

Specification of Sir Thomas Cochrane and Alexander Galloway : machinery for removing the inconvenience of smoke or gas, &c.;

Contributors

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Galloway, Alexander.

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A.D. 1818 N^o 4253.

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

OF

SIR THOMAS COCHRANE

AND

ALEXANDER GALLOWAY.

MACHINERY FOR REMOVING THE
INCONVENIENCE OF SMOKE OR GAS, &c.

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A.D. 1818 N° 4253.

**Machinery for Removing the Inconvenience of
Smoke or Gas, &c.**

COCHRANE AND GALLOWAY'S SPECIFICATION.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, ALEXANDER GALLOWAY, of Holborn, in the County of Middlesex, Engineer, send greeting.

WHEREAS His present most Excellent Majesty King George the Third, did, by His Royal Letters Patent under the Great Seal of the United Kingdom
5 of Great Britain and Ireland, bearing date at Westminster, the Fourth day of May, in the fifty-eighth year of His reign, give and grant unto Sir Thomas Cochrane, Knight, commonly called Lord Cochrane, and me the said Alexander Galloway, our executors, administrators, and assigns, His especial licence, full power, sole privilege & authority, that we, the said Sir Thomas
10 Cochrane, commonly called Lord Cochrane, & Alexander Galloway, our exors, admors, & assigns, during the term of years therein expressed, should and lawfully might make, use, exercise, and vend, our Invention of "THE WORKING OR MAKING A MANUFACTURE, BEING A MACHINE OR MACHINES FOR REMOVING THE INCONVENIENCE OF SMOKE OR GASES GENERATED IN STOVES, FURNACES,
15 OR FIRE-PLACES, BY THE IGNITION OR COMBUSTION OF COALS OR OTHER INFLAMMABLE SUBSTANCES, AND IN CERTAIN CASES FOR DIRECTING THE HEAT AND APPLYING SUCH SMOKE OR GASES TO VARIOUS USEFUL PURPOSES," within England, Wales, and Berwick upon Tweed, in such manner as to us the said Sir Thomas Cochrane, commonly called Lord Cochrane, and Alexander Galloway, our
20 executors, administrators, and assigns, should, in our discretion, seem meet; in which said Letters Patent is contained a proviso that if we, the said Sir Thomas Cochrane, commonly called Lord Cochrane, and Alexander

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Galloway, or one of us, should not particularly describe and ascertain the nature of our said Invention, and in what manner the same is to be performed, by an instrument in writing under our hands and seals, or under the hand and seal of one of us, and cause the same to be inrolled in His said Majesty's High Court of Chancery within six calendar months next and immediately after the date of the said Letters Patent, that then the said Lettters Patent and all liberties and advantages whatsoever thereby granted, should utterly cease, determine, and become void, as in and by the said recited Letters Patent, relation being thereunto had, may more fully and at large appear. 5

NOW KNOW YE, that in compliance with the said proviso, I, the said Alexander Galloway, do hereby declare that the nature of our said Invention, and the manner in which the same is to be performed, are particularly described and ascertained in manner following (that is to say):— 10

Our said Invention consists of making and forming a machine or machines for the heating of boilers, and may be denominated improved air-tight stoves, 15 furnaces, or fire-places, into which coals or other combustible and inflammable substances shall be used to generate and convey heat by the ignition and combustion of coal or other fit substance, and which air-tight stoves, furnaces, or fire-places must be composed and formed of any suitable materials, and with means which will permit the entrance and prevent the escape of any 20 atmospheric air or gas into or from such stove, furnace, or fire-place, but at the situation or situations formed for the introduction and exit of such air or gas, by means of pumps, valves, or other suitable machinery, which shall be capable of supplying any such stove, furnace, or fire-place with any required quantity of atmospheric air to keep up the ignition of any fuel or combustible substance, 25 and at the same time to force out of any such stove, furnace, or fire-place any smoke or gas so generated against any required resistance or pressure. Our Invention is of a three-fold character. The first part of it is for removing the inconvenience of smoke or gases generated in stoves, furnaces, or fire-places by the ignition or combustion of coals, or other inflammable substances; the 30 second part is in certain cases for directing the heat so generated; and the third part is for applying such smoke or gases to various useful purposes hereafter to be explained. These said branches or parts of our Invention may be applied collectively, or so much of them as may be required, under a great variety of modifications which will be familiar to any competent workman constructing 35 such works. Fig^s 1 and 2 are views of machines for forming air-tight stoves, furnaces, or fire-places for heating boilers for generating steam with the apparatus for blowing in compressed air into the fire-place, and for condensing and dissipating, and thereby removing the inconvenience and annoyance of smoke

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and gases generated in any air-tight stove, furnace, or fire-place, but without applying such smoke or gas to any useful object, and which are applicable to any land situation, but of such dimensions and modifications as may best suit the particular convenience of the employment and place to which they are to be applied.

