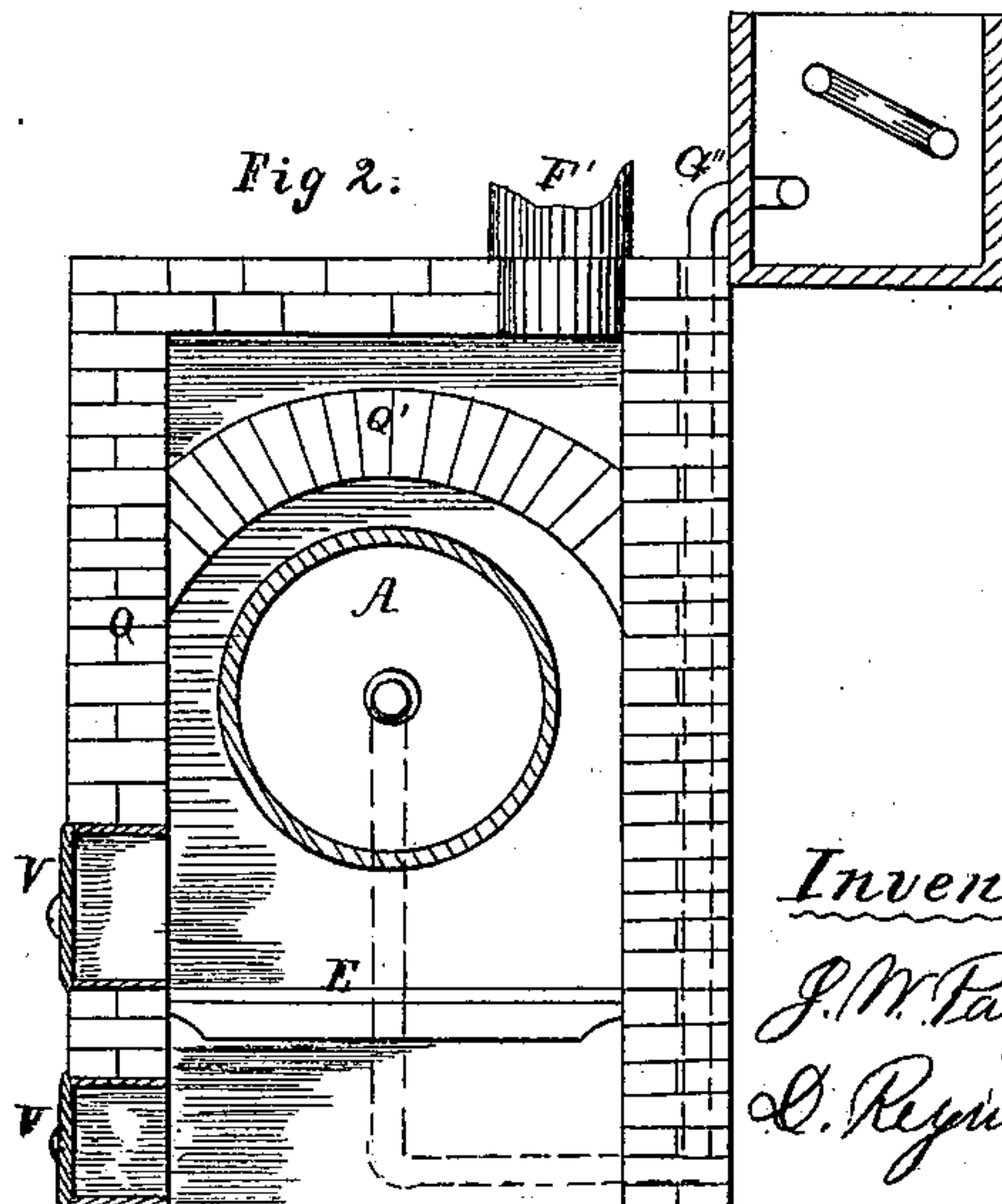
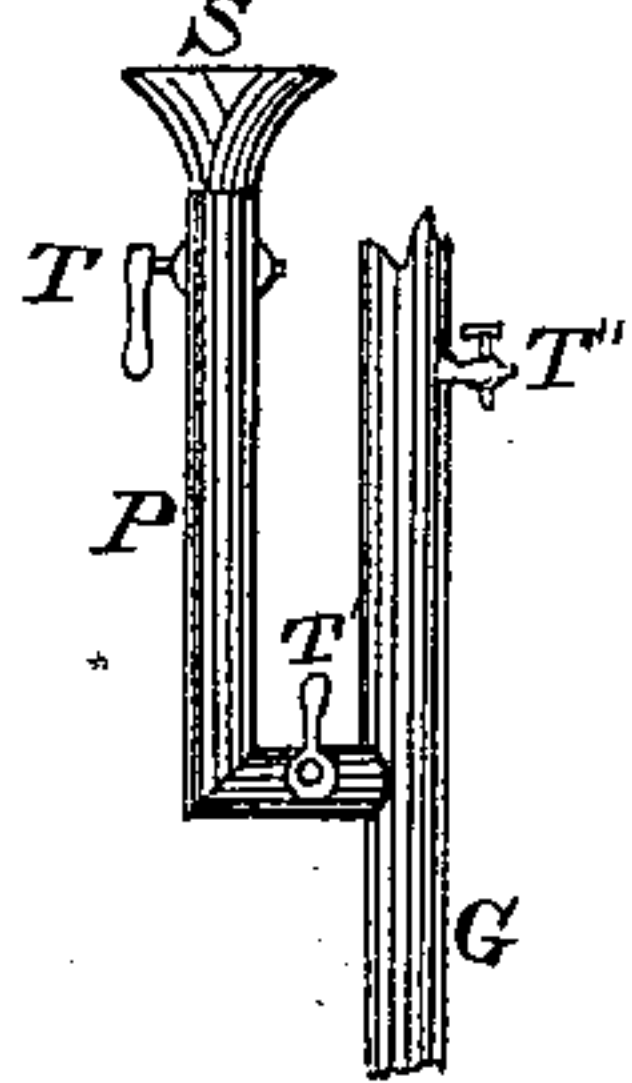


