

Specification of Charles Constant Joseph Guffroy : furnaces and fire-places.

Contributors

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A.D. 1860, 24th JANUARY. N° 172.

SPECIFICATION

OF

CHARLES CONSTANT JOSEPH GUFFROY.

FURNACES AND FIRE-PLACES.

LONDON:

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A.D. 1860, 24th JANUARY. N° 172.

Furnaces and Fire-places.

LETTERS PATENT to Charles Constant Joseph Guffroy, Merchant, of No. 3, Duke Street, Adelphi, Westminster, County of Middlesex, for the Invention of "**AN IMPROVED SMOKE-CONSUMING APPARATUS, AND ALSO AN IMPROVED METHOD OF INTRODUCING THE COAL OR FUEL INTO IT.**"

Sealed the 13th July 1860, and dated the 24th January 1860.

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 24th January 1860, 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 No. 3, Duke Street, Adelphi, Westminster, County of Middlesex, send greeting.**

WHEREAS I am in possession of an Invention for "**AN IMPROVED SMOKE-CONSUMING APPARATUS, AND ALSO AN IMPROVED METHOD OF INTRODUCING THE COAL**
10 **OR 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.

NOW KNOW YE, that I, the said Charles Constant Joseph Guffroy, do
15 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

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

Drawings hereunto annexed, and to the letters and figures marked thereon, that is to say:—

The arrangement is applicable without any essential modification to the furnaces of all forms of boiler, tubular or otherwise, whether marine or land, fixed or portable, to the fire grate of locomotives, to the ovens of glass workers 5 cementing furnaces, or in a word, for any purpose, industrial or domestic. It can also be adapted for any kind of solid fuel, however composed, or for the use of fluid or viscid combustibles by mixing them properly with other materials of a solid nature.

I now proceed to the description by way of example of the said Invention 10 as applied to the furnace of two fixed boilers of fifty-horse power, the Drawings for which, to a scale of one-tenth the actual size, are annexed, and to explain its mode of action. Fig. 1 is a front elevation of the above furnace; Fig. 2, a plan in perspective of the fire grate and dead plate; Fig. 3, a longitudinal vertical section through *a—b*, Figs. 1 and 2; Fig. 4, a cross vertical section 15 through *x—y*, Figure 3; Fig. 8, a vertical section, parallel to the face of the lining, to the apron or furnace face, through *c—d*, Figure 3; Fig. 9, horizontal section of the apron and its lining through *c—g*, Figure 8; Fig. 10, vertical section of the dead plate *d* between the supply troughs, shewing its position over the outer ends of the bars *c*; Fig. 11, example of an oblong shovel, 20 which serves to introduce the fuel into the troughs; Figs. 12, 12^{bis}, 12^{ter}, plan and sections of the elevator *v*.

The greater portions of the furnace through which the air enters are composed of longitudinal bars *c*, of whatsoever form, supported at their extremities by the cross bearers *s, s'*. Between these long narrow gratings 25 and resting on the same bearers *s, s'*, are placed one or more troughs, which may be made of cast or wrought-iron or steel, or in one or more parts; these troughs have their sides raised even with the top of the grate, but their lengths, breadth, and depth, (all or either) may vary according to the requirements of their application, but they are closed at the bottom sides, and inner end, and 30 open at the outer, at which, by means of the oblong shovel *u*, the fuel is introduced; they are also open at the top, whereby the fuel introduced is lifted by the elevators *v* up to the top of the grate inside the furnace. At the inner or "bridge" end of the furnace, the bottom of these troughs curve up so as to form an inclined plane *p*, terminating at its summit by a flat step *i*; at the 35 outer front end they are prolonged under the dead plate *d*, and their mouths *a'* widened, and thus projecting beyond the front of the furnace, are there supported by means *s''*, cast in one piece with (or attached to) the apron or furnace face. Over the opening of each trough there is hung a hook *r*, upon

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which to rest the handle of the elevator during the introduction of coal into the troughs. The "elevators" shewn in Figure 12 and in section by Figure 12^{bis} are double-faced, flat, and hollow, of the same width as the bottom of the troughs, and of the same length as the fire grate; the thickness must be
5 proportionate to the length, so as to ensure rigidity in use; the thickness shewn (about $\frac{7}{8}$ ths of an inch) or quite enough for a length of say four feet; one extremity is flattened to a wedge shape, the other terminates in a long arm and cross handle.

