which must produce very great friction on its bearings. This tendency of the dipping, is completely counteracted by the action of the emerging paddles. The truth of this has been proved by Mr. Perkins, in experimenting with a wheel in the stern, as shown at G, Fig. 4. When this wheel was used without a rudder, or any thing to direct the boat but the wheel itself, it was always propelled in the exact line of the keel.

ENGLISH PATENTS.

To JOHN DAVIS, *Sugar Refiner, for a certain improvement in the condenser used with his apparatus for boiling sugar in vacuo.* Dated 2nd October, 1829.*

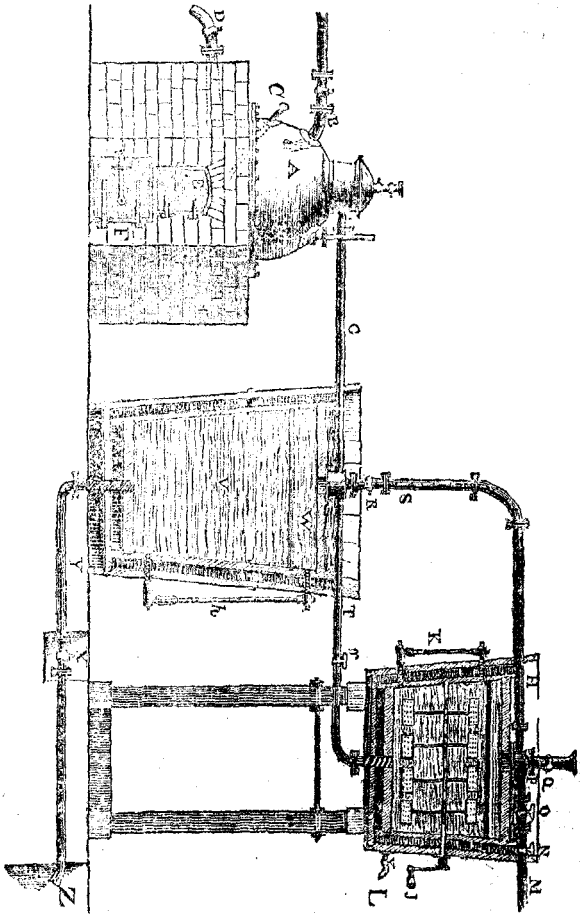
I, the said John Davis, do hereby declare the nature of the said invention to consist, in a certain improvement in the condenser used with the said John Davis's former patent apparatus for boiling sugar, whereby the necessary vacuum is not formed by the admission and eduction of water, as therein described; but by the introduction of steam from the boiler or pan into the condenser, thus doing away with the torrecellian column mentioned in the former patent of the said John Davis. And in further compliance with the said proviso, I, the said John Davis, do hereby describe the manner in which my said invention is to be performed by the following description thereof, reference being had to the drawing annexed, and to the letters marked thereon, (that is to say:)—

Description of the Drawing.

This represents a sugar boiling pan on the former principle, with the said condenser applied thereto, having such portions of the apparatus shown in section, as it was thought would give the clearest explanation of it. A, B, C, D, E, F, are the sugar pan, the feed pipe, proof stick, discharge cock, furnace, ash pit, &c. &c. all of which are too well known to need any further explanation; and G is the pipe which connects the pan with the said condenser, and is in fact, a steam pipe. H is a water tight vat filled with water, for the purpose of keeping the apparatus which is within it always covered with water, and thus air tight. I is a stout cask set into the vat H, with an agitator inside it, which agitator is turned by the handle J working in stuffing boxes to prevent the admission of air. K is a glass tube communicating at each end with the inside of the cask I, through the sides of the vat H, serving as a gauge to show the quantity of water in the cask. L is a discharge cock for the vat. M is a feed pipe supposed to lead from an elevated reservoir of cold water. N is a feed cock to fill the vat. O is a feed cock to fill the cask I through the pipe P,

* This is an improvement upon a plan patented in March, 1828, but the description is so generally repeated in the present specification, as to render the publication of the former unnecessary.—EDITOR.

and Q is an air cock to let the air escape from the cask as it fills. T is a supply pipe leading from the cask I to the condenser V, for the purpose of supplying cold water to the condenser, and R is a stop cock to regulate the supply.



