

Specification of John William Sloughgrove and James Henry Wheatley : furnaces.

Contributors

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A.D. 1855 N° 507.

SPECIFICATION

OF

JOHN WILLIAM SLOUGHGROVE
AND
JAMES HENRY WHEATLEY.

—
FURNACES.
—

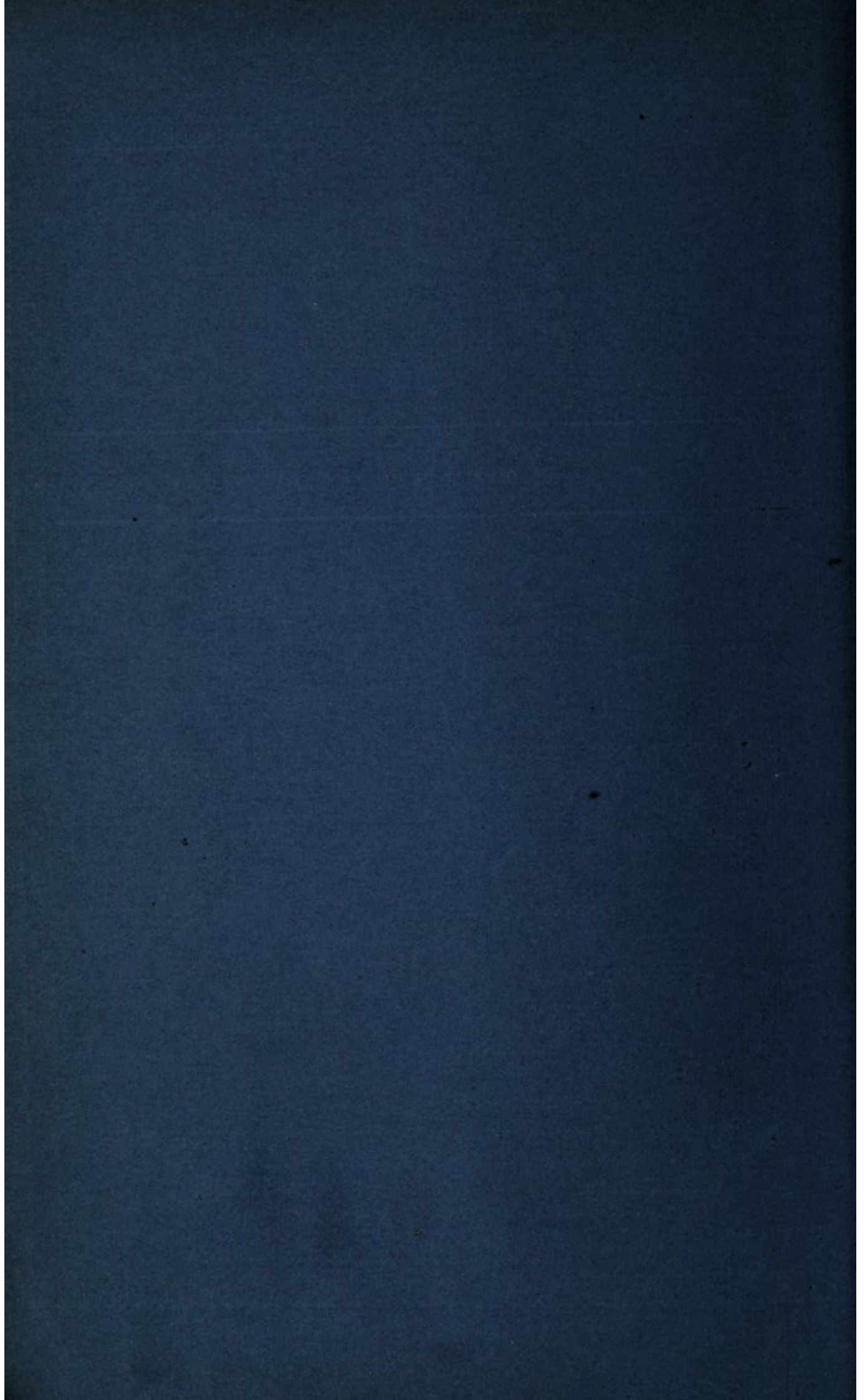
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1855.





A.D. 1855 N° 507.

Furnaces.

LETTERS PATENT to John William Sloughgrove and James Henry Wheatley, of Windsor Street, Islington, Engineers, for the Invention of "IMPROVEMENTS IN SMOKE-CONSUMING FURNACES."

Sealed the 7th September 1855, and dated the 7th March 1855.

