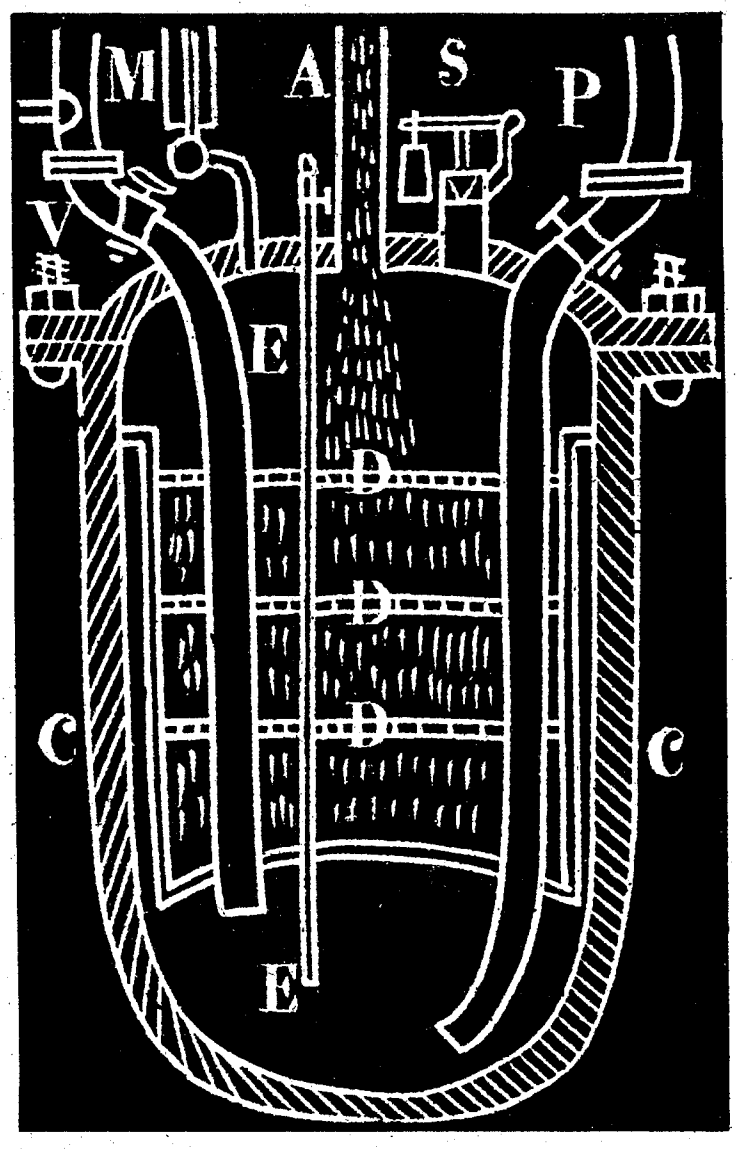
J. B. MOINIER & P. H. BOUTIGNY.

METHOD OF GENERATING STEAM.

No. 9,952. PATENTED AUG. 23, 1853.



Taken from Patent Office Report
Vol. of 1853.
Only Drawing Accessible (1913)

UNITED STATES PATENT OFFICE.

JEAN BAPTISTE MOINIER AND PIERRE HIPPOLITE BOUTIGNY, OF PARIS, FRANCE.

IMPROVED METHOD OF GENERATING STEAM.

Specification forming part of Letters Patent No. **9,952**, dated August 23, 1853.

To all whom it may concern:

Be it known that we, JEAN BAPTISTE MOINIER and PIERRE HIPPOLITE BOUTIGNY, both of Paris, France, have invented a new and useful Method of Forming Steam-Generators, which we entitle the "Diaphragmatic and Spheroidalized Steam-Generator," and which can be used either as a motive power or as a vehicle of heat; and the following is a clear description of the same, reference being had to the accompanying drawings, and to the letters of reference thereon.

