

Specification of Charles Constant Joseph Guffroy : smoke-consuming apparatus, &c.;

Contributors

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A.D. 1858, 15th JUNE. N^o 1348.

S P E C I F I C A T I O N

OF

CHARLES CONSTANT JOSEPH GUFFROY.

SMOKE-CONSUMING APPARATUS, &c.

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A.D. 1858, 15th JUNE. N° 1348.

Smoke-consuming Apparatus, &c.

LETTERS PATENT to Charles Constant Joseph Guffroy, Merchant, of Lille, Town in the French Empire, for the Invention of "A NEW SMOKE-CONSUMING APPARATUS, AND ALSO A NEW METHOD OF INTRODUCING THE COAL OR FUEL INTO IT."

Sealed the 14th December 1858, and dated the 15th June 1858.

COMPLETE SPECIFICATION filed by the said Charles Constant Joseph Guffroy at the Office of the Commissioners of Patents, with his Petition and Declaration, on the 15th June 1858, pursuant to the 9th Section of the Patent Law Amendment Act 1852.

5 **TO ALL TO WHOM THESE PRESENTS SHALL COME, I, CHARLES CONSTANT JOSEPH GUFFROY, Merchant, of Lille, Town in the French Empire, send greeting.**

WHEREAS I am in possession of an Invention for "A NEW SMOKE-CONSUMING APPARATUS, AND ALSO A NEW METHOD OF INTRODUCING THE COAL OR
10 **FUEL INTO IT,"** and have petitioned Her Majesty to grant unto me, my executors, administrators, and assigns, Her Royal Letters Patent for the same, and have made solemn declaration that I verily believe myself to be the true and first Inventor thereof.

Guffroy's New Smoke-consuming Apparatus, &c.

NOW KNOW YE, that I, the said Charles Constant Joseph Guffroy, do hereby declare that the following Complete Specification under my hand and seal fully describes and ascertains the nature of my said Invention, and the manner in which the same is to be performed, reference being had to the Drawings hereunto annexed, and to the letters and figures marked thereon, 5 that is to say:—

The new method after which I have constructed my stove is this, it is composed of thin bars placed transversally on longitudinal beams; each bar is subjected lengthways to the inequalities presented by the stove, so that I obtain this lengthways all the cavities and projectures necessary. This 10 method of construction alone enables me to obtain transverse air holes, through which jets of air coming from right and left seize the gases at the moment of their formation in the layer of coke where they are to be consumed.

The Figures 1, 2, 3, 4 (First Plate) present different views of this construction. 15

Figure 1 is the front view, showing the outer appearance of the stove with its doors; at the base can be seen the exterior orifices of the troughs by which coal is introduced, and also the hooks which are to support the handles of the elevators. Figure 2 is a vertical section of the stove taken rather sideways, shewing the plate which separates the door of the stove. Under this plate 20 the openings of the troughs are visible, and beyond the grate itself, with its quadrangular hollows forming troughs, between which are the projecting triangles, or air holes by which the inclined planes right and left are pierced. At the extremity of the troughs are seen the inclined planes on to which the elevators ascend. 25

Figure 3, longitudinal and vertical section by *a b*, Figure 2, or by the middle of the troughs; the inclined plane which terminates each trough is also visible.

Figure 4, vertical and transverse section of the stove; this Figure indicates the four different positions of the elevators, and consequently the four different 30 positions of the coal underneath the incandescent coke after its introduction.

Figure 5, view of a transverse bar; Figure 5, B, its section by *o e u*, Figure 5, showing that the bars are subjected to a diminution like those called "lames de couteau."

Figure 6 is an elevator; Figure 7 is the shovel by means of which the 35 coal is introduced into the troughs.

Figure 8 (Plate Second) is an angular fire iron or poker with sharp end, which is used to raise the clinkers and remove the cinders by passing it through all the length of the stove on the top of the angles.

