Specification of Richard Leake and Matthew Sykes : furnaces, &c.;

A.D. 1857 . . . . . N°. 1233.

SPECIFICATION

OF

RICHARD LEAKE AND MATTHEW SYKES.

FURNACES, &c.

LONDON:
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A.D. 1857 . . . . . N° 1233.

Furnaces, &c.

LETTERS PATENT to Richard Leake and Matthew Sykes, both of Barnsley, in the County of York, for the Invention of "IMPROVEMENTS IN CONSUMING SMOKE AND GENERATING HEAT IN FURNACES OF STEAM ENGINE OR OTHER BOILERS, ALSO HEATING THE FEED WATER OF THE SAID BOILERS, THEREFORE ECONOMIZING FUEL TO A GREAT EXTENT."

Sealed the 27th October 1857, and dated the 1st May 1857.

PROVISIONAL SPECIFICATION left by the said Richard Leake and Matthew Sykes at the Office of the Commissioners of Patents, with their Petition, on the 1st May 1857.

We, RICHARD LEAKE and MATTHEW SYKES, both of Barnsley, in the County of York, do hereby declare the nature of the said Invention for "IMPROVEMENTS IN CONSUMING SMOKE AND GENERATING HEAT IN FURNACES OF STEAM ENGINE OR OTHER BOILERS, ALSO HEATING THE FEED WATER OF THE SAID BOILERS, THEREFORE ECONOMIZING FUEL TO A GREAT EXTENT," to be as follows:—

These improvements are proposed to be effected by constructing furnaces in the following manner, and in adapting thereto the following parts, which when separately considered are old, but when combined together as hereafter described and employed for the purposes of this Invention, they are new, and constitute the above mentioned improvements.

As regards the 1st feature of these improvements it consists in separating the "ash-pit" into two parts by building a wall up the centre thereof, and providing the same in front with two doors.

The 2nd feature consists in the use of hollow "dead plates" divided as above stated, and grate bars through which air passes to the "split bridge" of the furnace.

The 3rd feature consists in the use of a series of fire-clay pipes placed behind the "split bridge" for the purpose of separating and infinitely dividing the smoke and small particles, so as to be easily acted upon by the flame from the fire. I propose to employ a "tue-iron" and blower to each of the aforesaid pipes.

The 4th feature consists in adapting a water tank extending the whole length and width of the fire grate, and in constructing the fire box of wrought iron to save the expense of a door frame and fire arch, also to heat the feed water for the boiler.

SPECIFICATION in pursuance of the conditions of the Letters Patent, filed by the said Richard Leake and Matthew Sykes in the Great Seal Patent Office on the 31st October 1857.

TO ALL TO WHOM THESE PRESENTS SHALL COME, we, RICHARD LEAKE and MATTHEW SYKES, both of Barnsley, in the County of York, send greeting.

WHEREAS Her most Excellent Majesty Queen Victoria, by Her Letters Patent, bearing date the First day of May, in the year of our Lord One thousand eight hundred and fifty-seven, in the twentieth year of Her reign, did, for Herself, Her heirs and successors, give and grant unto us, the said Richard Leake and Matthew Sykes, Her special licence that we, the said Richard Leake and Matthew Sykes, our executors, administrators, and assigns, or such others as we, the said Richard Leake and Matthew Sykes, our executors, administrators, and assigns, should at any time agree with and no others, from time to time and at all times thereafter during the term therein expressed, should and lawfully might make, use, exercise, and vend, within the United Kingdom of Great Britain and Ireland, the Channel Islands, and Isle of Man, an Invention for "IMPROVEMENTS IN CONSUMING SMOKE AND GENERATING HEAT IN FURNACES OF STEAM ENGINE OR OTHER BOILERS, ALSO HEATING THE FEED WATER OF THE SAID BOILERS, THEREFORE ECONOMIZING FUEL TO A GREAT EXTENT," upon the condition (amongst others) that we, the said Richard Leake and Matthew Sykes, our executors or administrators, by an instrument in writing under our or their hands and seals, or under the hand and seal of one of us or them, should parti-

cularly describe and ascertain the nature of the said Invention, and in what manner the same was to be performed, and cause the same to be filed in the Great Seal Patent Office within six calendar months next and immediately after the date of the said Letters Patent.