The nature of our invention consists in so forming the generator as to cause a direct production of steam at high temperatures, (500° and upward,) by means of injecting water at the top or near the top of the generator when the same is in a heated state, and causing the water to come in small quantities in contact with the surfaces of perforated metallic diaphragms, (placed within the generator,) and also to come in contact with the sides of the generator, so as to increase the evaporating-surface of the generator.

To enable others to make and use our invention, it will be necessary to be somewhat elaborate in the description. The following is the basis of the new system of generators.

If water is thrown in small quantities into a recipient of which one part—the bottom, for instance—has been previously heated to a temperature of 600° or 700° (dark-red heat) and the other parts to a temperature of less than 212° Fahrenheit, it is remarked that the water which touches the latter parts is changed immediately into steam, while that which is at the bottom of the vessel passes into the spheroidal state. In this state the water always takes a temperature lower than that of its boiling state, whatever may be the temperature of the bottom of the vessel. It evaporates less quickly than by boiling in the ordinary liquid state, and the steam is disengaged at the temperature of the bottom, where it has become spheroidalized. If the heated recipient is hermetically closed, the total mass of steam equalizes its temperature with that of the sides, and the moment of the equalization of the temperature is accelerated by the continuous production of the steam of the spheroids formed at the bottom of the recipient, and which, as we have said, possesses the same elevated temperature. Such are, among a thousand others, the facts which have been observed by one of us and which have indicated to us the new conditions in which we are placed in order to generate steam at a high pressure and temperature for manufacturing purposes. The deductions from this experience are—

First. That as a considerable number of "calorics and dynamics" can be inserted in a comparatively small volume of steam by means of the high temperature and pressure which can be given to it in a very hot vessel, generators constructed on the aforesaid principle may be very small. (Ten times smaller than the boilers now in use.)

Second. That the steam produced by boiling in a small generator and the steam formed upon such of its sides as are heated to less than 212° can be raised to the highest temperature and pressure, first, by the radiation from the sides heated to a temperature of more than 212°, and, second, by the vapor of the spheroids, which is an addition to that of the heated surface.

Third. That the spheroidalized water evaporating less quickly than liquid water it is necessary to have in a given time a sufficient quantity of steam to prevent the water from arriving immediately to the bottom of the generator, the temperature of which is always above 212°. With this view it must be made to pass over intermediate surfaces in the interior of the generator, in order that in this passage and in a very hot medium the steam from boiling may be produced in abundance, and that only a small quantity of water may arrive at the bottom. By these means an abundance of steam is obtained from boiling and a high temperature from the radiation of the surfaces of the generator.

Fourth. That the whole problem consists in making the water arrive by small quantities into the generator, which has been previously heated to more than 212°. From the necessity of not storing any water in the boilers there results all the advantages of the application of the general principle of the least action.

This summary exposition will suffice to make the subjoined plans of our generator understood.

The difficulties attending large boilers and danger of explosions are overcome by the means of our diaphragmatic generator. Being of very small dimensions, it may possess great solidity, and it is furnished with preservative apparatus very efficacious, which renders it truly inexplosible. Furthermore, it contains but little water, so that but a small quantity of steam can work instantaneously, which escapes easily by the valve. We repeat, then, that this generator is inexplosible.

The following table will explain the drawings which accompany this specification.

A is the feeding-pipe.

C is a boiler having about twenty-six inches in depth in the center and thirteen inches in diameter.

D are diaphragms of punctured sheet-iron alternately convex and concave.

E is a test-pipe to be opened occasionally. When it yields steam, all is right; but if it yield water it shows that the water-supply is too abundant. In the latter case the supply must be diminished by closing the receiving-cock or by contracting the action of the feeding-pump, &c.; or the excess of water may be disposed of by opening the purger.

M is a steam-gage.

P is a purger or snifting valve for discharging the water when the boiler is to be cleaned, or to decrease the quantity of water.

S is a safety-valve.

V is the mouth of steam-boiler, as it shows. This opens nearly at the bottom of the boiler. This arrangement causes the safety of the apparatus, and affords the best results by forcing the steam which is formed in the upper part of the boiler to kiss the sides and the bottom of the boiler before producing its useful effect.