5 A, A, A, A, shew an air-tight horizontal and vertical stove, furnace, or fire-place, with its flues, to heat a boiler for generating steam, or for such other purposes to which it may be found convenient to apply the action of heat. B is the pipe thro' which a supply of atmospheric air is conveyed by means of a pump or pumps, or other instrument for forcing air into the fire-place, to keep up

10 the combustion of any fuel previously ignited; in the pipe B is contained a metal valve which shuts against its seat by the pressure of the smoke from the fire, and opens by the force of the atmospheric air conveyed from the pump or other proper instrument employed to blow in the air; the pipe B may either discharge its supplies of air by being introduced under

15 or upon the ignited fuel of the horizontal fire, or be conveyed into any convenient part of the vertical fire-place; or if more than one pump is employed for this purpose, then the air may be blown into both fires at once, as circumstances may point out. C is the plate or valve by which the smoke, gas, and heated air are compressed, according to the pressure

20 placed on such plate or valve, either by any weight or fluid, or by any other known means of producing any required resistance. The opening or rising from its seat of the valve or plate C, allows the escape of the smoke, gas, and heated air, when the inflammable parts of the smoke shall have been subjected to any required degree of exhaustion, according to the

25 resistance made to their escape. The reservoir or vessel D, D, receives and incloses the end of the pipe which forms the seat of the valve C, and is made to contain the required quantity of water that shall be sufficient to perform the double object of confining the smoke until it is deprived by the action of the fire of any required quantity of its combustibile properties, and in its exit

30 and passage through the water it is cleansed of some of its mucilaginous properties, and in such a purified state it may either be collected for any useful object or it may be allowed to escape into the atmosphere without creating the inconvenience or annoyance generally experienced from the exit of foul smoke from any ordinary chimney, particularly from those chimnies

35 employed for the use of steam engines. E, E, are the iron doors to shut off the fire and the ash-pit G, G. F, F, is the metal chamber which incloses the fire doors E, E, and the ash-pit G, G, and which must be made perfectly air-tight when its cover I, I, is shut into its mouth H, H; this mouth or curved orifice in the chamber F, F, furnishes, when it is open, an introduction