I (generally) construct these as follows:—I take two rods of iron about
10 $\frac{7}{16}$ ths by $\frac{5}{8}$ ths of an inch in section and the length of the grate; these rods I unite at one, two, or three places of their length by cross rods, and at one of the extremities by a wedge-shaped piece of iron, and at the other by a piece terminating in the handle; the cross pieces should be securely rivetted to the rods with screw rivets. For each of the faces of this frame throughout its
15 length and breadth except for the $1\frac{1}{2}$ or 2 inches of the wedge extremity I propose (to use) sheet iron of about $\frac{1}{8}$ th inch in thickness, rivetted securely with sunk rivets, as shewn (by dots) in Figure 12^{bis}. I can also form my elevators of flat tubes (drawn), as shewn in section at Fig. 12^{ter}, with which it would suffice to insert the cross rods in the middle, as also the two plates at
20 the extremities with the handle. These fire grates may be placed either horizontally or inclined, but it is better that they should be inclined. The dead plate *d* (Figure 3) is also inclined even more than the grate, and should be close upon the top of the troughs; it has feathers sharp below underneath, coinciding with the sides of the troughs and increasing their height, also at the top
25 projections (Figures 2 & 3) between the troughs, to complete the apron.

Behind the fire bridge *m* (Figs. 2 & 3) is a cavity, intended to receive the clinkers from the furnace which the stoker throws over the fire bridge, instead of taking them out at the furnace door; this cavity is large enough to contain all the clinkers formed during a day's work; it communicates with the ash-pit
30 *k* by means of a large high door *l*, from whence the stoker clears out the clinkers; the side walls of this cavity are built up from the bottom in a curved (or inclined) form, so as to cause the clinkers to slide of their own accord to the front of the door *l* as fast as they are withdrawn. In order to ensure the solidity of the bridge *m*, I enclose the upper part (Figs. 2 and 3) between two
35 pieces of cast iron, the first, *n*, is a sort of curb or edging, with its extremities fixed into the side walls, having in its upper face deep recesses *n'*, which I fill with fire clay; the second piece is a plate *q*, supported by the bearer *s* and rising about seven inches above the same, and from three to four inches above the bars and troughs; the ends of this plate are also let into the side walls,

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This plate besides strengthening the bridge also prevents the adhesion of the clinkers ; the back of it is made hollow between it and the bridge by vertical bars, shewn by the dotted lines (Fig. 3.) To complete this arrangement for the getting rid of the clinkers I have added a new form of furnace front, as shewn in elevation by Fig. 1, and in section by Figs. 3, 8, & 9. The doors *b* 5 are only of the size strictly necessary for the introduction of the stoking tools ; the fuel is introduced and the clinkers withdrawn by other and different openings. The framework of the furnace front situated between the doors is lined with fireproof material contained between vertical and lateral projections cast upon the front plates ; these materials may be either of bricks, as in Fig. 8, 10 or of pounded fire-brick and clay, as in Fig. 9. In cases where it may be objectionable or impossible to construct the receptacle for the clinkers behind the fire bridge, and that therefore they must be removed through the front of the furnace, the arrangement as shewn in elevation by Fig. 5, and by longitudinal vertical section in Fig. 6 is employed. In this arrangement one or two 15 of the doors, according to whether the furnace has three or four troughs, are sufficiently large to allow of the withdrawal by them of the clinkers. When necessary that a workman should enter the interior by withdrawing the screw bolts which hold on the door jambs *x*, these and the doors attached can be removed, and a large opening obtained in the present design equal in width to 20 the three doors and intermediate jambs altogether.

