

# **Specification of Thomas Hedley and Cuthbert Rodham : apparatus for purifying the igneous vapours arising from furnaces, &c.;**

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A.D. 1842 . N<sup>o</sup> 9289.



SPECIFICATION

OF

THOMAS HEDLEY  
AND  
CUTHBERT RODHAM.

APPARATUS FOR PURIFYING THE  
IGNEOUS VAPOURS ARISING FROM  
FURNACES, &c.

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A.D. 1842 . . . . . N<sup>o</sup> 9289.

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**Apparatus for Purifying the Igneous Vapours arising  
from Furnaces, &c.**

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**HEDLEY'S SPECIFICATION.**

**TO ALL TO WHOM THESE PRESENTS SHALL COME,** we, THOMAS HEDLEY, of the Town and Borough of Newcastle upon Tyne, Gentleman, and CUTHBERT RODHAM, of Gateshead, in the County of Durham, Millwright, send greeting.

5 **WHEREAS** Her present most Excellent Majesty Queen Victoria, by Her Letters Patent under the Great Seal of Great Britain, bearing date at Westminster, the Seventh day of March, in the fifth year of Her reign, did, for Herself, Her heirs and successors, give and grant unto us, the said Thomas Hedley and Cuthbert Rodham, Her especial licence, full power, sole privilege  
10 and authority, that we, the said Thomas Hedley and Cuthbert Rodham, our exors, admors, and assigns, or such others as we, the said Thomas Hedley and Cuthbert Rodham, our exors, admors, or assigns, should at any time agree with, and no others, from time to time and at all times during the term of years therein expressed, should and lawfully might make, use, exercise, and vend, within  
15 England, Wales, and the Town of Berwick upon Tweed, our Invention of "**AN APPARATUS FOR PURIFYING THE SMOKE, GASES, AND NOXIOUS VAPOURS ARISING FROM CERTAIN FIRES, STOVES, AND FURNACES;**" in which said Letters Patent is contained a proviso that we, the said Thomas Hedley and Cuthbert Rodham, or one of us, shall cause a particular description of the nature of our said  
20 Invention, and in what manner the same is to be performed, to be inrolled in Her said Majesty's High Court of Chancery within six calendar months next and immediately after the date of the said in part recited Letters Patent, as in and by the same, reference being thereunto had, will more fully and at large appear.



*Hedley's Apparatus for Purifying Smoke, &c., arising from Fires, &c.*

NOW KNOW YE, that in compliance with the said proviso, we, the said Thomas Hedley and Cuthbert Rodham, do hereby declare that the nature of our said Invention, and the manner in which the same is to be performed, are fully described and ascertained in and by the following statement thereof, reference being had to the Drawing hereunto annexed, and to the figures and letters marked 5 thereon (that is to say):—

Our Invention relates to a mode of constructing an apparatus for purifying by washing, the smoke, gases, and vapours of such fires, stoves, and furnaces as during the process of combustion emit smoke, gases, or vapours highly charged with unconsumed carbon, or chemical, mineral, and metallic matters of a noxious 10 character. And in order that our Invention may be most fully understood and readily carried into effect, we will proceed to describe the Drawing hereunto annexed, first remarking, that we are aware that many attempts have been made to purify the smoke, gases, and vapours arising from the fires, stoves, or furnaces of manufactories, works, and buildings, by means of water, particularly copper 15 and lead works and some chemical works, also steam engine boiler and other furnaces, but we believe without success, owing to the mode of applying the water having materially injured or destroyed the draft of the flues and chimney, and the application of water for such purposes has in many cases been abandoned. Now, according to our Invention, the smoke, gases, and vapours arising 20 from fires, stoves, and furnaces, when of a highly impure character, are effectually purified, and the draft of the flues is improved, and the deposit of matters or solid particles separated from the water will be of value.