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[*a, a, a, a*, are troughs or channels in which the coal is placed for introduction into the stove. For that part of the stove properly called the grate they are formed by the assembling together of the transversal bars in the hinder part under the plate *d*; each one is formed of a single piece of cast-iron, which
5 is the mouth by which the coal is introduced; this piece has a slide under each of its extremities, which enters into the groove formed by the two beams *s', s''*, as indicated in Figure 3; *a', a', a', a'*, are double inclined planes, shelving on both sides, formed also by the union of the transverse bars, and perforated transversally to admit outer air; *b, b, b', b'*, are the doors of the
10 stove, two double doors, one above the other, in order to admit less air when extracting the clinkers, &c.; *c, c, c, c*, are transversal bars, the upper sides of which are indented at certain distances, so that the entire surface of the grate they compose presents alternate cavities where the coal is placed, and projectures through which the burning air passes; *d* is an iron transverse plate,
15 the extremities of which are fixed into the lateral wall, and which separates the grate from the doors; this iron plate forms roof over the orifices for the introduction of the coal. This plate opposite the projecting angles of the grate, as shown in Figures 2 and 3, is level with these angles, and forms the continuation, whilst over the troughs it gradually descends to about the half of
20 the height of the inclined planes, so as to form a sloping roof above the troughs from the front towards the back; *d'* are slides of the plate *d*, resting on the sides of the foremost small troughs *a*, and forming their continuation upwards; *g* is a loop hole, through which the stoker may ascertain the state of the fire without opening the doors; *h, h*, are boilers; *k*, cinders; *l*, upper iron
25 plate fixed by its two extremities into the lateral walls, and resting in the middle upon the support *n*; *m*, is the fire bridge of the stove; *n*, support of the upper plate *l*, cast all of one piece with the front of the apparatus; *p, p, p, p*, are cast-iron inclined planes, placed upon the bottom of the troughs towards their extremity at the base of the fire bridge, upon which the extremity
30 of the elevators *v* slide in ascending; the raising of these latter raises the coal under the layer of burning coke; if necessary, the inclined planes can have a second rest or notch about half-way up, added to that already at the summit, as indicated in Figure 3, to give facility for introducing the coal in two separate quantities, and consequently more gradually and gently beneath the
35 burning coke; *r, r, r, r*, are hooks hanging before the orifice of each trough, and destined to support and uphold the handles of the elevators at a convenient height, whilst they raise the coal. The hook chain might be replaced by a ring chain fixed to the right or left of the mouth of the orifice, instead of

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over it, so that the handle of the elevator might rest in the rings of the chain at the height required; *s, s*, are longitudinal beams, supporting the transverse bars which form the grate; one extremity is fixed in the wall of the fire bridge, and the other rests upon the transversal beams; *s', s''*, are transversal beams; the first *s'* supports the extremities of the longitudinal beams, and rests 5 against the bottom of the last transversal bar *c*, the top of which rests against the plate *d*. The two beams *s', s''*, are fitted with grooves, into which fit the slides of the foremost small troughs *a*, Figure 3; *t, t, t, t', t', t'*, are tenons or the projectures of the bars; the first *t, t, t*, are situated at the summit of the projecting angles, and the others *t', t', t'*, on the three 10 sides of the troughs, through which the coal is fed, in which three sides they completely close in. The thickness of these tenons separates the bars and regulates the section of air holes, which are transversely placed on the inclined planes *a'*. The lower tenons, which close the bottoms of the troughs, can be set aside when it is necessary to place an iron plate on the 15 bottom of the troughs which reaches to the inclined plane, to facilitate the sliding of the elevators. I place these tenons only on one side of the bars, to avoid the irregularities which frequently result from the warping to which they are exposed in various operations through which cast iron passes. *u* is an oblong shovel of proportionate dimensions, which serves to convey the coal 20 into the troughs, by which the stove is fed; *v, v, v, v*, are elevators, by means of which the stoker raises the fresh coal placed beforehand in the troughs to the level of the grate under the burning coke. These elevators are formed by two iron rods, three-eighths of an inch in width and five-eighths of an inch in height. These two rods are joined together at the two extremities and in the 25 middle, Figure 3, by cross bars; the whole is covered by a thin plate of sheet iron more or less perforated. *z* is a fire iron or poker, appropriated to the angular form of the top of the grate. In the first plate, Figure 4, the coal having been raised by the elevator, has spent its gas, become coke, and is burning intensely, very little flame remains. The stoker then fills the trough 30 as full as possible with fresh coal, and withdrawing the elevator, he slides it underneath the coal he has just introduced, explained in Plate No. 2. In this position the coal is in contact on its upper surface with the incandescent coke, and begins to throw off its gases, the combustion becomes animated, and the flames abundant. In No. 3 the stoker has raised the coal half-way from 35 the trough, which being already partially consumed penetrates further and further into the mass of burning coke; the flame becomes still more abundant, and attains its maximum of intensity. In Plate No. 4, the coal has entirely

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penetrated the mass of incandescent coke, where it finishes throwing off its gases; the intensity of the combustion, the brilliancy and abundance of the flame, continues thus some time, but gradually weakens, and the fire is then in the state represented in No. 1.