The best manner to light the fire so as to produce in doing so but a very trifling amount of smoke, and at same time very quickly to bring it up to a very great heat, with which will be combined great economy of fuel and a complete combustion of smoke, is as follows :—After having filled the troughs 25 with fuel sufficiently above the level of the fire grate for such fuel to fall over to the right and left, so as to cover about half the surface of the bars, the stoker places the material for lighting the fire upon the grates, and having lighted them here and there, he supplies them more and more with fuel by raising it from the troughs, which (as exhausted) he recharges in the manner 30 I will presently describe. The fire is not in full activity until it is one bed of incandescent coke, of which the thickness over the grates varies from 4 to 8 inches (or thereabouts), at the same time that above the troughs this thickness of glowing coke continually lifted up by the successive charges, reaches a height of from 8 to 12 inches. Between the charges the elevators lie at the 35 bottom of the troughs under the last supply of coal introduced, and pushed up to the foot of the inclines, when the necessity of a fresh charge arises, which generally takes place when the upper layer of fuel in the troughs is ignited, and the lower layer in process of distillation the stoker pushes forward

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the elevator until its end sliding up the incline *p* rests on the step at the top *i*, then raising the front end he suspends the handle upon the hook *r*; the last charge thus becomes raised in the furnace to the level of the grates under a bed of glowing coke, where it completes its distillation and ignition. Under
5 the elevator thus elevated to the level of the fire grate, and sustained at one end by the step *i* and at the other by the hook *r*, the trough is empty and ready to receive a new charge of fuel. This the stoker introduces by means of the long shovel *u*, then unhooking the elevator he gives it a quarter turn and withdraws it sideways through the fuel just introduced as far as the edge
10 of the trough, and again slides it along the bottom of the trough beneath the coal as far as the foot of the inclined plane *p*, where it remains until the next charge.

It will be clear that my troughs form a kind of retort in which takes place a great portion of the distillation of the coal or other fuel, and which by
15 the raising of their contents, supply to the whole surface of the furnace the bed of coke with which it is covered, and in which at the same time the mingling and combustion of the inflammable gases produced by the distillation and of the air entered through the bars is accomplished.

It is important to observe that my furnace, although the combustion in it is
20 more complete, requires a less excess of air, and that, therefore, the flue opening may be much less than with ordinary furnaces. I can dispense with the inclined plane *p* in the troughs, and raise the ends of the elevators on to the step *i* by two other means. The first is shewn by the longitudinal vertical section, Fig. 6, the step (or resting place) *i* is retained, but the incline is
25 removed, with the exception of a slight curve upwards of about $\frac{1}{2}$ an inch or an inch in the bottom of the trough to the foot of the step. At the time of the charge the stoker takes hold of the handle of the elevator, which (as before) lies at the bottom of the trough under the coal, lifts and suspends it to the hook *r*; it is shewn in this position in Fig. 6; then the stoker by means of
30 the rod *z* slides the moveable rest *o* (Fig. 6) along the bottom of the trough, upon which, having unhooked the elevator, he fulcrums it so that its farther extremity rises up to the level of the step *i*, upon which, having lodged it by pushing it slightly forward, he relifts it to and again suspends it upon the hook. The raising of the preceding charge of fuel into the fire being thus
35 achieved the stoker withdraws the fulcrum (or rest) *o*, refills the trough with fresh coal, and replaces the elevator under this new charge by pushing it along to the foot of the step *i*, and there leaves it till the next charge. With long furnaces, in order not to strain the elevator too much at the moment of leverage, the fulcrum *o* can be furnished with a sort of bed more or less

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lengthened, as represented in Fig. 6^{bis}, upon which the elevator would rest, and which would pivot with it upon the axis *o*. The second means, shewn by the vertical longitudinal section, Fig. 7, consists in introducing under the elevator, after its handle has been hooked up, an elbow lever *y*, of the form shewn, or some other analogous to it, taking its fulcrum on the bottom of the 5 trough, and a third of its length in (or thereabout); by means of this lever the stoker lifts the extremity of the elevator to the height of the step *i*, and having pushed it upon the same without withdrawing the handle from the hook *r*, the trough is at once replenished, and the elevator replaced at the bottom in the ordinary manner. 10

Having now described the nature of my Invention and in what manner the same can be performed, I declare what I claim as new,—

Firstly, the introduction of fuel into a furnace by means of an indefinite number of troughs alternated or intermixed with fire-bars, and placed on the same level with them (or nearly so); and I claim such combination of 15 troughs and fire-bars whether such modes of lifting the fuel therein, as hereafter claimed, be adopted in combination therewith, or any other in lieu thereof.