NOW KNOW YE, that we, the said Richard Leake and Matthew Sykes do hereby declare the nature of the said Invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement thereof, that is to say :—

Our improvements are proposed to be effected by constructing furnaces in the following manner, and in adapting thereto the following parts, which when separately considered are old, but when combined together, as hereafter described, and employed for the purposes of this Invention they are new, and constitute our above mentioned improvements.

As regards the first feature of our said improvements it consists in separating the "ash-pit" into two parts by building a wall up the centre thereof, and providing the same in front with two doors.

The second feature consists in the use of hollow "dead plates" divided as above stated, and grate bars through which air passes to the "split bridge" of the furnace.

The third feature consists in the use of a series of fire-clay pipes, either square or round, and of any length or diameter of bore, and placed either before or behind the "split bridge" for the purpose of separating and infinitely dividing the smoke into small particles, so as to be easily acted upon by the flame from the fire. We propose to employ a "tue-iron" and blower to each of the aforesaid pipes.

The fourth feature consists in adapting a water tank extending the whole length and width of the fire grate, and in constructing the fire box of wrought iron to save the expense of a door frame and fire arch, also to heat the feed water for the boiler.

In order to explain our said improvements as completely as possible, we now proceed to describe the best means we are acquainted with for carrying the same into practical effect, reference being had to the illustrative Sheets of Drawings hereunto annexed, and to the numeral figures and letters of reference marked thereon, respectively as follows :—

Description of the Drawings.

At Sheet I., Figure 1 is a side elevation of a two-flued cylinder steam boiler, showing our said improvements attached thereto; Figure 2, a longitudinal and vertical section thereof; Figure 3, a horizontal section on the line A, B, at

Figure 2; Figures 4 and 5 are transverse and vertical sections, respectively taken through the lines C, D, and E, F, at Figures 1 and 2; Figure 6 is a front elevation of Figures 1 and 2.

At Sheet 2, Figure 7 exhibits a longitudinal and vertical section of a multitubular boiler with our said improvements adapted thereto; Figure 8, a horizontal section on the line G, H, at Figures 7 and 9; Figures 9 and 10 respectively exhibit sections taken on the lines I, K, and L, M, at Figure 7, through the fire box and tubes; Figure 11 is a front elevation of Figure 7. At each of the foregoing Figures of each Sheet of Drawings, we employ similar letters of reference to denote corresponding parts in so far as such parts appear or can be seen at each of such said Figures respectively.

At Sheet 1, A is a cylindrical steam boiler with our improvements attached thereto for consuming smoke. The Drawing at Figure 6 shows the "ash-pit" closed by two doors B, C; above are the dead plates D and E, which are formed hollow to allow the air to pass through them into the grate bars G (which are also formed hollow) into the back dead plates E, which form the under part of one side of the bridge I; the said bridge is also formed hollow, with a slit or opening along the entire length thereof. The fire box K, together with the fire doors K^1 attached thereto, are placed on the top of the front dead plates, and are designed to save the expense of the ordinary fire doors and frame, and also to save a fire-brick arch, which is necessary to separate the fire from the flues if it be a fluid boiler, and also to heat the feed water before it enters the boiler, by which a great saving of fuel will be effected. L is an iron tank to contain water, said tank being made about the same length and width as the fire grate of the furnace; upon the bottom of this said tank the heat from the fire acts; the tank may either be open or closed at top. The foregoing arrangements are equally applicable to multitubular boilers or other boilers made with internal fire boxes, as exhibited at Sheet 2 of the annexed Drawings, the several parts whereof are distinguished by similar letters of reference to those at Sheet 1.

We would here observe, that for boilers made with internal fire boxes, we consider a bridge of the construction exhibited at Figures 7 and 8 of Sheet 2 would answer well. The opening marked *a* at Figures 10 and 11 is for establishing a steam communication between the boiler and the tank or fire box L, and the openings marked *b*, *b*, at these said Figures are for the water communication. The reason for thus economizing the heat from the fire is, that generally in practice there is not sufficient area of fire grate or ash-pit, and the draft being therefore very short, a great portion of the heat passes into the chimney and is lost; and as it has been found that about one-third of the

heat is expended to raise the feed water to the boiling point, the extra expense of and space occupied by our improved method of heating the feed water is unimportant, seeing that the wear and tear of the boiler would be considerably lessened by its adoption, and if the flues were made to the extreme ends of the boiler there would then be no extra expense. The two pipes M and N attached to the fire box are for the following purpose:—That marked M is to allow the water to pass from the fire box into the boiler, and that marked N is to convey the steam that is generated in the fire box into the boiler.

