

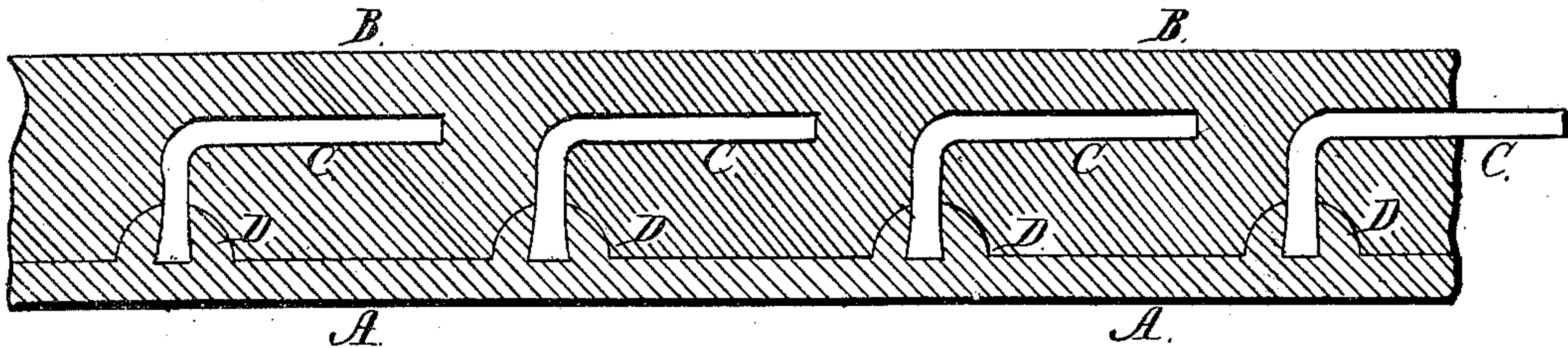
*J. Cochran.*

*Gas Retort.*

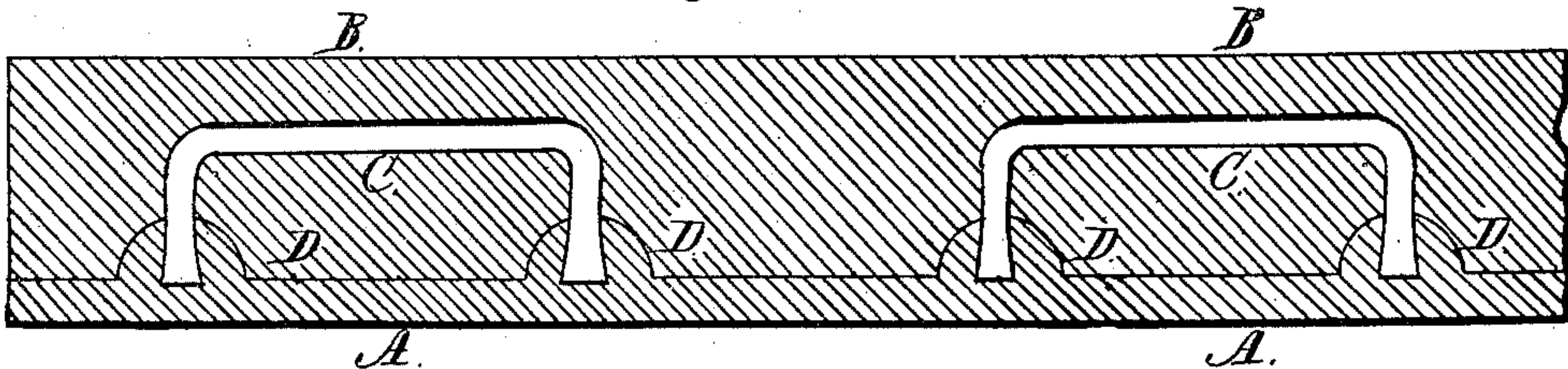
*N<sup>o</sup> 94,714.*

*Patented Sept. 14, 1869.*

*Fig. 1.*



*Fig. 2.*



*Witnesses:*

*Edward Lyon Jr*

*James Hunter*

*Inventor:*

*John Cochran*



# United States Patent Office.

JOHN COCHRANE, OF NEW YORK, N. Y.

Letters Patent No. 94,714, dated September 14, 1869.

## IMPROVED COMPOSITE GAS-RETORT.

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

*To all whom it may concern :*

Be it known that I, JOHN COCHRANE, of the city and county of New York, and State of New York, have invented a new and useful Improvement in the Construction of Retorts for the Manufacture of Coal-Gas and other purposes; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, making part of this specification.

The object of my invention is to make a tight and durable retort, using for that purpose iron and fire-clay in combination, the iron forming an interior lining, and the fire-clay the exterior covering thereof; and

My improvement relates to the means by which the fire-clay is secured to the iron.

To enable others skilled in the art to make and use my invention, I will proceed to describe the manner of constructing the same.

I make the retort of such size and shape as will suit the purpose to which it is to be applied.

The interior portion A A is a thin cast-iron shell, and forms a metallic lining for the retort, and the exterior portion B B is fire-clay, or other suitable material.

Upon the outer surface of the iron casting A A, I make numerous small protuberances, or hemispherical bosses, D D D, to embrace and hold the feet of the anchors or clamps C C C, which are made of small round bar-iron, bent at right angles near the foot, so as to lie parallel with the surface of the casting, and within the thickness of the fire-clay covering; or they may be rooted or attached to the casting at both ends, as shown at C C C, Figure 2, or they may be T-headed, or of any form or construction that will hold or clamp the clay to the casting.