Secondly, the manner of raising the fuel from the troughs into the furnace by means of an elevator, an inclined plane, a resting step, and hook, as 20 described.

Thirdly, the manner of raising the fuel, as before, by means of an elevator, a hook, a moveable fulcrum, and resting step, as described.

Fourthly, the manner of raising the fuel as before, by means of an elevator, a hook, a moveable lever, and a resting step, as described. 25

Fifthly, the form and construction of the hollow double-faced elevators herein described.

Sixthly, the receptacle for clinkers, built behind the bridge, as also the two cast-iron transverse pieces which protect and secure the bridge.

Seventhly, the combination, with such furnaces as are herein described 30 with a furnace front or apron of iron with a lining of fire-brick or other fire-proof substances, whether with all small doors as when a receptacle for clinkers is used, or otherwise, with large and small doors intermixed, all fully described.

REFERENCES TO THE DRAWINGS.

35

a, troughs alternated with the fire grates, through which the coal is introduced by the orifices *a*¹ by means of the long shovel *u*; *b*, doors in the furnace front; *c*, bars forming the grates between the troughs; *d*, dead plate; *d*¹, inner

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edges of the same, resting upon the edges of the troughs and ends of the fire-bars ; *e*, upper ribs (or feathers) to the fire or dead plate, intended to secure the fire bricks which are encased by them ; *e'*, under projections to the said plate, coinciding with the sides of the troughs *a'* ; *g*, receptacles for the clinkers
5 behind the bridge ; *h*, the boilers ; *i*, rest or step at the top of the inclined plane *p* ; *j*, wall plate or girder, with its ends let into the walls placed over the doors to support the masonry ; *k*, ash-pit ; *l*, door from the ash-pit into the receptacle for the clinkers ; *m*, fire-bridge ; *n*, curb or edging with recesses *n*¹, secured into the side walls behind the bridge ; *o*, a moveable fulcrum for the
10 elevator, furnished with a rod handle *z* ; *o*¹, the axis of the fulcrum rest *o* ; *p*, inclined planes at the farther end of the troughs upon which the elevators slide in being raised ; *q*, cast-iron plate placed upon the inner bearer *s*, behind, and rising higher than the bars and troughs ; *r*, hooks hanging over the orifices of the troughs, upon which to suspend the handles of the elevators ; *s*, *s'*, inner
15 and outer bearers of the fire-bars ; *s''*, an outermost bearer for the troughs, cast with furnace front or apron ; *t*, lateral and vertical projections cast with the apron, retaining the fire-proof material, which protects it from the excessive heat ; *u*, long shovel for introducing fuel into the troughs ; *v*, the elevators for lifting the fuel in the troughs ; *w*, moveable door jambs, fixed to the apron
20 by screws ; *y*, an elbowed lever for the purpose of lifting the inner end of the elevator to the top of the resting step *i* ; *z*, the rod handle of the moveable fulcrum *o*.

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

CHARLES CONSTANT JOSEPH GUFFROY. (L.S.)

Witness,

T. BRIGNOLES.

LONDON :

Printed by GEORGE EDWARD EYRE and WILLIAM SPOTTISWOODE,
Printers to the Queen's most Excellent Majesty. 1860.

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 in the year of our Lord One thousand eight hundred and fifty-nine.

CHARLES CONSTANT JOSEPH CUTTROY. (L.R.)

Witness
T. B. ...

LONDON:
 Printed by George Edward Evans and William Streeting,
 Printers to the Queen's most Excellent Majesty. 1860.