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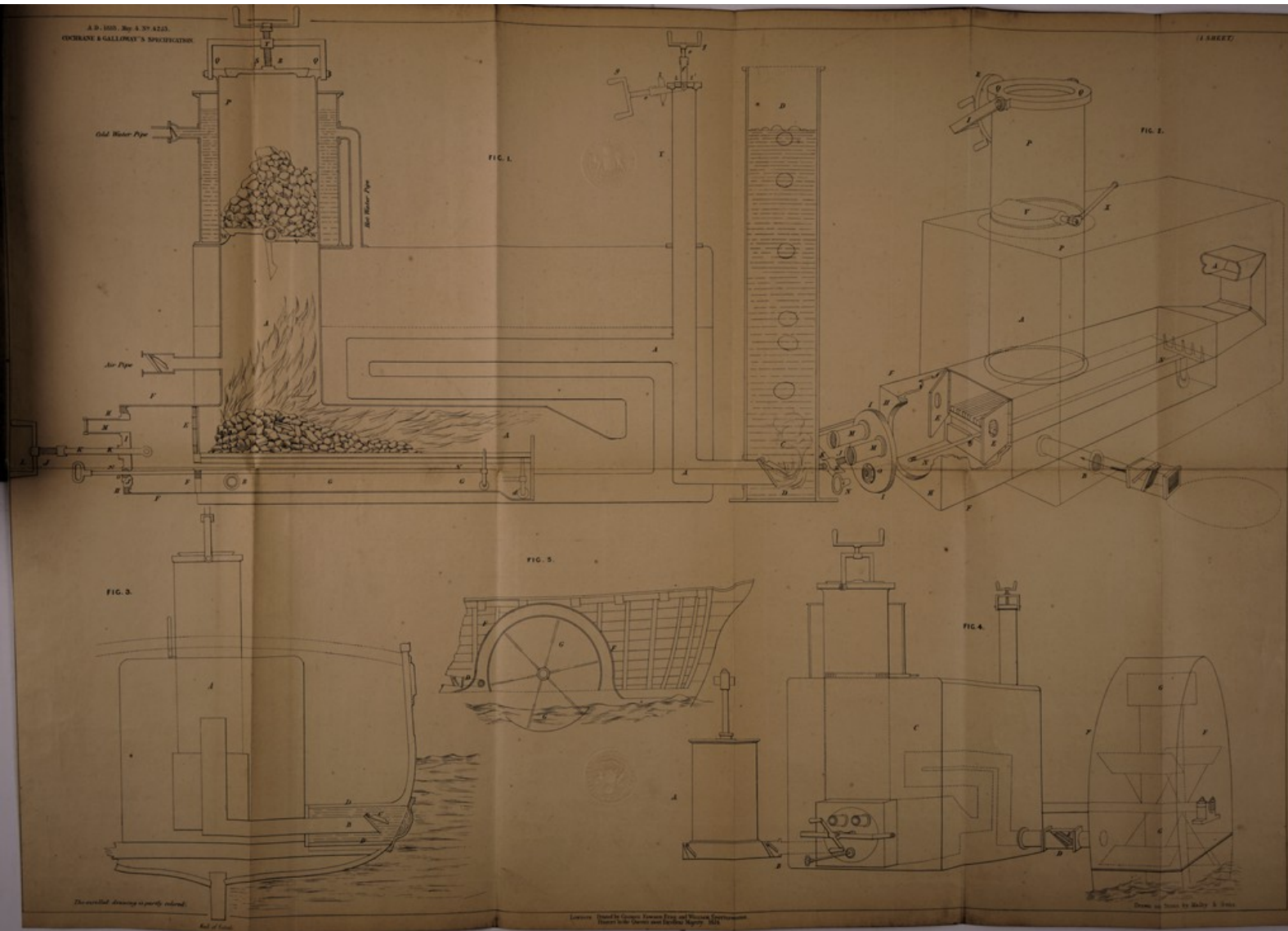
to the doors of the fire and the ash-pit; I, I, the spherical cover must be fitted and ground correctly air-tight into the mouth of the chamber F, F, and which is kept in that state by the pressure of the screw J, and by which means the atmospheric air is prevented entering into the fire or the ash-pit through the doors E, E; the smoke, gas, or heated air, are equally secured from 5 escaping through the doors of the fire and ash-pit. K, K, is the iron bridge, which swings on its pivots, and which is connected to the chamber F, F, and into which the screw J works by its lever L, and by a few turns of which screw the cover I, I, is admitted to move out of the way of the orifice or mouth of chamber, and thereby gives a free entrance into it when required. M, M, 10 are metal tubes, and of sufficient length to prevent the action of the fire from injuring the strong glass or glasses that are to be fixed in them for viewing the fire, and of such a diameter as will afford a general survey of the fire; these tubes, with their glasses, must be made air-tight and fixed securely in the spherical cover I, I, opposite the apertures made in the fire doors to view 15 the fire. N, N, is an iron rake with a shifting handle, and a roller or feet placed at the bottom to prevent the teeth of rake from falling intirely out of the fire-bars, although it is desireable that they should be as low as possible, and it is necessary when this rake is not in use that it should be kept in the recess made for it in the ash-pit at d, and which is introduced into the ash-pit 20 for distributing the fire and for cleaning the bars on which the fire is placed, and which rake moves in a ball and socket stuffing box O, inserted in the cover I, I; by this means the fire is raked without opening the cover I, I, and without sustaining any loss of the compressed air with which the fire and ash-pit is supplied. P, P, is a metallic magazine placed on the top of the vertical 25 fire, and surrounded with a case or reservoir for holding of water to keep the magazine from becoming too warm, and from which the boiler may be supplied with warm water as fast as the reservoir is fed with cold water, and which magazine P, P, may be made to contain any required supply of unignited fuel, and which magazine must be made air-tight in all its parts. Q is the frame 30 or mouth of magazine, through which the fuel is to be conveyed into the interior of it. R is the air-tight cover or plate, which by the pressure of the screw S working through the swinging bridge T, forces down the cover R. Near the bottom of the magazine P, P, is placed a valve or door V, with an axle through or across its centre, after the manner of a throatle valve of a 35 steam engine, as respects the axle of the valve or door; one half of which valve or door will rest when closed on the lower part of the seat W, W, while the other half of the valve or door rests on the upper part of the seat. The form of the valve seat, as shown at W, W, will be found to be very con-