These anchors or clamps are secured to the retort in the following manner:

The pattern from which the retort is moulded has upon its surface the necessary number of hemispherical bosses D D D, each of which has a deep cavity in the centre, to receive the foot of the anchors, and the anchors being placed in these bosses, are rammed up in the sand or mould, and are left there on withdrawing the pattern, in the manner well known in the art.

On pouring the molten metal into the mould all the anchors are instantly secured in position, and combined with the casting by means of these bosses.

The interior lining A A being cast with its clamps in position, is covered with fire-clay, in a plastic state, to the proper thickness, during which operation the casting is mounted on bearings at its ends in any convenient manner, to permit of rotation on its axis, so as to facilitate the covering and moulding-process. The retorts should then be allowed to dry or harden

in the shade, after which they may be fire-hardened, in the ordinary manner, or they may be placed in the bench and hardened by the heating-fire before or while in use.

The tempering of the clay and the treatment of the retort, after claying, is substantially the same as in the manufacture of fire-brick retorts.

Formerly retorts for the production of coal-gas were exclusively made of cast-iron, but the continued action of the great heat to which they were necessarily exposed while in operation, rapidly destroys the integrity of the iron and causes it to crack into numerous fissures or openings, through which the gas escapes from the retort into the fire-chamber and is wasted.

An iron retort seldom continues perfect for more than three months, but they are generally allowed to remain in use for a longer time before removing them from the fire-chamber, on account of the trouble and expense of reconstructing the bench, notwithstanding the great wastage of gas thus incurred.

In consequence of the inability of cast-iron to resist the action of heat, fire-clay has been resorted to as a material for making retorts, and it has proved much more durable than iron for that purpose; but fire-brick being a porous substance, the gas readily passes through it when new, and will continue to do so till the pores are filled up with the grosser particles that are carried into them by the more subtile elements in their outward passage; in time, however, the adhesion of the material appears to be so reduced by the action of the percolating gases, that numerous cracks occur, which afford a ready exit to the gas.

The wastage from fire-brick retorts, from these causes, notwithstanding their apparent durability, is so great, when compared with the wastage and expense of iron retorts, that many intelligent and careful gas-engineers consider the iron retorts the more economical of the two.

The retort herein described, combining the impermeable properties of the iron with the refractory properties of the fire-brick, must necessarily produce the greatest possible economic result, for it is obvious that there can be no wastage of the gas from such retort, as the iron lining is impervious; and as this iron lining secures the proper form and integrity of the retort, so long as it is protected from the action of the external heat by its fire-brick covering, no cracks or fissures can occur, and consequently no wastage of the gas can take place from the retort while this condition or relation of the parts is maintained, for as the two elements of this composite retort mutually sustain each other, such retort must be more durable and more economical than if composed of either element separately.



The combination of an iron lining with a fire-clay covering has heretofore been essayed, by means of longitudinal metallic straps or flat bars, secured to the retort upon the outside of the clay covering, to hold the clay to the iron, and more recently by the use of numerous small spines cast with and upon the iron lining, by which to pin the clay to the iron; and also by means of numerous holes or openings cast in the iron lining, into which the clay may enter for the purpose of obtaining a hold upon the iron. But all such modes of construction are inferior to that herein described, as I shall briefly point out.

The exterior metallic straps soon burn away under the action of the continued fire-heat to which the retort is necessarily exposed while in operation, leaving the clay to separate and drop off from the iron lining when these supports are destroyed, and thus exposing the iron lining to certain and rapid destruction.

The small spines or thorn-like projections, above referred to, must be very numerous indeed to answer a useful purpose, and being sharp and brittle, such castings are exceedingly difficult to handle or transport, even from the foundry, without receiving great damage from the breaking off of these spines; and the plan of holding the clay to the iron lining by means of holes or openings cast in the lining for that purpose, is manifestly but little better than the common clay retort, as the gases will escape more or less through such holes or openings in the iron lining.

My mode of construction is not only clear of all these defects, but it possesses, in addition, this important commercial advantage: the iron lining, with its wrought-iron clamps complete, may be transported

from the foundry to any distance with perfect safety and may therefore be transported to a remote gas-works, without having the clay covering thereon, at a saving of about two-thirds the freight upon a complete retort, as it may be clayed at such gas-works, and be fire-hardened in position in the bench, by the actual operation of making gas, and thus greatly cheapening the cost of such retorts.

Having thus described the nature and construction of my improvements in retorts, for the production of coal-gas and for other purposes, and shown wherein my mode of construction differs from those plans which have heretofore been essayed to obtain the same result,

What I claim therein as my own invention, and desire to secure by Letters Patent of the United States, is—

1. A retort, for the production of coal-gas, or other purpose, having its interior portion of iron, and its exterior portion of fire-clay or fire-brick, or other refractory substance of analogous character, in which the iron lining and fire-clay covering are combined with each other, in the manner and by the means substantially as described.

2. The hemispherical bosses, or their equivalents, in combination with the anchors or clamps and the interior casting, constructed in the manner and for the purpose substantially as described.

JOHN COCHRANE.

Witnesses:

EDWARD LYON, Jr.,  
JAMES HUNTER.