5 My method of introducing the coal or fuel into the stove is this:—The fuel is introduced underneath the incandescent coke, which covers the grate by means of narrow, deep, fixed troughs, open on the top, and at one end slightly narrowing towards the bottom, terminated at their extremity on the fire bridge side by an inclined plane. These troughs are fitted into the stove at certain
10 distances, being of the same length as the stove is, that their top is level with the grate. A light plate is fixed to each trough, which I call an elevator, the same width as the bottom of the trough, and the same length as the stove, provided with apertures, and terminated by a handle, by which to manage and support the troughs before filling with coal; the layer of burning fuel being on
15 a level with the grate, one of the extremities of which rests on the inclined plane, and the other extremity, that is, the handle, on a movable hook, which hangs opposite the outer orifice. When the elevator is in this position, the trough is empty. The stoker fills it with fresh coal by means of an oblong shovel, after which, withdrawing the elevator and introducing it under the coal
20 just placed, he pushes it along the bottom of the trough under the coal as far as the inclined plane. If the stoker continues to push, the elevator ascends the inclined plane, and raises at the same time the fresh coal, mixing it with the incandescent coke which lies on the surface. The portions of the stove between the troughs are furnished with air holes, destined to support com-
25 bustion. These air holes or nozzles are formed by two inclined planes joined at the top, and forming a triangle, through which the orifice is pierced transversally.

My method of lighting the fire is this:—The stoker in the first place fills the troughs with blocks of coal until they cover about half the transversal
30 apertures right and left; this done, he spreads the combustible matters with which he intends lighting his fire over the layer of coal until it covers the remaining half of the transversal apertures; he then sets light to it and shuts the doors; then he slips the elevators under the coal in the troughs, and when he sees that the combustible matters are ignited, he raises the elevators half-
35 way up the troughs to the first notch and the first hook, which operation causes a small quantity of coal to fall upon the lighted combustible matters. When this small quantity of coal has caught fire, he raises the elevators to the second hook, which completely covers with coal the fire beneath, which

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quickly invades the whole layer. This mode of lighting causes scarcely any smoke.

Figures 9 and 10 present a longitudinal section of a modification, which is indispensable in certain long stoves like those used in glass works, cementing furnaces for steel, &c., which are three or four yards in length; these furnaces 5 being open at both ends, are considered as composed of two furnaces, placed end to end, and the inclined plane elevators *p, p*, are placed in the middle, either fixed to a brick fire bridge *m*, as in Figure 9, or by forming a double inclined plane, as seen in Figure 10; in the last case the double inclined plane is necessarily fixed into the bottom of the troughs to render it perfectly 10 secure.

In the Eleventh Figure is represented in a transversal section a system applicable to the furnace of a glass oven, which permits the entire changing of the grate whilst the oven is in full operation; for this purpose the grate must be placed right and left upon two longitudinal beams *s, s, s, s*, the topmost of 15 which is moveable by means of rollers upon the second, which is fixed. These rollers placed at certain distances on the beam are either fixed to the upper or under beams, as in Figure 11. In the first case the rollers fit into a groove, which runs the whole length of the upper beam; in the second case, when these rollers are fixed to the upper beam, they are hollowed out and roll on 20 the lower beam, which is then of a convex form. The grate being thus constructed, it suffices when necessary to replace it, whilst the oven is in operation to place at each end a sort of railway, the rails of which are of the same length, and appear like a continuation of the under beams. This done, the new grate is placed on the rails, on the side by which it is to be entered in 25 several lengths, and one at a time on new upper beams; then by employing a certain force, and pushing horizontally, the old grate will be pushed out at once, as the new enters at the opposite end. During this operation men must be placed at the two extremities of the oven, some at the end, by which the old grate is removed, in order to keep back the fire by pushing it towards 30 the oven, and others at the other end to bring it into the new grate. It is of course necessary before commencing this operation to detach the slags, which cause the grate to adhere to the wall of the oven. When the fuel used is poor and of the nature of anthracite, as it produces no smoke, it is not absolutely necessary to introduce it by the troughs, as before indicated. 35

The grate represented in Figure 12 may then be used instead of the troughs; at the bottom of the inclined planes, are the openings, through which the cinders fall. This sort of grate facilitates the combustion of a poor sort of coal,

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especially if small. The two most obvious inconveniences in burning small coal are, in the first place, its tendency to cake together, and thus exclude the air; in the second place, it being subject to fall through with the ashes without having been burnt. These difficulties are almost entirely raised by
5 my stove, firstly, by its inclined position, secondly, by the position and size of the air holes.