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venient, as, by its angular shape, no coals or other fuel will lay upon it to obstruct the shutting of the valve or door V, which is performed by the motion of the handle X, see Figure 2. The object of this valve or door is not only to shut off the unignited fuel from the vertical fire, but to allow the magazine P, P, to be replenished with fuel as often as required, without permitting any considerable escape of smoke, gas, or heated air; and when the cover R is closed or shut, then the valve V may be opened whenever the fire shall require any additional supply of fuel, and when it is so opened the cover R must completely prevent the escape of any smoke, gas, or heated air through the magazine P, P. Y is a chimney of any required height, issuing from the top of the boiler, and in connexion with the flue, with its cover Z, Z, its screw *e*, the bridge *f* in which the screw works, and the lever *g* by which it is moved. This chimney may be used for carrying off the smoke when the fire is first lighted, and when the valve or cover I, I, is opened to admit freely and copiously the atmospheric air under the fire; when the stove, furnace, or fire-place of the boiler is so used, then it is a fire on the common principle, and when used in that state, it forms no part of our Invention, but when the covers and valves I, I, and Z, Z, with either the cover R or the valve V, are shut by any sufficient machinery, and rendered air-tight in those parts, and a full supply of atmospheric air forced into the fire at the place or places assigned for its entrance, then such a change and combination in the machinery puts this part of the principle of our Invention in full force. A fire-place and its apparatus thus arranged will produce not only a saving of fuel by extracting a greater quantity of combustile material from the fuel, but will direct the heat to the object of its application more effectually than hitherto done, and will at the same time remove the inconvenience and annoyance sustained from the issue of large quantities of foul smoke, as at present experienced from ordinary fires and chimnies employed for the heating of boilers. The letters in the foregoing Figures 1 and 2 are made to represent and correspond with each other in the description of similar parts as far as they extend. Figure 3 shews a view of a boiler, flues, &c., similar to the boiler, flues, &c. shewn in Figure 1, but fitted to a ship or vessel, and from which the smoke, gas, and heated air are permitted to escape for dissipation through the side of such ship or vessel into the water at such a depth from the surface as may be necessary. The smoke pipe or horizontal chimney B leading from the boiler A contains the valve C, which opens by the pressure of the smoke, and is shut by that of the water. The pipe or chimney B is surrounded, and the valve C guarded, by the metal case or pipe D, D, which connects to the boiler, and is made water-tight and of such

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dimensions as shall contain a sufficient quantity of water to keep the case or pipe D, D, so cool as not to injure the timber of the vessel with which it comes immediately in contact. The pressure on the valve C is regulated by its area and the height of the external column of water bearing on the valve, and according to which pressure must be the force of the compressed atmospheric air necessary 5 to feed the fire in which the smoke is generated. Fig. 4 will illustrate not only the third part of our Invention, namely, that of applying the smoke and gases issuing from one of our air-tight fire-places, but it will also exhibit the two first parts of it, by forming a combined view of the whole, besides shewing many combinations which are no part of our Invention, but which are common 10 and necessary to give them effect, and shewing the operation of each as applied to the working of steam boilers on board ship, and the application of such smoke and gases resulting from the use of such air-tight fire-places to assist the steam engine machinery employed for the propelling of any such vessel through the water. Figure 4 represents a perspective view of a blowing pump, 15 a steam-engine boiler with air-tight fire-places, and apparatus to be placed on board ship, with a paddle wheel to be worked either in the interior or exterior of a vessel, and an air-tight reservoir or case for inclosing that part of the paddle wheel. The principal object of this Figure 4 is not to lay claim to those parts or combinations of machines except what has been explained or is 20 to be explained as our Invention, but to afford the means of describing that part of our Invention more effectually which relates to the mode of applying the smoke and gases generated in our improved air-tight stoves, furnaces, or fire-places to certain useful purposes, which are to assist the propelling of a vessel by such smoke and gases, by forcing down the water that will rise in 25 such paddle wheel, reservoir, or case, (according to the ship's draught of water, low enough to relieve such paddle wheel from the obstruction of such a body of water, and which desirable object of propelling a vessel by internal paddles has been to a small extent accomplished by means of pumping directly into the paddle reservoirs atmospheric air to force and keep down the water, but 30 the great labor of supplying such reservoirs with air, owing to the great dissipation of such air by the rotation of the paddle wheels in the direction of their motions, have hitherto, among other causes, rendered that project unsuccessful, but which our Invention is intended to obviate and remove. The great and easy supply of smoke and gases issuing from our air-tight stoves, furnaces, or 35 fire-places, when properly connected with these paddle reservoirs will be sufficient, not only to force and keep down any body of water that may by any pressure be invited into such paddle wheel, reservoir, or case, or the well or