Fig 3.



Witnesses:
Chauncey New
W. C. Bowley

Inventors:

J. M. Paige

L. Reynolds

Per
W. S. Soughborough & Co.
Attys

United States Patent Office.

JAMES W. PAIGE, OF ROCHESTER, AND DEXTER REYNOLDS, OF ALBANY,
NEW YORK.

Letters Patent No. 103,492, dated May 24, 1870.

BOILER FOR STEAM HEATERS.

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

We, JAMES W. PAIGE, of the city of Rochester, county of Monroe and State of New York, and DEXTER REYNOLDS, of the city of Albany, county of Albany and State of New York, have invented a certain Improvement in Steam Heating-Boilers, of which the following is a specification.

Our invention relates to that class of steam-generators applicable solely to heating purposes, and consists mainly in a combination of a revolving generator with a circuit of radiating-pipe and suitable cocks and valves to operate the same, and in which the pressure is limited by the amount of water employed, and in working the same water is alternately converted into steam and condensed.

In the drawings—

Figure 1 is a vertical longitudinal section of our invention.

Figure 2 is a vertical transverse section of the same.

Figure 3 is an elevation of another form of reservoir P and its connections.

A, fig. 1, is a hollow cylindrical vessel, with heads made of any metal or combination of metals, but preferably of rolled iron, provided with hollow trunnions B B', secured to the heads, and extending through the brick-work Q, and supported outside of such brick-work on standards C C', provided with boxes or friction-rollers D D', so that the cylinder may revolve thereupon horizontally, or nearly so.