Now this condenser is a large cask set within another cask, the outer cask being filled with water to keep the inner one air tight. W is a shelf of wood or iron perforated with holes to spread the steam when it first rushes into the condenser. U is a stop cock* to cut off the communication between the pan and the condenser. S is a steam pipe, which receives the steam from the pan A through the pipe G. Now this pipe S, it will be seen, communicates at its upper end with the cask, the effect of which is, that when the steam from the pan A is allowed to pass into the pipe G, a portion of the steam passes up the pipe S, and

* This must be in the pipe G, but is not shown in the drawing.

acts on the surface of the water in the cask, thus driving a portion of that water through the pipe T into the condenser, while the other portion of steam passes down into the condenser, and is there condensed by the water that is forced in as aforesaid. Y is a waste pipe leading from the condenser to the reservoir or waste place, Z.

Having now described the various parts of the said apparatus, I shall proceed to describe the manner of using the same, and the mode of creating and keeping up a vacuum therewith, during the process of sugar boiling.

The first thing to be done is, to fill the outer casing of the condenser with cold water, and also the vat H; then stop the cocks N, R, and *r*, and open the cocks O and Q, this will admit water from the elevated reservoir of cold water through the pipe M into the cask, and the pipes S and T, while the air that the water displaces will find vent at the air cock Q; when the cask is completely filled with water, the cocks O, and Q, are to be stopped, and the cock *r* opened, this will cause a portion of the water in the cask, and pipe S, to fall into the condenser, and when it has dropped eight or ten inches, which will be seen by observing the gauge or glass tube K, the cock *r* must be stopped again and the agitator in the cask must be turned round by means of the handle J, in order to disengage whatever portion of air may be in the water in the cask, and which will, by this means, rise to the upper part of the cask; the cocks O and Q must then be opened again, and more water admitted, which will again fill the cask, and expel the air that has been disengaged, by which means, the water in the cask will be as free from any portion of air as possible, and thus fitted for the purpose it is intended to accomplish. The cocks O and Q must now be closed again for the last time during the operation. When in this state, the apparatus is ready for the process of boiling and condensation to commence. The fire must now be lighted in the furnace, the liquor measured into the boiler or pan, and heated in the ordinary way. When the steam in the pan has been got up to a pressure of more than fifteen pounds to the square inch, the water in the condenser must be drawn off by the pipe Y, and the cocks U and X must be opened. The steam from the pan will rush into the condenser and expel what atmospheric air may be in it, and rush out of the waste pipe Y; when this is accomplished, shut the waste cock X, and open the cock R, and partly open the cock *r*; a portion of the steam will instantly rush up the pipe S, into the upper part of the cask, and thus cause a pressure on the surface of the water in the cask, while another portion will rush downwards into the condenser V, striking upon the perforated plate W, and distributing itself for condensation; the cock *r* being partly opened, the effect produced will be as follows,—the force of the steam which is passing up the pipe S into the cask, will act with sufficient force of pressure on the surface of the water in the cask, to force out as much as is required for the purposes of condensation through the pipe T and the cock *r* into the condenser V, which quantity may be regulated by the cock *r*; the cold water thus flowing constantly into the condenser, will condense the steam there, and the condenser must be of a size

to hold all the condensing and condensed water required for one operation, as this operation will continue till the whole of the liquor in the pan is sufficiently evaporated for the purpose of the operator. The general proportions of the apparatus as attached to an ordinary sugar pan, holding about fifty gallons are here shown, but as a useful general guide to the size of the apparatus, it is only necessary to observe, that the cask, should be large enough to hold sufficient water to condense all the steam that will be generated in one operation of the boiling pan, as it cannot be replenished during the process of boiling, and the condenser of the relative size hereinbefore shown. When the operation is concluded, it is hardly necessary to observe, that the water is drawn out of the condenser by the waste pipe Y, and the cask, again filled as before, for the next operation. *h* is merely a gauge to ascertain the quantity of water in the condenser.