Generally we construct our boiler of a cylindrical form, its depth being twice its diameter and having the bottom semi-spherical, in order to prevent a larger surface to the action of the fire. The diaphragms D D D are usually placed horizontally across the boiler, and are held in their proper places by an iron frame-work extending downward from the inside of the boiler top or cover, or they may be supported (and which is perhaps the preferable way) by projections or steps on the inner sides of the boiler itself. These diaphragms, when placed horizontally, are alternately convex and concave, thereby offering the greatest surface for causing quick and effectual evaporation. We generally make use of three pairs, or half a dozen, though this number may be increased or diminished. The test-pipe E is of small diameter—say half an inch—and passes through the several diaphragms down nearly to the bottom of the boiler. The steam-gage M only passes through the boiler top or cover, that being sufficient to enable it correctly and fully to perform its functions. The purger or snifting valve P passes also down to the bottom of the boiler, and has its lower end bent of the same curve with the bottom of the boiler, in order that it may the better and more effectually decrease or discharge the water in the boiler. The mouth V of the boiler, or the tube by which the steam is transmitted for use, extends about two-thirds of the way to the bottom of the boiler, thereby insuring the safety of the boiler, as before stated, by forcing the steam to kiss or be brought in contact with the sides and bottom of the boiler before being discharged.

The manner of using our boiler is very simple. It is first heated with but little or any water in it. When the fire is first lighted, about a quart of water is introduced into the boiler by means of a hand-pump. This water penetrates the boiler by means of the pipe or cock A, placed in the center of the cover, and falls on the first diaphragm, by which it is scattered and evaporated. What is not evaporated on the first falls on the second, and from the second to the third, &c., the surplus, if there be any, falling upon the bottom.

When the water has been thus introduced, the boiler is put in connection with the steam-gage, and when this is observed to stop mounting a fresh quantity of water is added for the production of additional steam. When the gage shows a pressure of from five to eight atmospheres, the machine is put in train for heating the cylinder and for working. Ordinarily from three-quarters of an hour to an hour are necessary to get in operation, after which the boiler is supplied by means of a force and lift pump, or any other mechanical arrangement worked by the engine or machine. A boiler of the size before described usually evaporates from eight to nine gallons of water per hour, under the pressure of from five to ten atmospheres. The number of revolutions of the fly-wheel being known, it is easy to calculate the volume of water which must be raised by the pump to supply the above quantity of water and not exceed it. The state of the level of the water is ascertainable by means of the test-cock E, and the superfluous quantity of water may be discharged by the purger P. The feeding of the boiler should be continuous, and the boiler should never contain but a small quantity of water, nor can it, as the mouth of the boiler or boiler-tube V opens near the bottom of the boiler or steam-generator.

The essential feature of our boiler is that it yields a large quantity of steam, which is actually the case, the boiler, when contrived as before set forth and described, generating available steam, when compared with the old kind of boilers, to an extent of from three to five times greater.

We do not confine ourselves to the proportions here indicated for the generator. They can be modified in various ways. The diameter may be increased and the height diminished, and vice versa. Our generator

may also be inclined, and even placed horizontally. In this case the diaphragms or false circular bottoms become elliptic or even rectangular, placed one upon the other, or as shelves.

What we claim as our invention, and desire to secure by Letters Patent in generators for generating steam at high temperatures from water introduced into the generator when in a highly-heated state, is—

Injecting or introducing water from the top or near the top of the generator when this mode of feeding or introducing the water is combined with the series of perforated metallic diaphragms described, arranged one above another in the generator, so as to subdivide the water and at the same time increase the evaporating-surface of the generator, substantially as described, the water being gradually heated and subdivided in its passage through the apertures or meshes of the diaphragms before it comes in contact with the more highly-heated surface of the generator, substantially as described.

JE. BTE. MOINIER.
PIERRE H. BOUTIGNY.

Witness to the signature of J. B. Moinier:
W. S. CHASE.
Witness to the signature of P. H. Boutigny:
JAMES M. CURLEY,
U. S. Consular Agent, London.