The section at Figure 4 shews a series of fire-clay pipes X, about four inches inside diameter, one inch thick, and eighteen inches or two feet in length, said pipes being placed about two or three feet either behind or at the front of the split bridge, according to the length of the boiler. (The above dimensions are suited for a furnace the fire grate of which presents a surface of about thirty square feet.) In each of the aforesaid pipes we insert a blower and tuyere iron, such as are now used in ordinary smiths' forges. The air will be conducted to the aforesaid pipes through the before-mentioned hollow dead plates, grate bars, and split bridge. The blow pipes may be made either of fire clay, cast iron, or other material that will stand the action of the air and fire thereon, and may be placed either horizontal or perpendicular to the said pipes, either before or behind them. We also propose to separate the opening in the dead plates and split bridge in two parts, so as to be able to blow through the aforesaid fire-clay pipes either on the hot or cold side of the fire, either by mechanical means, or the action of the air itself.

Another form of fire bricks or pipes Y, to be used in combination with the pipes X lastly above described, is exhibited at Figure 2, which said Figure exhibits a split bridge in section, and one of the above-mentioned bricks at the top thereof. These bricks we form in the shape of a hollow triangle, and place them in front of the pipes X, and we arrange and dispose said triangular bricks about four inches asunder, and form them with a slit or opening on each side thereof for the air to pass out of and meet the flame which passes through the aforesaid four inch slits or spaces between said bricks.

We now proceed to describe the mode of operating with our said improvements as follows:—When we fire, we close one or both of the doors of the ash-pit, according to the state of cleanliness of the fire, and open the furnace door or doors in front of the grate bars, thereby allowing the air to pass through the dead plates, grate bars, split bridge, and fire bricks Y, as also to the blow pipe, tuyere, and fire-clay pipes X, by which time we assume the air will have acquired a temperature of about 600 degrees of Fahrenheit's thermometer, being a temperature at which it is supposed to become ignited

by the flame from the fire, and should any smoke remain after passing the bridge, the heated air and smoke having to pass through the aforesaid red-hot fire-clay pipes will thus be consumed. By the ash-pit being closed, the fire will be formed as good at the end of ten minutes and possess as much heating power as when it was newly fired.

Having now fully described and set forth the nature and object of our soid Invention of "Improvements in Consuming Smoke and Generating Heat in Furnaces of Steam Engine or other Boilers, also Heating the Feed Water of the said Boilers, therefore Economizing Fuel to a great extent," together with the best means we are acquainted with for carrying the same into practical effect, we would remark in conclusion, that we hereby declare our Invention to consist in, and we claim,—

Firstly, making the ash-pit of furnaces in two parts, each having a door, and also forming a wall up the centre of said "ash-pit," as above stated.

Secondly, making furnaces with hollow dead plates and hollow grate bars for the passage of air through them to the split bridge of the furnace, as above stated.

Thirdly, the fire-clay pipes marked X and Y for separating the smoke into small particles, so that it may be easily acted upon by the heat from the furnace fire, and thereby be consumed.

Fourthly, the fire-box L for heating the feed water for the boiler.

In witness whereof, the said Richard Leake and Matthew Sykes have hereunto set their hands and seals, this Thirtieth day of October, in the year of our Lord One thousand eight hundred and fifty-seven.

RICHARD LEAKE. (L.S.)
MATTHEW SYKES. (L.S.)

Witness, WILLIAM GREEN,
Wosbro' Common, near Barnsley.
October 30th 1857.

LONDON:
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Printers to the Queen's most Excellent Majesty. 1857.

A.D. 1857. May 1. N° 1233.
LEAKE & SYKES' Specification.

SHEET 1.

FIG. 1.