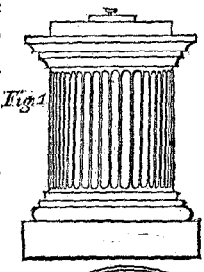
Now whereas, I claim only as the invention, the following improvement, viz.—The substitution of the common waste pipe to the bottom of the condenser, instead of the torrecellian column, and an enlargement of the condenser to about six times the size of that required in the said John Davis's former apparatus, by which said improvement I am enabled to form the required vacuum by the introduction of steam from the boiler or pan into the condenser, as hereinbefore described, which does away with the necessity of the torrecellian column, and the consequent height of the apparatus above the well of waste water, which is often extremely difficult to procure, while it greatly simplifies the operation. [*Repertory of Patent Inventions.*

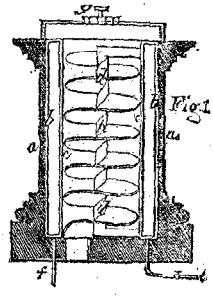
To GEORGE STRATTON, *Gentleman, for his invention of an improvement in Warming and Ventilating Churches, Hot-houses, and other Buildings; which improvement may be applied to other purposes.* Dated August 28, 1828.

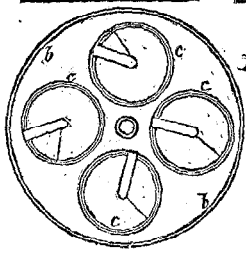
I the said George Stratton, do hereby declare that the nature of my said invention, and the manner in which the same is to be performed, is described and ascertained as follows, (that is to say:)—

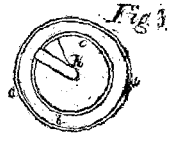
My improvements in warming and ventilating churches, hot-houses, and other buildings, consist in the construction of an apparatus having one or more spiral channels, through which atmospheric air is to be passed; these spiral channels being surrounded by a hot medium produced by a close vessel containing steam. The manner in which I construct my improved apparatus is shown in the drawing hereunto annexed, in which Fig. 1 is an external view of the heating apparatus; Fig. 2, is a section of the same taken vertically; and Fig. 3, a horizontal view of the same, the top being removed to show the interior. It is contained in a hollow pedestal, which may be of any convenient form dictated by fancy or taste; that is, circular, triangular, square, or polygonal. The most simple construction of the apparatus is that exhibited by the three first figures, in which the contrivance is adapted to a cylindrical chamber or box: *a a* is the outer case or hollow pe-

destal, enclosing the apparatus; *b b* is a cylinder within the pedestal, having another cylinder *c c* within it, which contains the spiral *d d*. The cylinders *b* and *c* are made of sheet copper, or any other suitable material, and being connected together at top and bottom, and the ends of the passage between them closed, form a close cylindrical box or channel for the reception of steam; a pipe *e*, which communicates with a boiler, conducts the steam into this cylindrical box or channel *b*, by which a heated medium is made to encompass the cylinder *c* containing the spiral *d*; and any water which may accumulate by the partial condensation of the steam, runs off to the boiler or elsewhere by the pipe *f*. In the bottom of the pedestal there is an opening for the admission of atmospheric air, which, passing upwards, proceeds through the winding passage of the spiral, and becoming heated in its progress, is passed off at top into the open part of the pedestal, and thence is disseminated through the ventilator *g*, into the building or apartment intended to be heated. A perpendicular pipe *h*, passes up the centre of the spiral as a support to the several coils of the sheet metal, by which the winding passage is formed. This pipe communicates at top and bottom by means of short horizontal pipes with the steam chamber *b*, and by that means allows the steam to circulate through the centre of the spiral, for the purpose of assisting to heat the air in its progress. The ventilator is formed by two perforated circular plates sliding round upon their centre, or by other sliding apparatus of the same kind, by which the quantity of heated air passed from the apparatus may be regulated.









Having described the mode of constructing my improved heating apparatus, in its most simple form, I now proceed to state the manner in which I adapt several of these spirals in one pedestal or steam box, for the purpose of increasing the quantity of air heated, and passed through an apparatus of this description. Fig. 4 is a horizontal section of a circular steam box *b b b*, with four of the cylinders *c c c c* passed through it, each containing one of the spirals *d*, constructed with pipes, and forming spiral channels exactly as described with reference to Figs. 2 and 3. Any number of these spirals may be inserted in this way in a close steam box of any convenient shape; the steam being conducted from a boiler, and admitted by a pipe *i*, in the centre or elsewhere, and the atmospheric air being passed from

below through the spiral channels in the manner before explained, and discharged through a ventilator at top. [*Ib.*

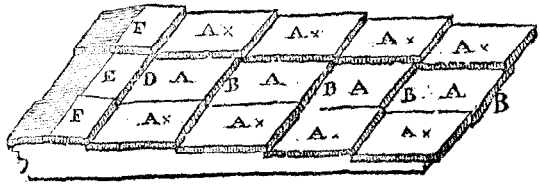
To ELIAS CARTER, *Upholsterer, for a new Covering for the Roofs of Houses, and other Buildings.* Dated October 11, 1827.