FIGURE 1

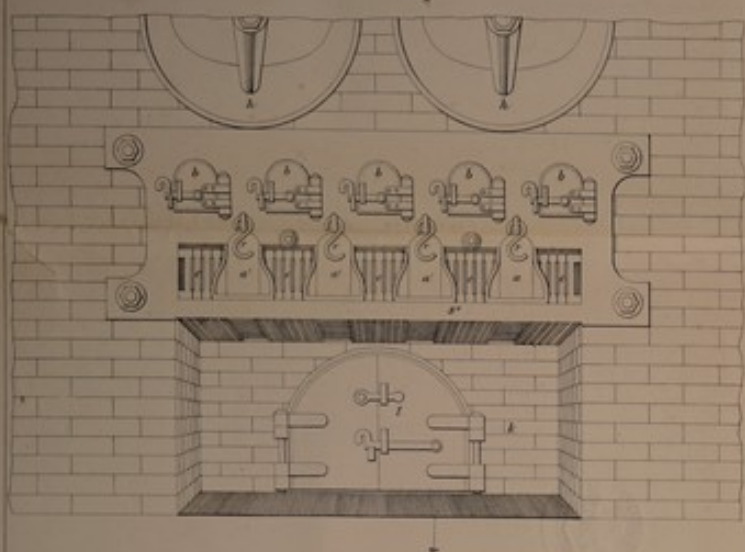


FIGURE 2

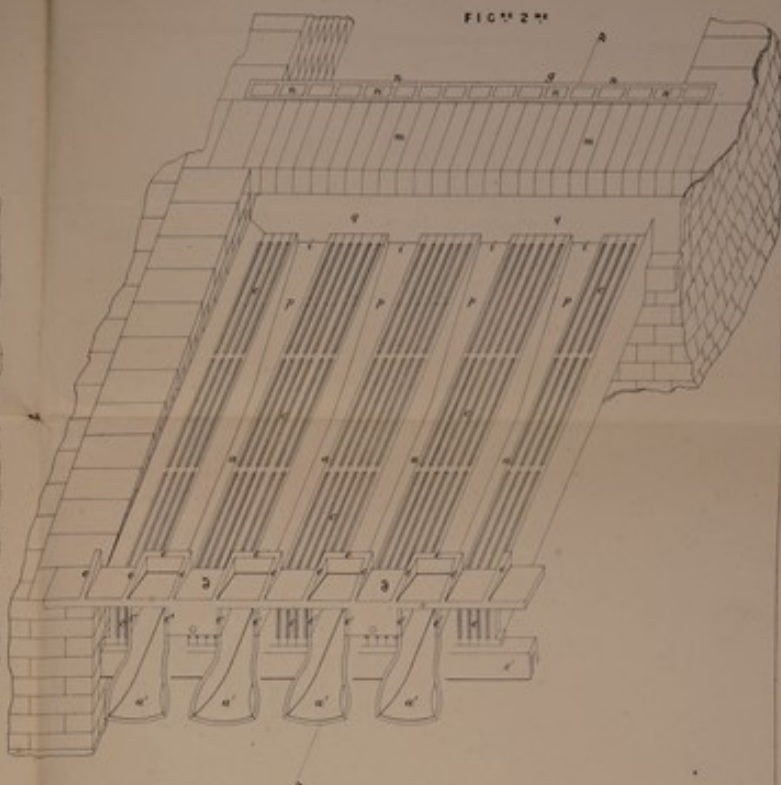


FIGURE 3

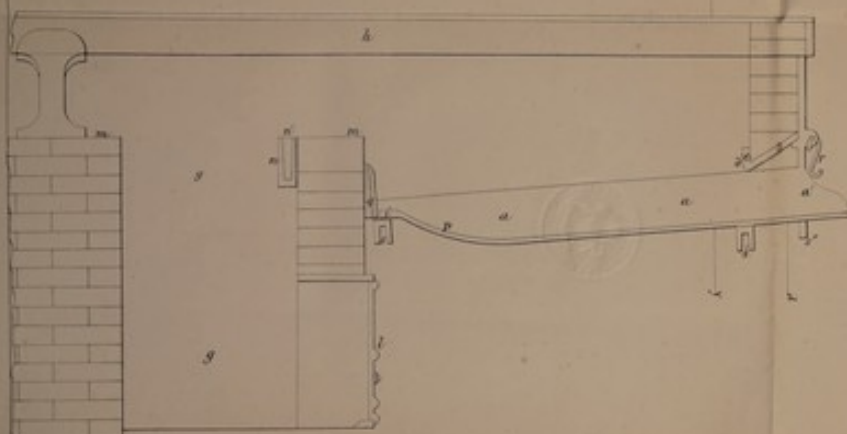


FIGURE 4

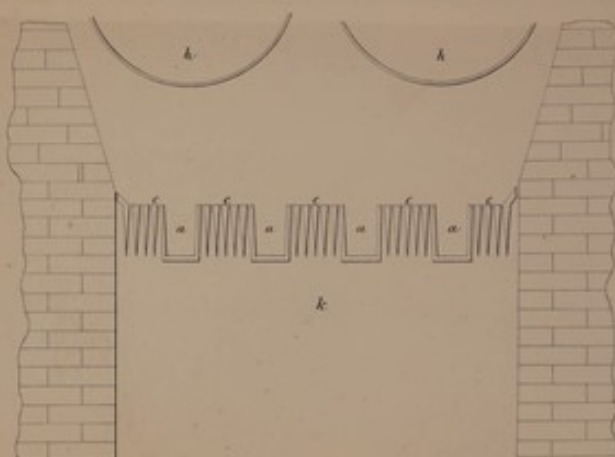


FIGURE 5