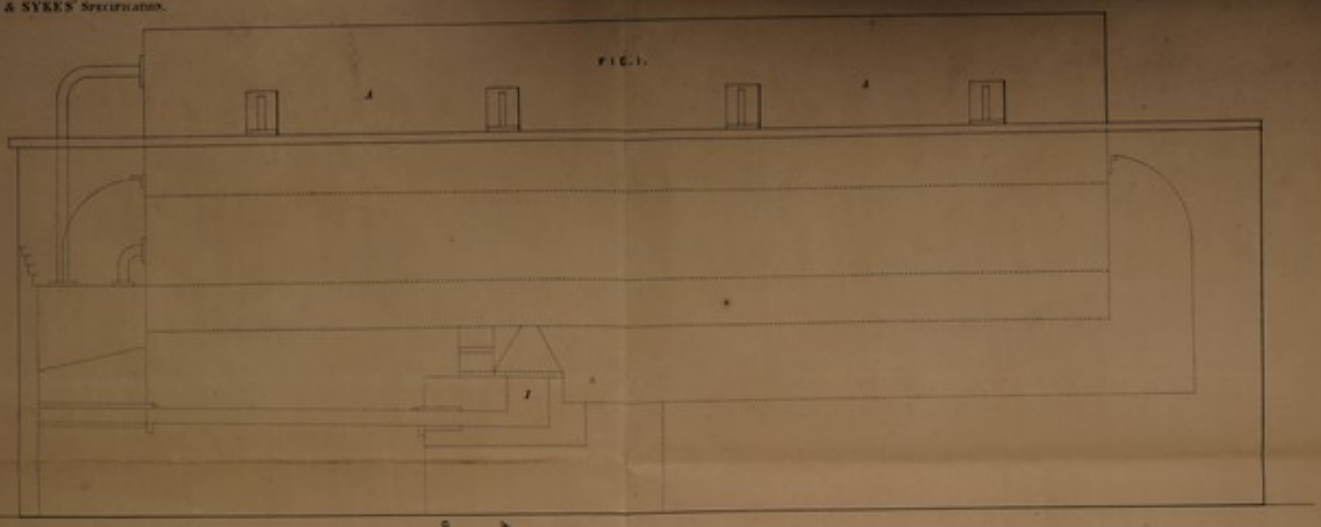


FIG. 2.

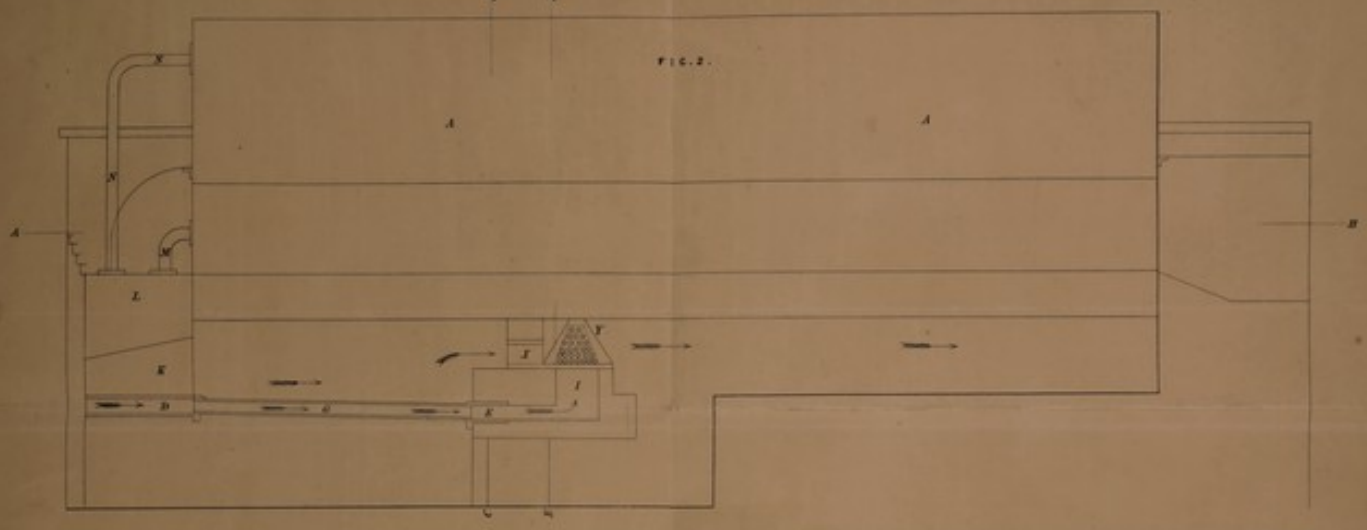


FIG. 3.