## DESCRIPTION OF THE DRAWING.

The Drawing represents the section and plan of an apparatus constructed 25 according to our Invention, and it will be seen to consist of a series of ascending and descending flues, connected with each other as hereafter explained. The vapours, gases, and smoke arising from one or more fires, stoves, or furnaces, are made to pass through these flues, and then the purified products evolve from the chimney or other vent; and the apparatus is so arranged that streams 30 or showers of water are caused to descend and mix with the vapours, gases, and smoke in the descending flues, by which means the vapours, gases, and smoke are washed and forced downwards. In the ascending flues no water is applied, consequently the vapours, gases, and smoke freely ascend without any interruption, which they would not do if they were opposed by water falling 35 upon them in their upward course. And it will be seen that the descending flues are placed so far apart from the ascending flues as to leave sufficient room to turn an arch at the top in a sloping or inclined direction downwards, and the



*Hedley's Apparatus for Purifying Smoke, &c., arising from Fires, &c.*

partitions which divide the ascending from the descending flues are rounded at their lower ends, the effect of which will be found to be that the rush of water down the descending flues will cause a quick and powerful draft in the ascending flues, and that the vapours, gases, and smoke will be purified by mixing  
5 with and being washed by the water in their downward course, and the draft in the ascending flue will at the same time be so powerful that the partly purified smoke, gases, and vapours will rush up the ascending flues. *a, a*, is the flue which comes from the fire stove or furnace to which the apparatus is applied. *b, b*, is an ascending flue leading to and turning over into the descending flue *d*,  
10 by a flue *d<sup>2</sup>*, sloping down from the spring of the arch at the top of the flue *b, b*. Above the flue *d* is placed a water box, with a perforated plate at the bottom *d<sup>1</sup>*, through which the water, in streams or showers, passes down the flue *d*, and mixing with the vapours, gases, and smoke, force them downwards and encrease the draft in the ascending flue *b, b*. In consequence of the flue or passage *d<sup>2</sup>*,  
15 connecting the ascending flue *b, b*, with the descending flue *d*, being sloped or inclined downwards from the spring of the arch at an angle, as is shewn in the Drawing, it should be observed, that round the inside of the descending flues are ledges or projections *n, n*, of an inch to an inch and a half in breadth, of brick, stone, slate, or other suitable material, which are placed at a distance of  
20 from three to four feet from each other, with an edge slanting down, to prevent the possibility of any gases, vapours, or smoke escaping the water and passing up by the sides of the flue. The gases, vapours, and smoke, in their downward passage, become partly purified, and the matters carried thereby are separated and mix with the water which passes into the tank or reservoir marked *D, D, D*,  
25 in Figure 2, through the side apertures *k, k, k, k*, at the bottom of the flues, and are run off by a sluice at the end into other reservoirs, where the water is gradually drained off, and the matters so separated from the gases, vapours, and smoke removed. The water in the tank or reservoir *D, D, D*, is so regulated by the sluice at the escape end as to stand as high above the aperture at the  
30 bottom of the flue *d* as will leave the passage into the ascending flue *e, e*, to be of the same dimensions as the ascending & descending flues. The surface of the water being above the level of the aperture *k*, forms a bottom to the flue, and offers such resistance to the current of gas, vapour, and smoke, then partly purified in its progress down the flue *d*, as to cause it to pass round into and  
35 ascend up the flue *e, e*, which communicates with the flue *d* at the lower end. The vapours, gases, and smoke then rise freely up the flue *e, e*, in consequence of a strong draft being kept up in that flue by its opening into the descending flue *f, f*, at its upper end, by a second inclined connecting flue *e<sup>1</sup>*, sloping downwards from the spring of the arch, where the smoke, gases, and vapours are