My system is applicable also to raised furnaces by placing mouths for the introduction of the fuel between the steps or degrees at different heights. The result of this system is, that the smoky gas of the coal is forced by the direction
10 of the draughts to enter to the burning coke in the grate, where it is consumed partly between the two plates, which surmount the mouths of the furnace, and partly in the mouths themselves. This sort of stove is represented in Figure 13 and 14, Plate Second. Figure 13 is a vertical and longitudinal section of the stove by *c . . . d*, Figure 14. Figure 14 is a transverse oblique section by
15 *g . . . h*, Figure 13. *a* are feeding mouths and deposits for fresh coal; *a'* are the parts of the grate containing lighted coke, and where the fuliginous gas is consumed; *a''* is the lower part of the stove, forming the funnel, whence descend the cinders, stones, clinkers, &c. This funnel or receptacle for the slags, &c., has already been described in my Patent, under date of the Seventh of
20 June, One thousand eight hundred and fifty-five. I have, however, improved upon it, as I have now rendered it air-tight, doing away with the lower openings, and by means of its doors *b, b*; thus, instead of being a place for combustion, it becomes an air-tight stove. *c* are plates of sheet iron, forming the steps or degrees of the furnace; they rest at each end on narrow projectures,
25 which are fastened to the back mantle of the boiler. These projectures are visible in a transverse section, and in full lines in Figure 14, also in a longitudinal section, Fig. 13; *h* are boilers.

In the Drawings a boiler divides the grate into two parts, and joins the copper at the top and bottom behind the funnel *a''*. *s* is a support, fixed to
30 the mantle of the boilers supporting the upper mantle of the funnel. The working of this stove is easy; it is only necessary for the stoker to keep feeding with fresh coal as soon as the last has caught fire.

And having now described the nature of the said Invention, and in what manner the same is to be performed, I declare that I claim as of my said
35 Invention,—

First, the manner of constructing the grate of transversal bars.

Second, the introduction of the coal by means of troughs, inclined planes, and moveable elevators.

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Third, the combination of the means above mentioned, which form a smoke-consuming stove, furnace, or apparatus.

Fourth, the manner of establishing the transversal grate upon rollers, represented, Figure 11.

Fifth, the manner of introducing the coal through the raised grate. 5

In witness whereof, I, the said Charles Constant Joseph Guffroy, have hereunto set my hand and seal, this Tenth day of June, in the year of our Lord One thousand eight hundred and fifty-eight.

CHARLES CONSTANT JOSEPH GUFFROY. (L.s.)

Witness, 10

F. BRIGNOL.

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Printers to the Queen's most Excellent Majesty. 1858.

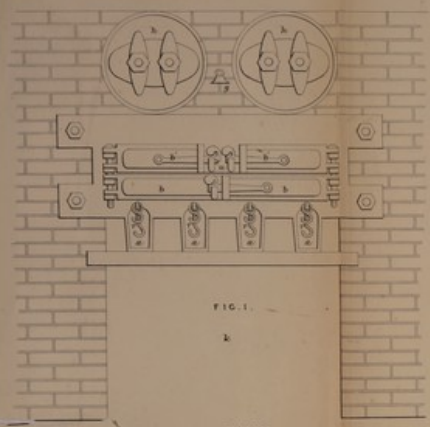


FIG. 1.

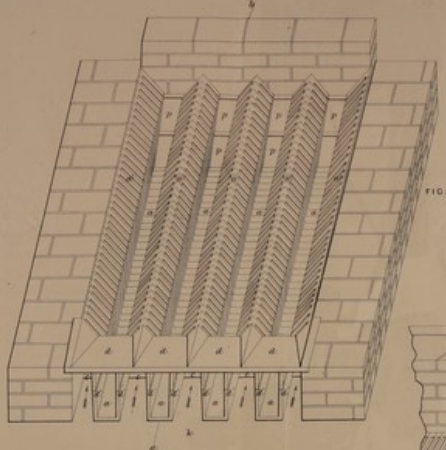


FIG. 2.