PROVISIONAL SPECIFICATION left by the said John William Sloughgrove and James Henry Wheatley at the Office of the Commissioners of Patents, with their Petition, on the 7th March 1855.

We, JOHN WILLIAM SLOUGHGROVE and JAMES HENRY WHEATLEY, of Windsor Street, Islington, Engineers, do hereby declare the nature of the said Invention for "IMPROVEMENTS IN SMOKE-CONSUMING FURNACES" to be as follows:—

The first of these improvements in smoke-consuming furnaces consists in fitting beneath the furnace bars a moveable plate, so as to shut off the communication between the ash-pit and the flue or chimney. The accompanying Drawing represents an outline of this part of our Invention. A is the dead plate; B, one of the furnace bars; C, a bridge at the end of the bars; D, a plate beneath the grate. The dead plate A is supported by pins or other means, so as to move easily about its points of support; the furnace bars are supported by a framework or cradle, moveable upon its axis, so that the fire grate may be raised or lowered by means of a lever extending in front of the

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ash-pit. The plate D is secured to the furnace bars B by the rod or lever E, so that when the grate is moved either up or down, by means of the lever the plate is likewise moved, and either opens or cuts off the communication between the ash-pit and the flue or chimney. As shown in the Drawing, the passage from the ash-pit to the flue is partly open, but may be completely 5 closed by depressing the lever attached to the bars B, which causes the front end of the bars to descend, and raises the plate D and also the bridge C until it touches the lower part of the boiler. The air necessary for the combustion of the fuel now passes up through the fuel at the front part of the furnace and through the incandescent fuel at the back of the grate. In passing through 10 the highly heated fuel, the combustible gases of the smoke are ignited, and the invisible vapours only escape by the chimney.

The second part of our Invention is as follows:—The furnace is fitted with two sets of fire bars, placed behind each other; between them is a space, in which a moveable screen or bridge is worked; the screen is made of two 15 perforated metal plates, the sides and top of the bridge being closed, and the bottom left open to admit a current of air between the plates. The shape of the screen or bridge will be made in accordance with the form of the furnace and boiler, and it is to be raised or lowered by means of a lever, a rack and pinion, a quadrant, or other mechanical arrangement. Another screen or 20 bridge, similar to the foregoing, is fitted at the end of the second set of fire bars, next the chimney shaft or flue; this screen may be worked by similar means to the other; or one screen may be actuated by a tube attached to the lever or rack, and the other by a rod fitted within the tube. These screens when raised form a double bridge, the fire burning in front of each. The fire nearest the flue 25 is supplied with fuel by lowering the front screen and pushing back a portion of the incandescent fuel from the outer fire; the screen or bridge is then raised. When coal is thrown upon the outer fire, the smoke and gaseous products arising from its combustion pass through the screen and over the second fire, 3 by which they are ignited and consumed. The object of the second screen is 30 to prevent the gaseous matters passing over the incandescent fuel too quickly and escaping into the chimney unconsumed. By the foregoing arrangement the visible and combustible gases are entirely consumed, the heated air and invisible vapour alone passing off by the chimney. In some cases the second 35 screen or bridge will not be required, but we reserve the right to vary the details of this Invention as required.

Sloughgrove & Wheatley's Improvements in Smoke-Consuming Furnaces.

SPECIFICATION in pursuance of the conditions of the Letters Patent, filed by the said John William Sloughgrove and James Henry Wheatley in the Great Seal Patent Office on the 7th September 1855.

TO ALL TO WHOM THESE PRESENTS SHALL COME, we, JOHN
5 WILLIAM SLOUGHGROVE and JAMES HENRY WHEATLEY, of Windsor Street, Islington, Engineers, send greeting.

WHEREAS Her most Excellent Majesty Queen Victoria, by Her Letters Patent, bearing date the Seventh day of March, in the year of our Lord One thousand eight hundred and fifty-five, in the eighteenth year of Her reign,
10 did, for Herself, Her heirs and successors, give and grant unto us, the said John William Sloughgrove and James Henry Wheatley, Her special licence that we, the said John William Sloughgrove and James Henry Wheatley, our executors, administrators, and assigns, or such others as we, the said John William Sloughgrove and James Henry Wheatley, our executors,
15 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 SMOKE-CONSUMING FURNACES**," upon
20 the condition (amongst others) that we, the said John William Sloughgrove and James Henry Wheatley, by an instrument in writing under our hands and seals, or under the hand and seal of one of us, should particularly 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
25 Patent Office within six calendar months next and immediately after the date of the said Letters Patent.