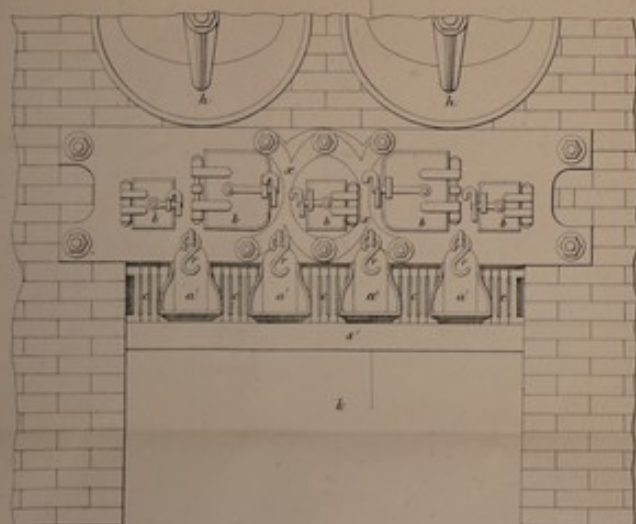


FIGURE 6

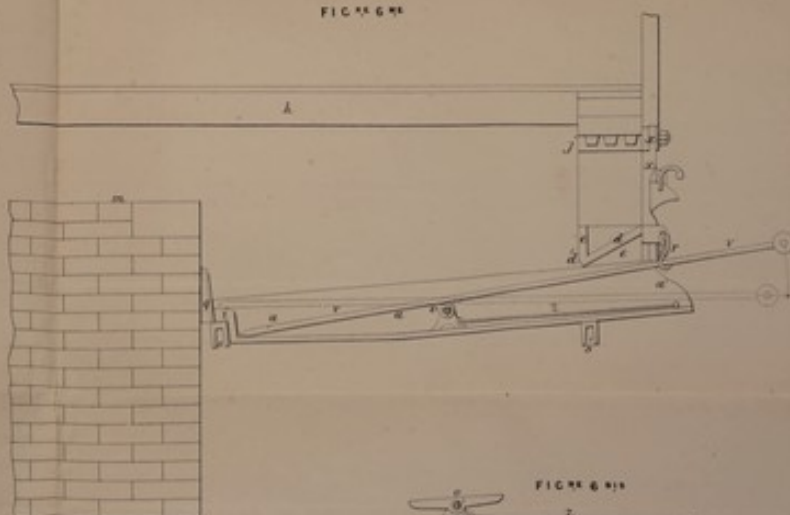
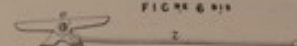


FIGURE 7



The filed drawing is partly colored.

Scale, one Tenth.

Drawn on Stone by W. & G. S.