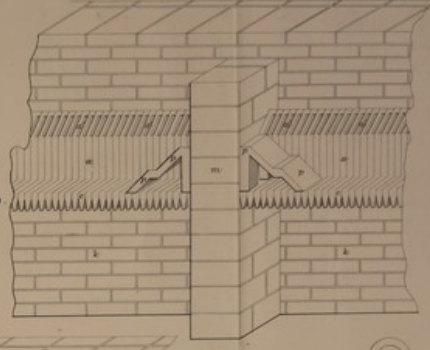


FIG. 3.

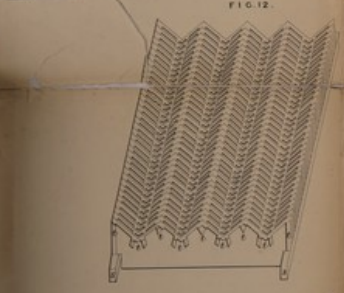


FIG. 4.



FIG. 5.

FIG. 5^{1/2}.

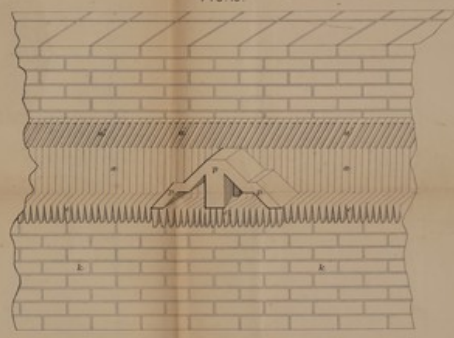


FIG. 6.



FIG. 7.

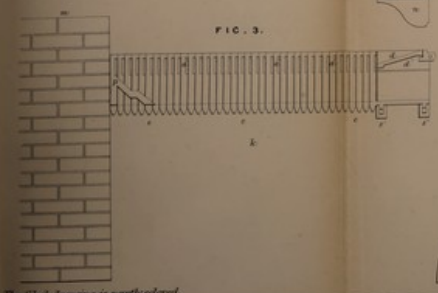


FIG. 8.

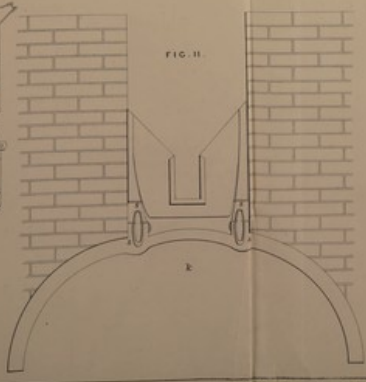


FIG. 9.

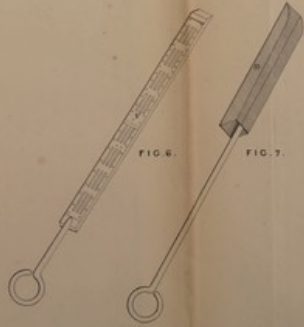


FIG. 10.

FIG. 11.

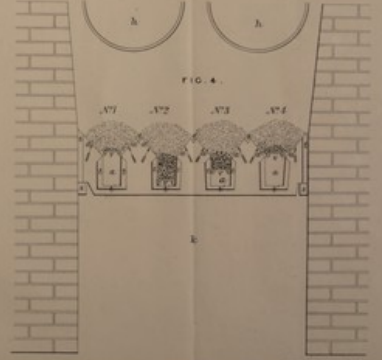


FIG. 11.

The tiled drawing is partly colored.