NOW KNOW YE, that we, the said John William Sloughgrove and James Henry Wheatley, do hereby declare the nature of our said Invention, and in what manner the same is to be performed, to be particularly described
30 and ascertained in and by the following statement:—

The object of our Invention is to thoroughly consume the combustible gases which emanate from burning coal, and are usually allowed to pass off into the atmosphere, forming those dense volumes of smoke which are so frequently observed issuing from engine shafts or chimnies, funnels of steam vessels, and
35 other places where furnaces are used. These improvements are applicable to the furnaces of all varieties of boilers, whether plain or tubular, brewers' and sugar refiners' furnaces, bakers' ovens, chemical works, and other places where it is desirable to prevent the emission of visible smoke. The improved furnace

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is fitted with two sets of fire bars, slightly inclining upward towards the back. At the end of the further set of bars is fitted a perforated bridge, and this may be made moveable or not. Below this bridge a door is fitted, in order to afford access to the space behind the bridge, for the purpose of cleaning out the same. Between the front and back set of fire bars is fitted a moveable bridge or 5 partition, attached to a lever, so that it may readily be moved up and down by the stoker or person in charge of the furnace. When the bridge or partition between the bars is lowered, access may be readily had to the back or further set of bars, and while the furnace is at work a brightly glowing fire is kept on this grate by pushing back the incandescent fuel from which the gas has 10 escaped from the front grate to the back. After the further grate has been supplied, the bridge is lifted, and all communication cut off between the two fires except through the holes or perforations in the bridge or diaphragm. The front fire is supplied with fuel in the ordinary manner. Now, when fuel is thrown on to the fire a large quantity of unconsumed gases and smoke are 15 immediately evolved, which, instead of being allowed to escape at once to the flue or shaft, are arrested by the perforated bridge. This is so constructed that a current of air is caused to be intimately mixed with the smoke, which then passes through the perforations in a series of streams on to the second fire; this being kept in a state of vivid combustion, the inflammable gases contained 20 in the smoke are flashed into flame, which circulates round the boiler, imparting its heat thereto, and effecting a saving of fuel, at the same time nothing but invisible vapour escapes from the chimney.

In the Drawings accompanying this Specification our improvements are shown applied to boilers of various forms of construction. 25

Figs. 1 and 2 represent longitudinal sections of a stationery boiler. A is the boiler; B, the brickwork which supports the same; C, the furnace; D and E, two series of fire bars. These incline slightly upward towards the back of the furnace, as shewn in the Figures. The fire bars are supported by the bearing bars F, F, and the bridge plate G. H is the dead plate; L, a perforated bridge, 30 which may be made either of fire-clay or of metal thickley coated with fire-clay. The perforations are made of a taper or conical form, the larger part being towards the flue. Between the sets of fire bars D and E is fitted a diaphragm K, which separates at will the after part of the furnace from the front part. This diaphragm is a double metal plate, closed at the top and sides, but open at 35 the bottom; it is fitted in guides, which are secured to the sides of the ash-pit, so that it may slide freely up and down. The back and front plates of the diaphragm are perforated with holes *k, k*, but they are not placed opposite each other; the rows of holes in the back plate are made between those in the front

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plate. This arrangement is for the purpose of dividing the streams of smoke, and more effectually mixing them with the current of atmospheric air that passes up through the bottom of the diaphragm. A lever L, secured to the shaft M, gives motion to the diaphragm; this lever is made sufficiently heavy
5 to counterpoise the greater portion of the weight of the diaphragm, so that it may be easily raised by the hand. The diaphragm is connected to the lever by two links, one of which is seen at N. This arrangement admits of the diaphragm moving in a perpendicular direction, notwithstanding the curve described by the end of the lever L. M is a quadrant, for the purpose of
10 adjusting the position of the lever L. The furnace is fitted with what we term a trunk front O, that is to say, the iron-work of the front projects, as shown in the Drawing, and is connected with the plate P, in order to afford a communication between the furnace and the space below the fire bars. This arrangement is for the purpose of carrying off the small quantity of smoke that
15 would otherwise hang near the furnace door, in consequence of its being beyond the influence of the draught, but by having this passage for its exit, it is rapidly conveyed below the fire bars D, and up through the fire. The fire bars E are supplied with fuel from the front fire; and to do this the diaphragm is lowered, as shown by Fig. 1, and a sufficient quantity of incandescent fuel is
20 pushed back upon the bars E. It should be observed that this fuel must be in a state of intense ignition, but not giving off any smoke, and that it is kept supplied in this manner. The diaphragm is then raised, as shewn by Fig. 2, and the coal is thrown upon the front fire in the ordinary manner; the smoke arising from its combustion passes through the holes of the front plate of the
25 diaphragm, where it is mixed with the current of air which passes up between the plates. The smoke and air are carried in divided streams through the back plate of the diaphragm on to the bright fire upon the bars E, by which they are instantly flashed into flame, which passes through the perforated bridge I; this perforated bridge prevents the smoke and air passing off to the flue before it
30 is thoroughly ignited, and this bridge may also be made moveable, like the diaphragm K.