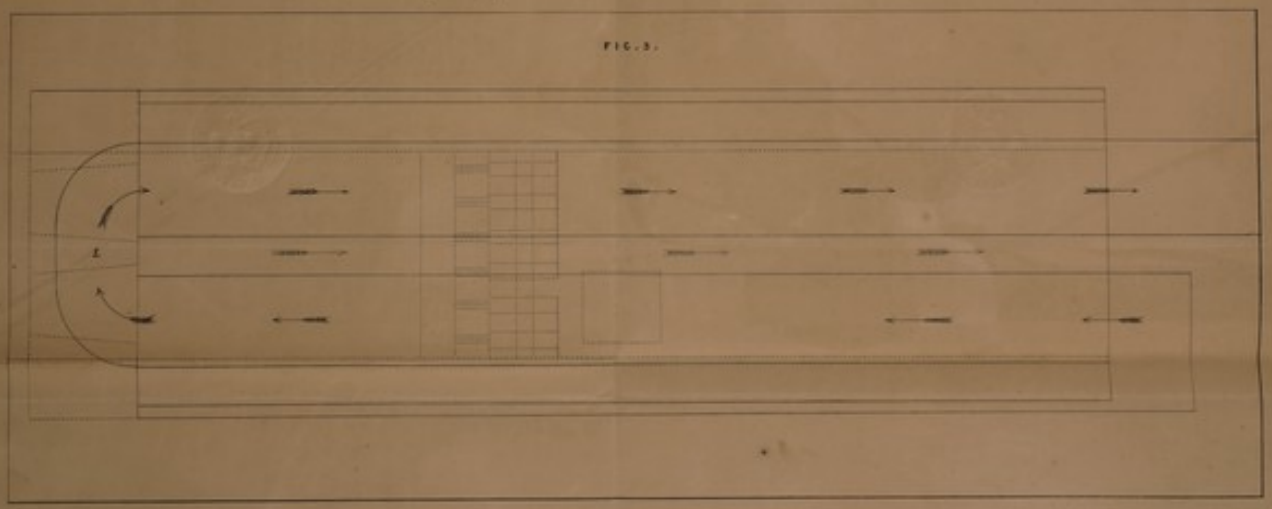


FIG. 4.

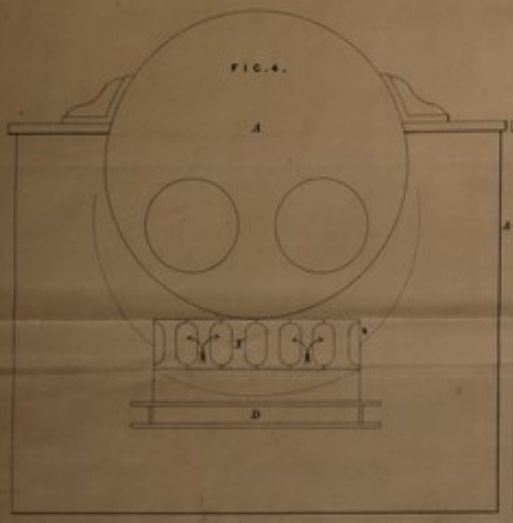


FIG. 5.

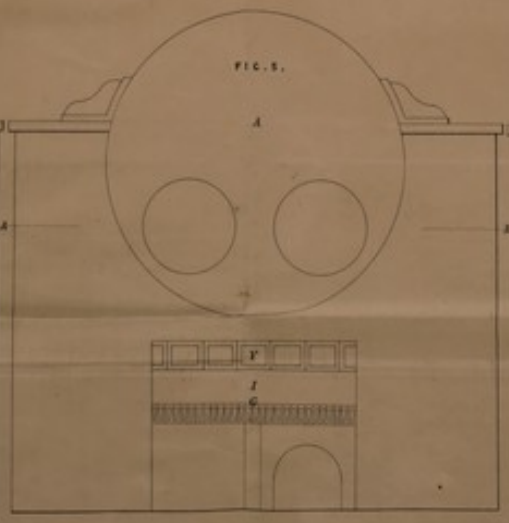
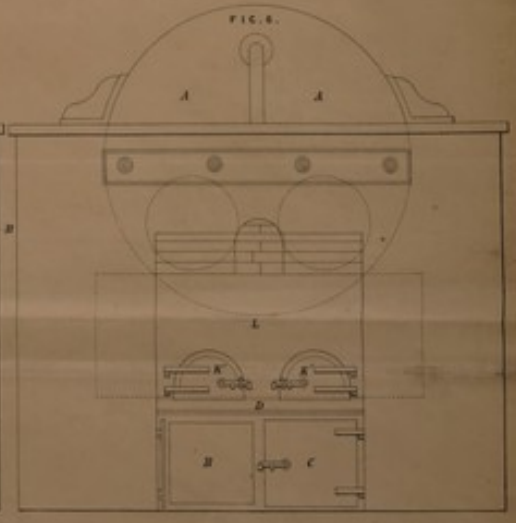