I the said Elias Carter, do hereby declare the nature of my said invention to consist in particular shaped plates of iron, or other suitable metal or material to be used in a regular series for covering the roofs of houses and other buildings; and in further compliance with the said proviso, I, the said Elias Carter, do hereby describe the manner in which my said invention is to be performed, by the following description of the said plates, and of the mode of placing the same for the purpose aforesaid, reference being had to the drawing annexed, and to the letters and figures marked thereon, (that is to say:)—And first of the particular shaped plates, which consist of three different forms, and which are shown in the drawings by Figs. 1, 2, and 3. Of these Fig. 1 is what I call the roof plate, and is marked A; it is made with three of its sides turned up and one turned down; the side which is turned down in this figure, is marked B, and I call it, for the sake of distinction, the lip; this roof plate A, tapers narrower towards the lip end of it; by twice the thickness of the plate, the reason for which will be seen when the mode of placing the plates to form a roof is described.

Fig. 1. *Fig.* 2. *Fig.* 3.

To form the ridge of the roof, two kinds of plates are required, and Fig. 2 represents one of these plates, and Fig. 3 the other. The plate, Fig. 2, is marked E, and it will be seen has two sides marked C, C, turned up, and two sides marked D, D, turned down; this plate I call the low ridge plate, and the other plate, Fig. 3, marked F, I call the high ridge plate or cap plate; this plate it will be seen is in fact a mere cap, since all its four sides are turned down; it will be observed that both the ridge plates are made with an angle, sloping downwards each way from the centre; and it should here be observed, that the fall of these ridge plates should not be less than half an inch to a foot.

Fig. 4.



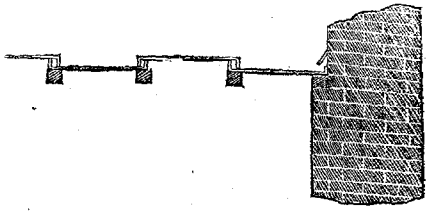
And now I will proceed to describe the manner of laying the said plates to form a roof, with reference to Fig. 4; this figure shows part

of a roof formed of the three kinds of plates hereinbefore described; the plates marked A and A × are all roof plates, those marked A, have the lip B placed downwards, and turned towards the eves of the roof, while those marked A × have the lip placed upwards, and turned towards the ridge of the roof, and it will be observed they are laid in alternate rows; the plates marked A are first laid with the lip B lapping over the upper side of the plate next below it, as here shown, and which the tapering shape of the plates easily permits. The plates marked A × are next laid, a row on each side of the plates A, and lapping over their sides, and then the low ridge plate E, is laid; and last of all the high ridge plate or cap plate F, which completes the portion of roof. It should be observed here, that inasmuch as the high ridge plate F, is to lap over or cover over four edges of other plates, it should be made a little larger in its dimensions than the other plates, while the low ridge plate should, from its situation, be made a little narrower in the direction of the ridge; in fact, it should be of the same width as the roof plate at the lip or smaller end.

Fig. 5.

Fig. 5 is a section across the end of a roof, formed of such plates as aforesaid; and Fig. 6 is a section in the direction from end to end of such a roof, which two last figures clearly show how the sides and lips of the plates are to lap over each other.

Fig. 6.



Now whereas, I do not claim any particular metal or material of which the aforesaid plates are to be made, or any particular dimensions, but I recommend that the plates should be made of cast iron, and that they should be $\frac{3}{16}$ths of an inch in thickness, and two feet square, with the sides and lips two inches deep.

And whereas, I claim as my invention, metal plates so formed, as aforesaid, with such sides and lips as hereinbefore described, and laid in manner aforesaid, for the purpose of forming a covering for the roofs of houses and other buildings; and such my invention, being to the best of my knowledge and belief, entirely new, and never before used within that part of his said majesty's United Kingdom of Great Britain and Ireland, called England, his said dominion of Wales or Town of Berwick-upon-Tweed, nor in any of his said majesty's colonies or plantations abroad; I do hereby declare this to be my specification of the same, and that I do verily believe that this my said specification doth comply in all respects fully, and without reserve or disguise, with the proviso in the said hereinbefore in part

recited letters patent contained, wherefore I hereby claim to maintain exclusive right and privilege to my said invention.