Figs. 3 and 4 represent the Invention applied to a marine boiler; the different parts are marked with similar letters of reference to those in Figs. 1 and 2. The lever L does not interfere in any way with the projecting front,
35 but passes up by the side of it, close to the wall or side of the ash-pit. Although we have shown the diaphragm L as fitted with a lever for actuating the same, other mechanical means may be used to effect the object.

Figs. 5 and 6 show the application of the improvements to a Cornish boiler. In this arrangement the diaphragm is of a semicircular form, and has cogs or

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teeth k^2 cast upon the outer surface; k^3 is a pinion in gear with the teeth k^2 ; the pinion is keyed to a shaft or rod l^1 , which is carried out to the front of the boiler, and upon its outer end a handle is fitted, by which the diaphragm may be raised or lowered at pleasure. Where desirable, both the diaphragms k and k^3 may be made to move together; this may be done by having k^3 cast 5 with teeth, similar to k , and fitting the rod l^1 , to work it in connexion with k , as before described.

Figs. 7 and 8 represent a modification of the foregoing improvements. In this case the products of combustion are made to pass from the first fire down beneath the second set of fire bars, and up through that fire to the flue. 10 Fig. 7 shews the diaphragm K down, in which position the smoke would at once pass off to the flue or shaft. Fig. 8 represents the arrangement with the diaphragm raised. The products of combustion now take the course indicated by the arrows, and pass through the back fire, which is kept in a state of intense ignition, thereby consuming all inflammable matter, and 15 allowing only invisible vapour to escape. The other parts of the details are sufficiently obvious, and do not require describing in words. This arrangement may be applied to any form of construction of furnace.

Another modification of our improvements consists in fitting beneath the furnace bars a moveable plate, in such manner as to shut off the communica- 20 tion between the ash-pit and the flue or chimney, and thereby causing the air necessary to support combustion of the fuel to ascend through the fuel at the front of the fire bars, and descend through the incandescent fuel at the back, carrying with it the smoke or unconsumed gases. In this arrangement the fire bars are supported in a frame or cradle, moveable upon an axis, so that 25 the fire grate may be raised or lowered by means of a lever extending in front of the ash-pit.

The diagram, Fig. 9, represents an outline of this part of our Invention. A is the dead plate; B, one of the furnace bars; C, a bridge at the back of the furnace; D, a moveable plate beneath the grate. The dead plate A is 30 supported at a^1 , so as to move readily about its points of support; the furnace bars B move in a similar manner about the axis b^1 . Beneath the fire bars is fitted the plate D, moveable on an axis at d^1 , and connected to the fire bars by a rod or lever E. When the lever attached to the framework of the fire bars is pushed down, it causes the after part of the fire bars 35 to be elevated, and this action carries the bridge C close up to the bottom of the boiler, and likewise draws the plate D up to and in contact with the fire bars; the effect of this is, that a current of air is drawn rapidly through the fuel in front of the bars, which, owing to the rarefaction of the air

FIG. 1.

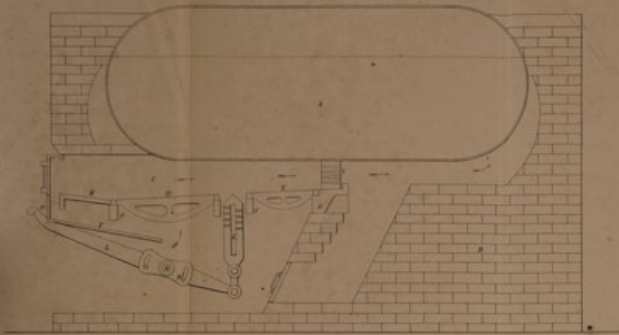


FIG. 2.