FIG. 6.



The filed drawing is not colored.

Drawn on Stone by Wolfe & Sons.

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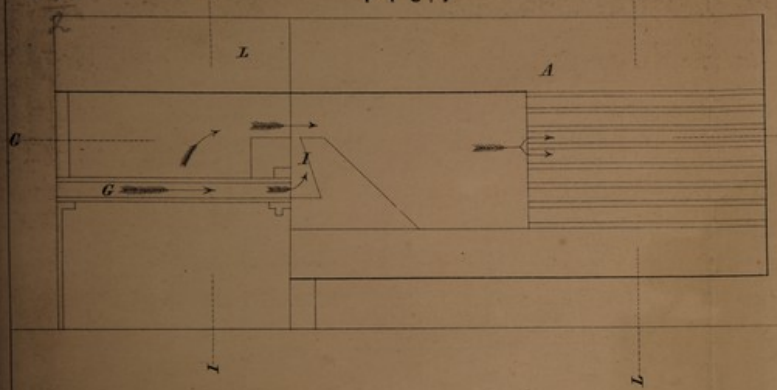
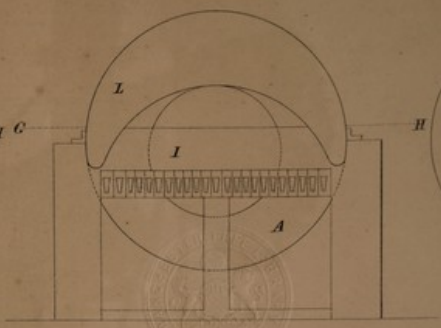
(2 Sheets)
Sheet 2.

392
2

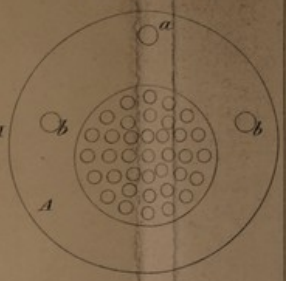
F I G. 7



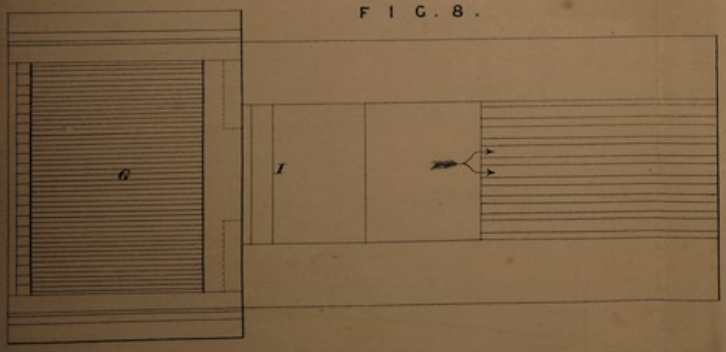
F I G. 9.



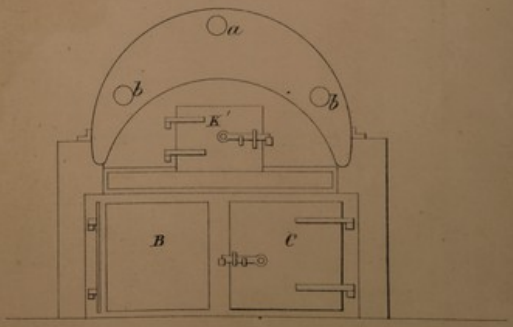
F I G. 10.



F I G. 8.



F I G. 11.



The filed drawing is not colored.

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