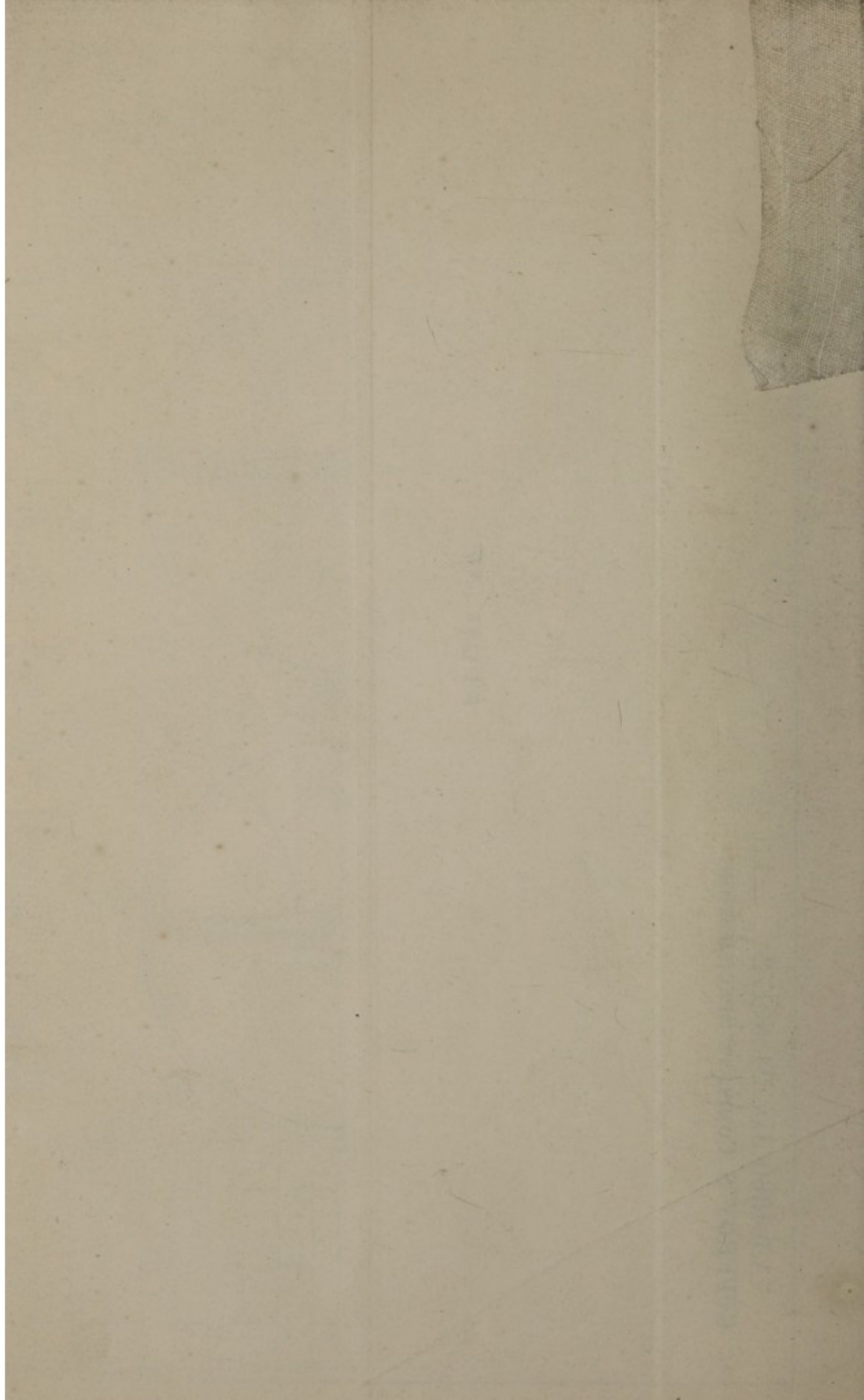



Fig. 1. A plan view of a vaulted structure, likely a tunnel or bridge. It shows a series of arches supported by piers. The top is labeled 'h' and the bottom is labeled 'h'. The left side is labeled 'e' and the right side is labeled 'g'. The central part is labeled 'a' and 'a'.

FIGURE 9

FIG. 12 ME

1.25



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