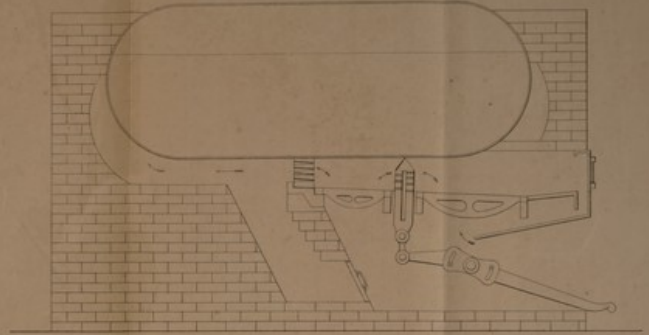


FIG. 3.

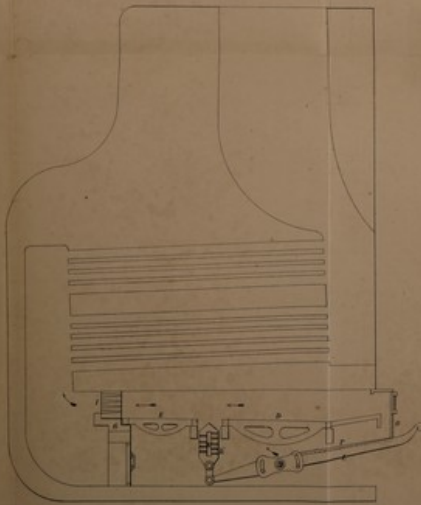
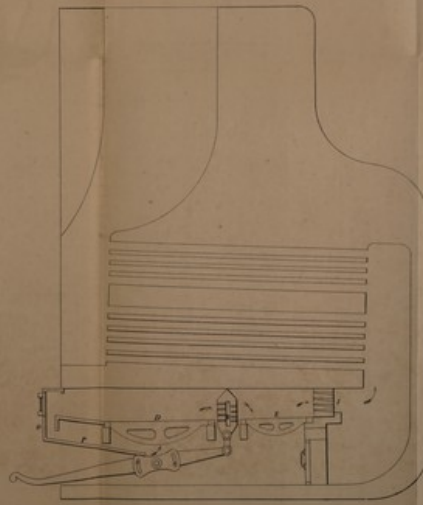


FIG. 4.