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forcibly driven down the descending flue *f, f*, by another strong shower or stream of water rushing from another perforated box placed at the top of the flue *f, f*, which mixes with, further washes, and purifies the gases, vapours, and smoke, and passes into the tank or reservoir *D, D, D*, by the apertures *k* at the bottom of the flue; the surface of the water in the tank being also kept so far above 5 the apertures at the bottom of flue *f, f*, as to leave a passage equal to the size of the flues for the gases, vapours, and smoke to pass round into and to ascend up the flue *g, g*, (which communicates with flue *f, f*, at the lower end). In consequence of the draft being kept up in the flue *g, g*, by its opening into the descending flue *h, h*, at its upper end by a third inclined connecting flue, sloping 10 downwards from the spring of the arch, where the gases, smoke, and vapours are forcibly driven down the descending flue *h, h*, by another strong shower from a similar perforated box or cistern placed at the top of this flue, which mixes with and further washes the gases, vapours, and smoke, in the same manner as above described, and a further deposit is made, which flows through the opening 15 at the bottom of this flue into the tank or reservoir *D, D, D*. The process will be repeated until the gases, vapours, and smoke are perfectly purified, and are then evolved from the chimney or other outlet in an innoxious state, and the deposited matters are removed from the tanks or reservoirs. It should be stated that the apparatus here shewn and described is intended to be applied to the 20 flue of a furnace used in the manufacture of sulphate of soda, but it is equally applicable to other work and manufactory where noxious vapours and smoke evolve from the flues or chimneys, where a considerable quantity of smoke is generated, or where mineral or metallic or other noxious matters are evolved into the atmosphere. In such cases, when the Invention is applied, the purified 25 vapours only are allowed to escape, the metallic and other matters previously carried by the gases, smoke, or vapours, being separated by the washings with water, and deposited. Although the apparatus is shewn to be constructed of iron, brick, and stone, we do not confine ourselves thereto, as other suitable materials may be used. In some cases where the impurities are not easily 30 separated we apply a series of jets, forming a sheet of water in an oblique direction, within the first inclined or descending flue *a, a*, as is shewn at *i, i*; and we also apply jets of steam in some of the ascending flues, as is shewn at *m, m*, such jets of steam mixing with the gases, vapours, and smoke, assists the washing process and quickens the draft in those flues, but these are not essen- 35 tial to our Invention. *k, k, k, k*, are the apertures from the flues into the reservoir or tank *D, D, D*. *o* is a damper to regulate the draft. *l* is a pipe for supplying water to the water boxes, and the water is supplied by pipes from a reservoir or by pumps. We would remark, that this apparatus is not intended

FIG. 1.  
Longitudinal Section.