The brick-work Q incloses the cylinder as in a furnace, E being the grate, F the ash-pit below the grate, and W the flues, taking off the products of combustion to the chimney.

The trunnions B B', at their outer-ends, are provided with stuffing-boxes H H', which revolve with the trunnions and cylinder.

Through the stuffing-boxes H H' and trunnions B B' passes a pipe, G, which is part of the circuit of pipe through which steam is passed to heat any building, space, or vessel of liquid desired.

The part of such pipe between the points *g g'*, within the cylinder, has its upper half section, or more or less, removed and fitted with a plug at *g'*, or other arrangement for closing the pipe G at *g'*, so as to form a gutter or trough between *g* and *g'*. Beyond this division openings are made in the pipe G, to permit the passage of steam thereto, and its escape thereby, from the cylinder A. The gutter or trough thus formed may, if desired, have its bottom and sides pierced with holes, for the more even or more speedy discharge of water therefrom.

After leaving the stuffing-box H a short distance, the pipe G is bent down and up, as shown in fig. 1, and at the bottom of the bend is fitted with an overflow-valve, K, designed not to regulate or control, but to

limit the supply of water introduced, to just sufficient, when expanded into steam at the pressure at which this valve is set, to fill the pipe G throughout its whole extent, including the cylinder A and reservoir P, (which cylinder and reservoir form, in fact, part of the circuit of such pipe G,) excepting, however, the cubical contents of the pipe G below the point where it enters the trunnion B, as this part of the pipe G is always filled with water.

The pipe G, at any point above the bottom of that part thereof which passes through the trunnion B, is provided with a reservoir, P, which may be fitted with a funnel-shaped mouth, S, through which water may be introduced, and the cock T thereto to be opened when it is desired to introduce water into G.

The cock T' can be used when it is desired to supply water, while the pipe G is filled with steam, by shutting T', and, with T open, filling the space between T and T', then closing T and opening T'.

The valve T'' on the pipe G permits the escape of air.

As the amount of water required for use is small, instead of the reservoir P the pipe G may itself be enlarged, or a sufficient length used as such reservoir, and fitted with the necessary appliances.

The pipe G from G' passes through the material to be heated, and is then united at G''.

The pipe G, just before entering the stuffing-box H, is provided with a stop-cock, N, and after leaving the stuffing-box H, with a stop-cock, N', the former to permit or prevent the passage of water to, and the latter the passage of steam from the cylinder, and the pipe G may be bent down with a branch just beyond the cock N', and such branch provided with a cock, M, to allow of the discharge of any condensed water flowing that way between the cock N' and the material to be heated.

A weighted diaphragm, X, may be placed, as in fig. 1, at any point in the bend of G below the point where it enters the trunnion B, and so adjusted that, when the heat under the cylinder A is diminished, it will shut off and lessen the supply of water thereto, thereby preventing the passage of water to the cylinder A faster than it can at once be converted into steam, preventing an accumulation of water therein to affect injuriously its economic working, and that, as the heat under the cylinder is increased, it will permit a greater supply of water thereto, up to, but not beyond, a given desired pressure, at which point it will again close and prevent the admission of an excess of water, whereby the pressure would be increased. As diminishing the extent of the circuit has the same effect to increase the pressure within the cylinder A as to increase the water, leaving the extent of circuit the same, it follows that, where the circuit-pipe G being

used to heat several rooms or vessels of water, and it is desired to shut off the steam from one or more of them, this latter adjustment will come into play to keep the pressure the same for the reduced circuit, so that it cannot exceed the amount fixed for all, and yet, when the circuit is again enlarged, it will again maintain the same former pressure for all, whereas, if only the overflow-valve were used, set at the given pressure, when the circuit was diminished the surplus water over what was sufficient, when converted into steam, to maintain the pressure in the diminished circuit, would be discharged, and would have to be again supplied at S, to restore the same pressure for the circuit when enlarged.