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Fig. 3

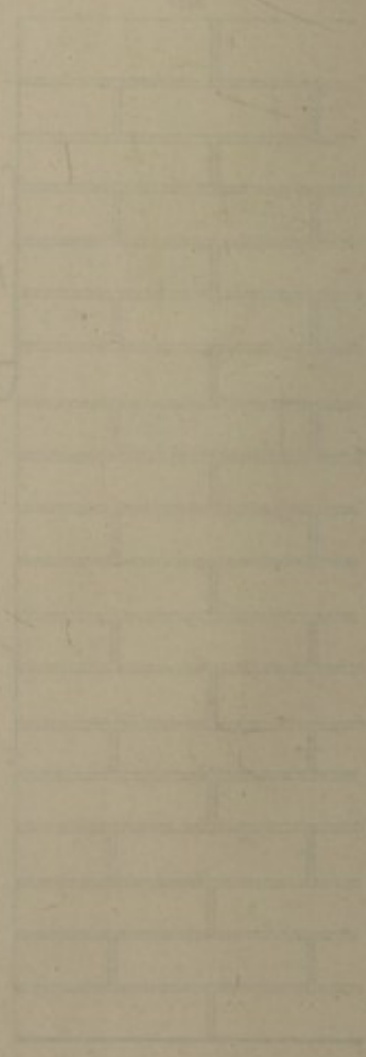
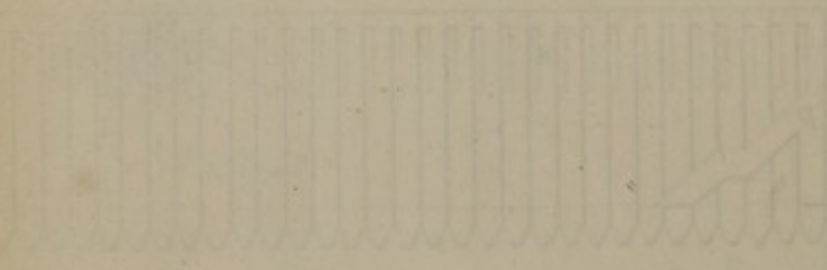
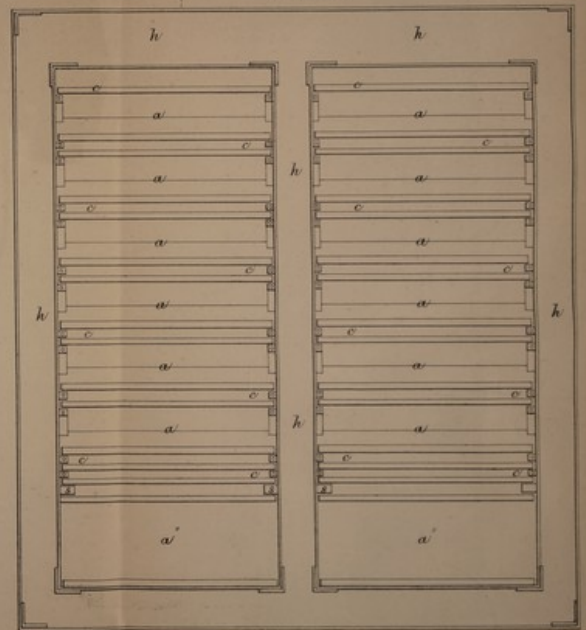
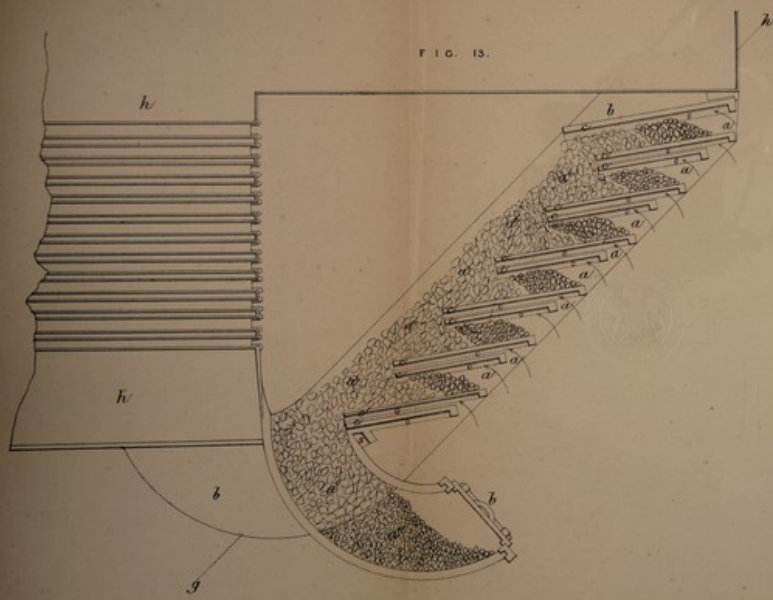


Fig. 4



The steel drawing is partly colored.