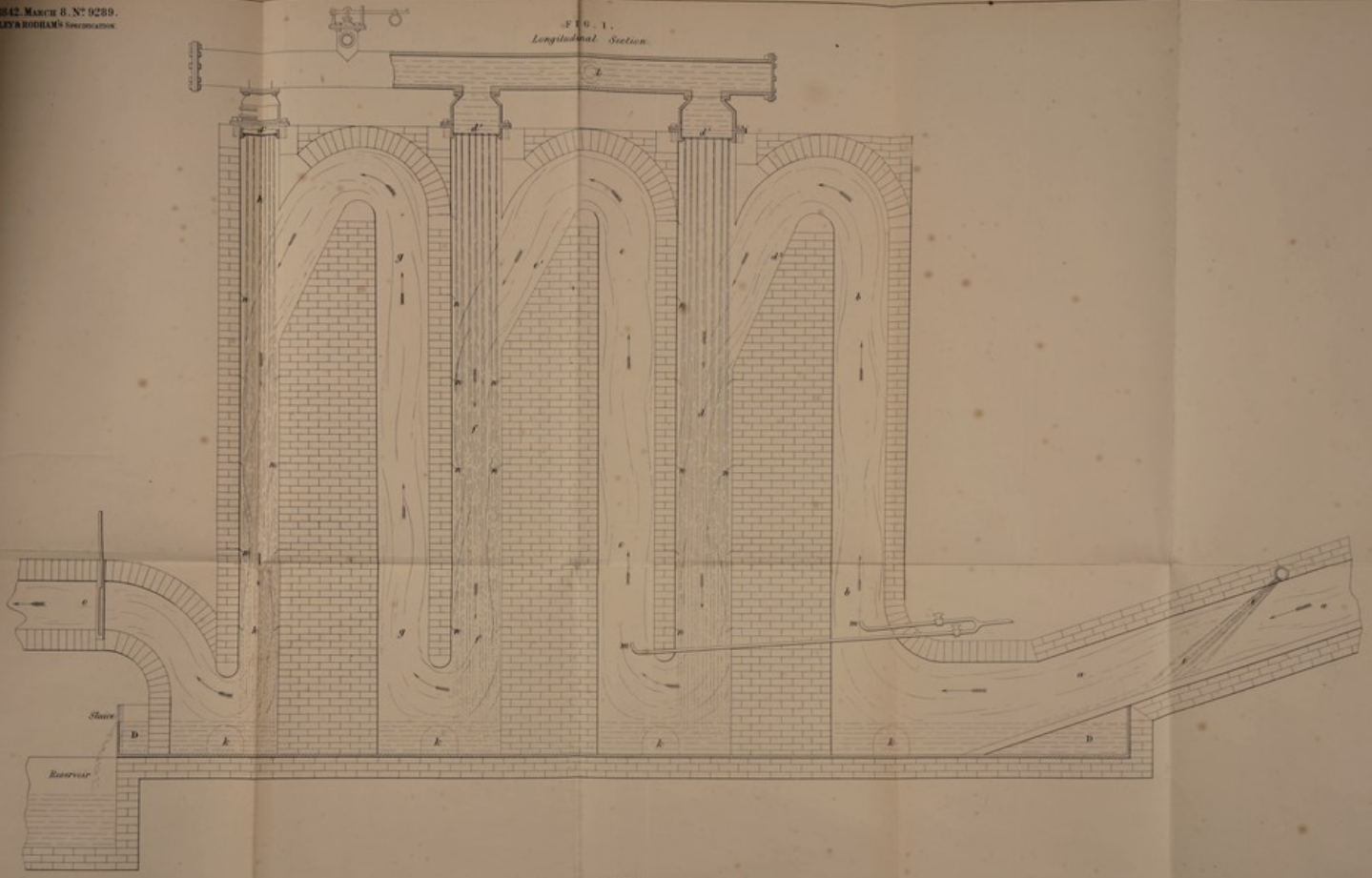



FIG. 2.  
Ground Plan.



The Engraving is colored.

Scale half an Inch to one Foot.





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*Hedley's Apparatus for Purifying Smoke, &c., arising from Fires, &c.*

to be applied to small fires, stoves, or furnaces for domestic purposes, but is intended for factories and extensive works, where the quantities of impurities are very great.

Having thus described our Invention, and the manner in which the same is  
 5 to be performed, we would have it understood that what we claim as our Invention is, first, the mode of constructing an apparatus for purifying vapours, gases, and smoke, arising from certain fires, stoves, and furnaces, by combining two or more ascending flues with descending flues, by inclined or sloping flues or passages at their upper ends with streams or showers of water to fall down  
 10 the descending flues into suitable reservoirs below, leaving a space above the water in such reservoirs for the passage of the gases, smoke, and vapours, to pass into the next ascending flue, as above described; and, secondly, we claim the combining an ascending flue and a descending flue by means of an inclined passage or flue at the upper parts thereof, in such cases as have water descend-  
 15 ing down a descending flue, to purify gases, vapours, or smoke from certain fires, stoves, and furnaces, as above described.

In witness whereof, I, the said Thomas Hedley, have hereunto set my hand and seal, this Seventh day of September, in the year of our Lord One thousand eight hundred and forty-two.

20

THO<sup>s</sup> (L.S.) HEDLEY.

**AND BE IT REMEMBERED**, that on the Seventh day of September, in the year of our Lord 1842, the aforesaid Thomas Hedley came before our said Lady the Queen in Her Chancery, and acknowledged the Specification aforesaid, and all and every thing therein contained and specified, in form above  
 25 written. And also the Specification aforesaid was stamped according to the tenor of the Statute made for that purpose.

Inrolled the Seventh day of September, in the year of our Lord One thousand eight hundred and forty-two.

LONDON:

Printed by GEORGE EDWARD EYRE and WILLIAM SPOTTISWOODE,  
 Printers to the Queen's most Excellent Majesty. 1854.



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