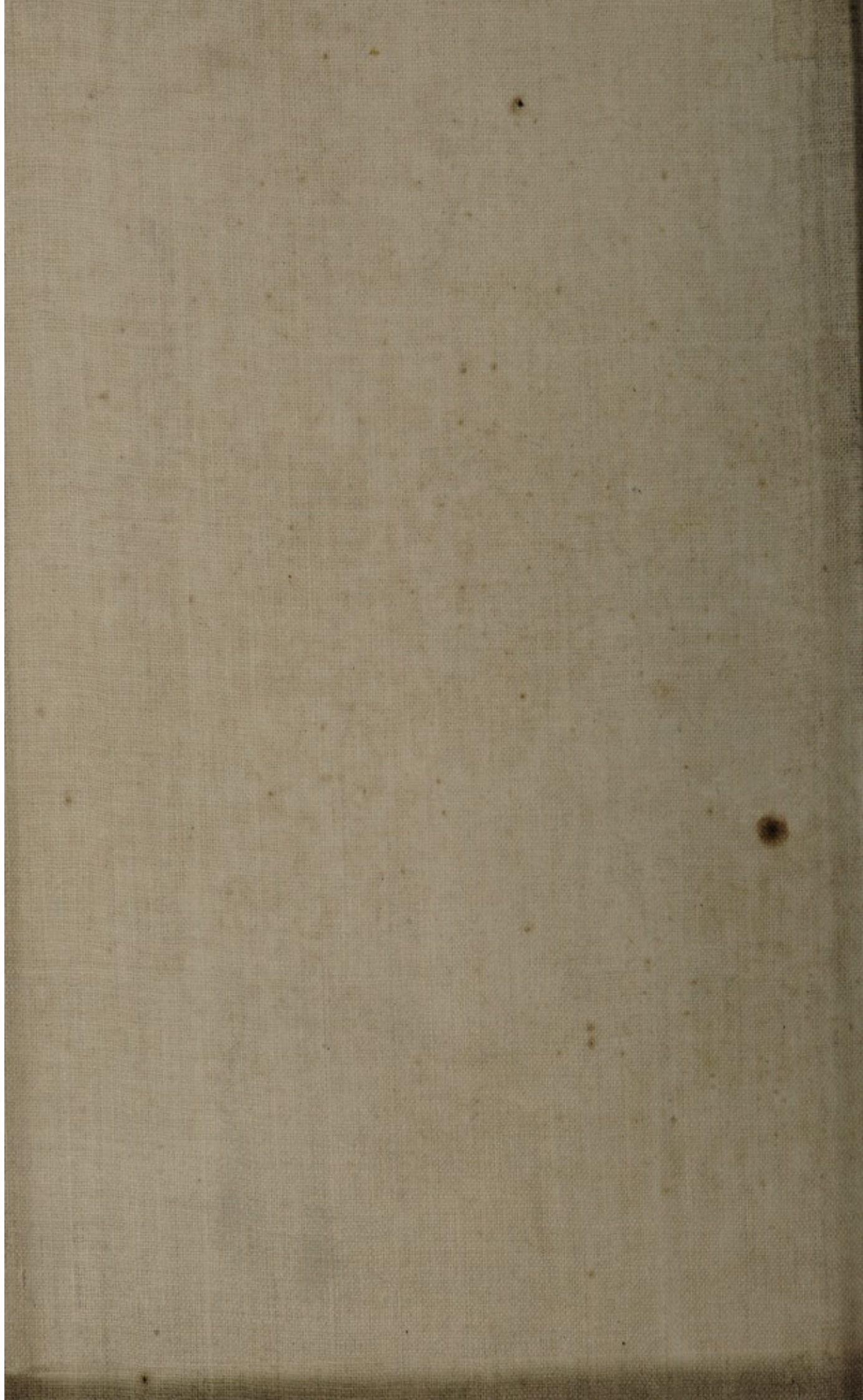


FIG. A.

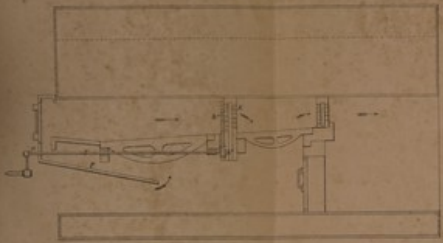


FIG. B.

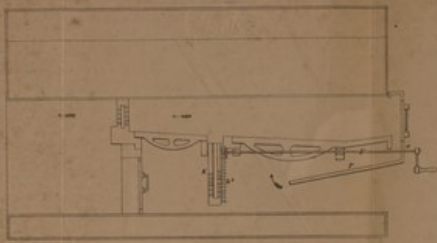


FIG. C.

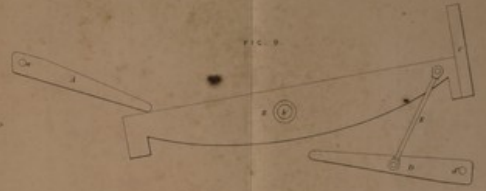


FIG. D.