The cylinder A may be revolved by clock-work and weights or springs, or any suitable means, other than by power derived from the generator itself, the object of such revolution being to heat the cylinder evenly on all sides, and prevent its being strained by unequal expansion and contraction.

In fig. 2 V is the door for the introduction of fuel, V' the door to the ash-pit, Q' the end of the arch over the cylinder A, F' the chimney, the other parts lettered as in fig. 1.

The method of operating the apparatus will be as follows:

Take, for example, a pressure of thirty pounds steam to the inch, which, as the steam can be greatly superheated, will do any work required in heating, boiling, or evaporating as well as other boilers at one hundred pounds pressure. Set the diaphragm to close off the supply of water at thirty pounds pressure, and the overflow-valve to discharge at a little higher pressure, say forty-five pounds, the reason for this excess having been explained when speaking of the diaphragm. Close the cocks M, N, and T', leaving open N' and T; introduce at S water to the amount of, or slightly in excess of one eighth hundred and eighty-third part of the cubical contents of the circuit-pipe G, including the reservoir P and cylinder A, less that part of G in the bend below the point where it passes into the trunnion B, and, in addition, sufficient water to fill this bend. Set the cylinder A revolving, and start the fire under it, and, when it has become sufficiently heated, open the cocks T' and N slightly, to allow the admission of water to the cylinder A, which, if sufficiently heated, the water, as introduced, will be at once flashed into steam, and issuing from the cylinder by the pipe G, through the holes provided therefor beyond the plug or cut-off g', will pass through the circuit, driving the air in the pipe G before it, which is allowed to escape by opening the valve T". The cocks N and T' can then be opened wide, and the steam, as it passes through that part of G surrounded by the air or liquid to be heated, will be condensed, and the pipe G being properly arranged, the condensed water will flow back to the reservoir P, and from thence again to the cylinder A, where it will be reconverted into steam, and

pass on as before, to be again condensed. When it is desired to cease operations, the cocks N and N' should be closed and M opened, and the fire slackened or put out.

It is well known that large numbers of boilers are now used to generate steam, not for motive-power, but simply for heating buildings, dry rooms, and for boiling or evaporating the liquids in salt-works, breweries, distilleries, sugar-refineries, &c., and the object of this invention is to replace such boilers, which are so liable to destructive explosions, by an apparatus absolutely proof against explosions, while, at the same time, more effective and more economical and simple in construction and working.

The principles on which this invention is based, and by which it is claimed these results are obtained, are—

First, that a given amount of water, converted into steam, occupies at different pressures certain fixed spaces.

Second, that this steam can be superheated, away from the presence of water, to any degree of temperature, with comparatively but slight increase of pressure.

Third, that the nearer the water to be converted into steam is to 212°, the more rapidly and economically it can be converted into steam.

As where steam is used for motive power it must be allowed to escape, and as in this invention it is proposed to allow none, or as little as possible, to escape, it follows that this apparatus cannot be used for motive power, but only for heating purposes.

We are aware that revolving boilers have been heretofore used for generating steam, and that such an apparatus has been patented by Thomas and Thomas H. Mitchell, in a patent dated May 21, 1867, and numbered 64,895. It will be observed, however, that we do not use or claim any part claimed by them, or any combination used or claimed by them, nor are their arrangements of any use in our invention, the action of which is based on different principles.

We do not mean to claim or to confine ourselves to any particular material for, or size, form, shape, or position of generator A, reservoir P, and pipe G, or the position, number, or character of the valves or cocks to be employed, where these can be varied to any extent and still produce the same results; but

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

A revolving generator, A, and reservoir P, or its equivalent, forming part of a circuit of pipe G and in connection therewith, and the necessary stop-cocks or valves, when constructed and adjusted to operate substantially in the manner and for the purposes herein set forth.

JAS. W. PAIGE.
DEXTER REYNOLDS.

Witnesses:

CHAUNCEY NASH,
F. H. CLEMENT.