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opening in the bottom of such vessel, but will amply provide for any loss or dissipation of the smoke or gases that may necessarily or unnecessarily take place by the rotation of any paddle wheel in its motion through the water, besides supplying the loss and dissipation that may be created by the passage
5 and motion of the vessel through the water. It is obvious that the atmospheric air pumped, forced, or conveyed into a fire-place to keep on and promote the ignition of any fuel will become rarefied, and thereby considerably increased in its bulk, together with the smoke and gases generated by the combustion of any fuel, will form a considerable column and supply of gases
10 to be used for forcing and keeping down the water in such paddle wheel, reservoir, or case, with a small degree of power or labor compared to what would be necessary to feed such reservoir or case with an adequate supply of ordinary atmospheric air. Figure 4, A, represents a blowing pump; B, the pipe through which the air is forced into the fire-place; C, the boiler, which
15 contains the air-tight fire-place and apparatus; D, the pipe; and E, the valve through which the smoke and gases are conveyed into the paddle wheel, reservoir, or case, when such smoke and gases shall be so compressed as to be able to lift the valve E, and the pressure of the water upon it. While the smoke and gases are thus usefully applied, any superabundant quantity generated in
20 the air-tight fire-place will be deposited and dispersed in the water after they have performed their duty or useful purposes in the paddle wheel, reservoir, or case, without the inconvenience or annoyance occasioned by the issue of foul smoke, as from common chimnies. Figure 5 is a section of a paddle wheel, with its reservoir or case and a tunnel, which may either extend round the
25 reservoir or case, or may be placed in the interior of the reservoir near the extremity, and extending from side to side; this tunnel will be found to be a very convenient assistant to enable the smoke and gases to keep down the back water, and give a free communication to the smoke and gases from side to side of the paddle case. The abstract parts, or the combinations of machinery by
30 which we construct our air-tight stoves, furnaces, or fire-places, we do not claim but as they are necessary as means to effect the objects of our Invention; these objects may also be effected and produced by other abstract parts and combinations of machinery not explained or described either in this Specification or in the Drawings annexed, but yet such alterations may be made embracing the
35 principles of our Invention that may be a different modification of them, and yet be substantially in their effects and principles our Invention, which is for the Working or Making a Manufacture, being a Machine or Machines for Removing the Inconvenience of Smoke or Gases Generated in Stoves, Furnaces, or

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Fire-places by the Ignition or Combustion of Coals or other Inflammable Substances, and in certain Cases for Directing the Heat and Applying such Smoke or Gases to various useful Purposes.

In witness whereof, I, the said Alexander Galloway, have hereunto set my hand and seal, this Fourth day of November, in the year of our 5 Lord One thousand eight hundred and eighteen.

ALEX^R (L.S.) GALLOWAY.

AND BE IT REMEMBERED, that on the Fourth day of November, in the fifty-ninth year of the reign of His Majesty King George the Third, the said Alexander Galloway came before our said Lord the King in His 10 Chancery, and acknowledged the instrument aforesaid, and all and every thing therein contained and specified, in form above written. And also the instrument aforesaid was stamped according to the tenor of the Statute made in the fifty-fifth year of His said Majesty's reign.

Inrolled the Fourth day of November, One thousand eight hundred and 15 eighteen.

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