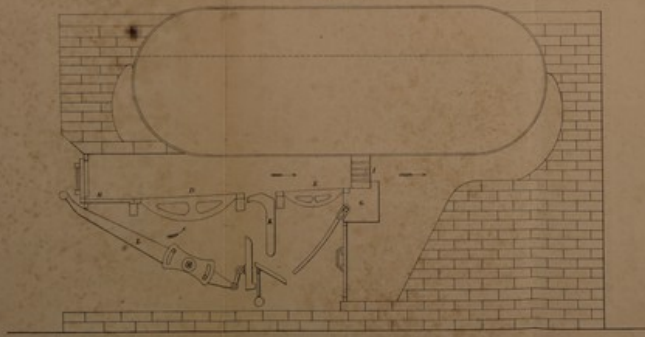
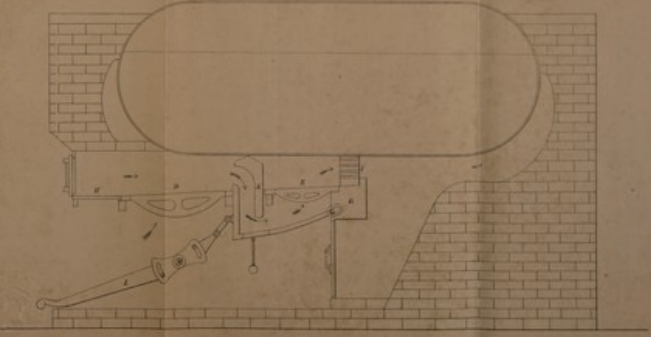
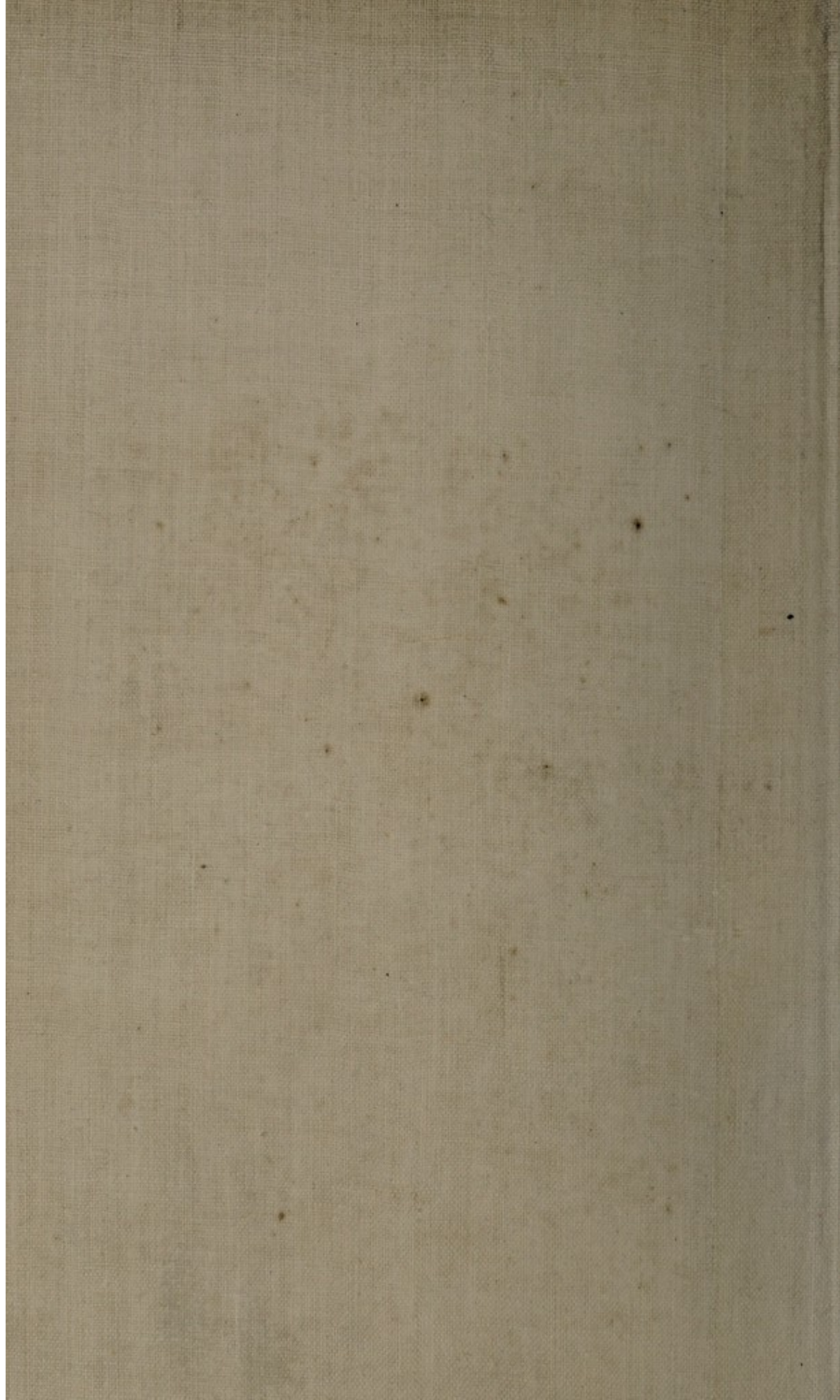


FIG. E.