Observations by the Patentee.—The above described roofing is adapted to the covering of churches and other public buildings, as well as private dwellings and warehouses. It is particularly well calculated for the Grecian style of architecture, which requires the roof of a lower angle than can safely be given with any other than a metallic covering. The expense, compared with lead, is scarcely more than one-third.

By the contraction and expansion of metals in all changes of temperature, lead is very liable to fracture, and particularly so when confined, or laid in long sheets. The patent iron roofing being divided into figures of equal dimensions, the expansion or contraction is so equally diffused, and its quantity so divided, that no fracture can possibly happen from such cause. Taking into account the quantity of lead used on slate roofs, upon the ridges and angles, also the charges for laths, copper nails, &c. &c., particularly on buildings of large dimensions, in which the double or M roofs are required; considering also the saving of materials in the diminished surface, occasioned by the low angle, the iron will not be of more cost than a covering of the best slate, over which it has likewise the advantage in being of lighter weight. The slate roof may be calculated to last about fifty years; at the end of that period the old slate will be of no value, although the iron will in that time be scarcely deteriorated, and, in case of the final destruction of a building, the roof covering may be worth the original cost for its original purpose.

The effect produced by the simple and regular form of the parts composing this covering, is peculiarly pleasing to the eye, which is relieved by the light and shade produced by the alternate projection, the apparent thickness, and the gradation of the plates. It also presents a field for the display of architectural taste, in such buildings of classical design, as require that a participation of ornament be continued to the roof; or, that this part of the building be totally concealed from view. The roofing of the portico of the London University may be quoted as a specimen, being made exactly in accordance with one of the best examples of the ancient Greek style, excepting the honeysuckle ornaments of the ridge and eaves, which are omitted.

To illustrate the comparative weights of the different roofing materials generally employed, it may not be deemed irrelevant to the present subject, to give a table of them, as extracted from Tredgold's valuable work on the strength of cast iron.

Copper - - -	100 lbs.	per square of 100 feet.
Lead - - -	800	——
Large Slates -	1,120	——
Ordinary ditto -	900	——
Stone Slate -	2,380	——
Plain Tiles - -	1,780	——

Weight of the proposed iron covering, 1,000 lbs. per square of 100 feet.

An objection having been raised against the cast iron covering on the score of lightning, a few words on that subject may be required:—Electrical experiments prove that metals are all conductors of electricity, the most pure and least oxidable standing first on the list as the best conductors. By this rule iron is not so good a conductor as copper and lead. It is a well known fact that our cathedrals, and many of the older churches, are covered with lead; and buildings without number, in all parts of the world, are covered with lead or copper. The inhabitants of districts where iron is raised and smelted, live without fear amongst immense quantities of that metal; nor is a thunder storm more destructive there than in other places. Iron has likewise been used near a century in the construction of bridges, and neither of them having yet been injured by lightning, is a satisfactory proof that iron is not more attractive of electric matter than any other metal. [*Ib.*

FRANKLIN INSTITUTE.

Monthly Meeting.

The stated monthly meeting of the Institute was held at their Hall on Thursday evening, April 22, 1830.

Isaac Hays, M. D., was appointed chairman, and

William Hamilton, was appointed secretary pro tem.

The minutes of the last meeting were read and approved.

Mr. S. P. Morris presented to the Institute, *The British Architect, or the Builder's Treasury of Stair-cases*, and also

A German work on Architecture, by Jacob Van Campen, Architect, 1661.

The corresponding secretary laid on the table the following works received in exchange for the Journal of the Institute, viz.

London Journal of Arts and Sciences, for February and March, 1830.

The Mechanic's Magazine, for July, August, September and October, 1829, and January and February, 1830.

The Quarterly Review, Nos. 10, 11, and 12, new series.

The Journal of Arts and Register of Patent Inventions, for August, September, October, November, and December, 1829, and January, February, and March, 1830.

Gill's Technological and Microscopic Repository, for February and March, 1830.

Recueil Industriel, for October and November, 1829.

The North American Review, for April, 1830.

The death of Dr. Godman was announced, whereupon, on motion, it was unanimously

Resolved, that the Institute have heard with extreme regret of the death of their former professor of Natural History, John D. Godman, M. D.