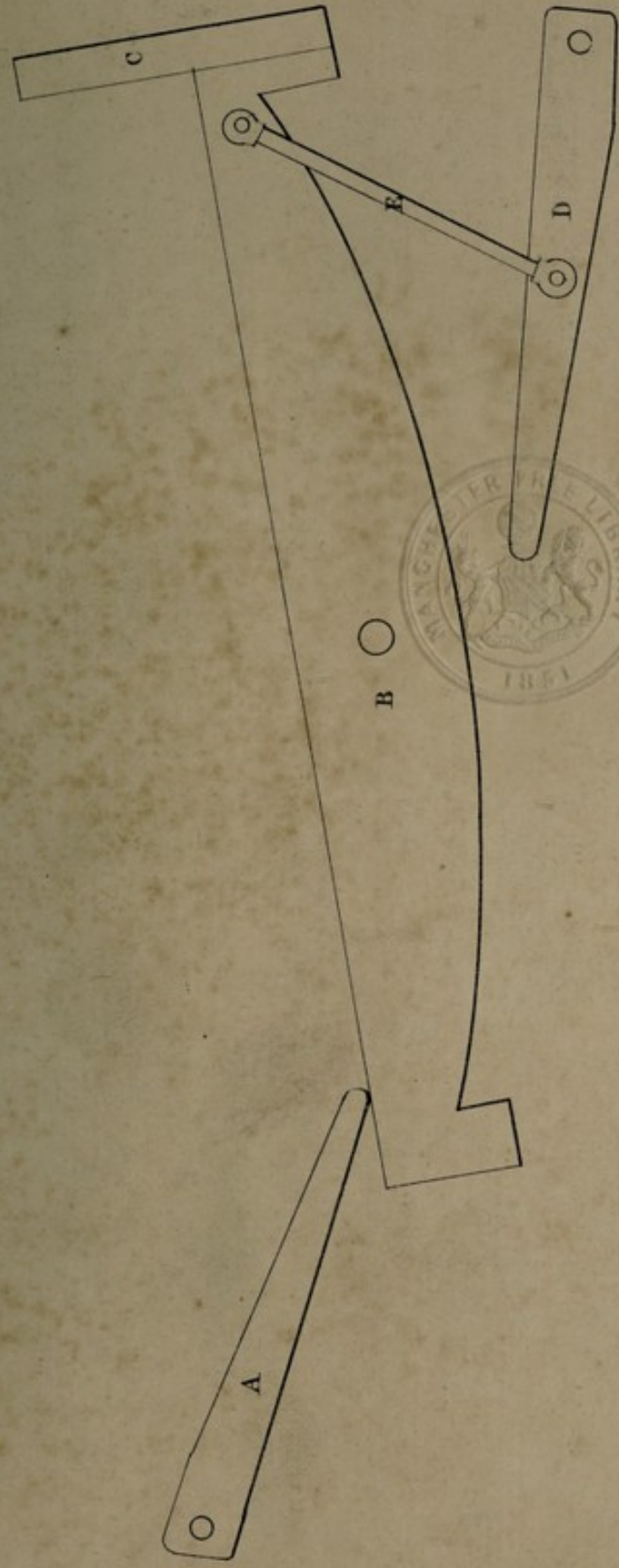
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(1 SHEET.)

A. D. 1855, March 7, N^o 507.

SLOUGHGROVE & WHEATLEY'S PROVISIONAL SPECIFICATION.



The drawing left with Provisional Specification is not colored.

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Sloughgrove & Wheatley's Improvements in Smoke-Consuming Furnaces.

in the chimneys, descends through the burning mass at the back of the grate, igniting all combustible matter, and allowing only invisible vapour to escape. The fire may be checked by partly depressing the lever by which the plate D is lowered, as shown in the Figure; this allows a current of air to pass into
5 the flue or chimney, which is thereby cooled, and the consumption of fuel retarded.

Having described the nature of our Invention, and the manner of carrying the same into practical use, we desire it to be understood that we do not confine ourselves to the precise arrangement of the details as herein described
10 and shown, as the same may be varied without departing from the Invention; but what we claim, and desire to secure under the herein-before in part recited Letters Patent is,—

Firstly, the mechanical arrangements for consuming smoke, as shown and described in reference to Figs. 1 to 6 of the accompanying Drawings, or any
15 mere modification thereof.

Secondly, the arrangement for consuming smoke, as shewn by Figs. 7 and 8, and herein-before described, or any mere modification thereof.

Thirdly, the arrangement for consuming smoke, as shewn by Fig. 9, and before described, or any mere modification thereof.

20 In witness whereof, I, the said James Henry Wheatley, have hereunto set my hand and seal, this Seventh day of September, One thousand eight hundred and fifty-five.

JAMES HENRY WHEATLEY. (L.S.)

Witness,

25 CHARLES BARLOW,
Patent Agent,
89, Chancery Lane, London.

LONDON:

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The first part of the report is devoted to a description of the country and the population of the district. It is found that the population has increased since the last census, and that the country is generally fertile and well cultivated.

The second part of the report contains a detailed account of the revenue of the district. It is found that the revenue has increased since the last year, and that the district is generally well governed.

The third part of the report contains a detailed account of the education of the district. It is found that the education has improved since the last year, and that the district is generally well educated.

The fourth part of the report contains a detailed account of the public works of the district. It is found that the public works have improved since the last year, and that the district is generally well provided with public works.

JAMES BARRY WILKINSON (2)

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