



A.D. 1835 N° 6883.

Re-carbonizing Animal Charcoal.

BOWMAN'S SPECIFICATION.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, FREDERICK BOWMAN, of Great Alie Street, in the County of Middlesex, Sugar Refiner, send greeting.

WHEREAS, in consequence of a communication made to me by a certain
5 foreigner residing abroad, I, the said Frederick Bowman, am in possession of
an Invention for "AN IMPROVEMENT IN THE PROCESS OF RENEWING THE VIRTUES
OF ANIMAL CHARCOAL WHEN EXHAUSTED OR IMPAIRED;" and whereas His present
most Excellent Majesty King William the Fourth, by His Royal Letters
Patent, bearing date at His Palace at Westminster, the Seventeenth day of
10 August, in the sixth year of His reign, did, of His especial grace, certain
knowledge, and mere motion, for Himself, His heirs and successors, give and
grant unto me, the said Frederick Bowman, my eñors, adñors, and assigns,
His especial licence, full power, sole privilege and authority, that I, the
said Frederick Bowman, my eñors, adñors, and assigns, and every of them,
15 by myself and themselves, or by my and their deputy or deputies, servants or
agents, or such others as I, the said Frederick Bowman, my eñors, adñors,
or assigns, should at any time agree with, and no others, from time to
time and at all times thereafter during the term of years therein expressed,
should and lawfully might make, use, exercise, and vend, the said Invention
20 within that part of His said Majesty's United Kingdom of Great Britain and
Ireland called England, His Dominion of Wales, and the Town of Berwick-
upon-Tweed, and also in all His Colonies and Plantations abroad, in such

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manner as to me, the said Frederick Bowman, my eñors, adñors, and assigns, or any of them, should in my or their discretions seem meet, and that I, the said Frederick Bowman, my eñors, adñors, and assigns, should and lawfully might have and enjoy the whole profit, benefit, commodity, and advantage from time to time coming, growing, accruing, and arising by reason of the 5 said Invention, for and during the term of years therein mentioned; to have, hold, exercise, and enjoy the said licence, powers, privileges, and advantages therein before granted or mentioned to be granted unto me, the said Frederick Bowman, my eñors, adñors, and assigns, for and during and unto the full end and term of fourteen years from the date of the said Letters Patent, next 10 and immediately ensuing, and fully to be complete and ended, according to the Statute in such case made and provided; in which said Letters Patent is contained a proviso, that if I, the said Frederick Bowman, should not particularly describe and ascertain the nature of the said Invention, and in what manner the same is to be performed, by an instrument in writing under my hand 15 and seal, and cause the same to be enrolled 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 Letters Patent, and all liberties and advantages whatsoever thereby granted, should utterly cease, determine, and become void, anything therein-before contained to the contrary thereof in 20 anywise notwithstanding, as in and by the said Letters Patent, reference being thereunto had, will more fully and at large appear.

NOW KNOW YE, that in compliance with the said proviso, I, the said Frederick Bowman, do hereby describe and ascertain the nature of the said Invention, and in what manner the same is to be performed as follows, 25 that is to say:—

It is well known that animal charcoal, called frequently carbon by sugar refiners, has the peculiar virtue or property of bleaching or whitening sugar filtered through it, which virtue or property becomes exhausted after the animal charcoal or carbon has been used for a certain length of time in 30 bleaching or whitening sugar; and it is also well known that when the whitening or bleaching virtue of animal charcoal has been thus exhausted or impaired, it may be renewed by subjecting the animal charcoal to heat, so as to recarbonise it. In the ordinary process of renewing the said virtue of animal charcoal, it has been usually hitherto the practice to enclose it in masses in 35 retorts, either alone or mixed with bones (or such other animal matters as the said animal charcoal is usually prepared from), and to expose the retorts and their contents to the heat of suitable furnaces until the whole is at a red heat, after which the animal charcoal or carbon is withdrawn from the retorts. The

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masses of animal charcoal or carbon thus operated upon are usually of considerable thickness, varying according to the size of the retorts, and it is found requisite to apply the heat of the furnace for a very considerable time to effect the carbonization of the charcoal or carbon contained in the retorts; they are, in fact, usually kept at a red heat for several hours, nor can this well be avoided. The defect of this process is, that as the animal charcoal or carbon is put in a mass in the retort and the whole mass heated together, before the central part of the mass of animal charcoal or carbon operated upon is heated to a sufficient degree to be recarbonized, the outer parts thereof will have been for a long time heated to a red heat, and the particles at the surface almost in a state of vitrification, whereas no part of the animal charcoal or carbon undergoing the process of recarbonization ought to be long at a red heat; in fact, it ought hardly ever to reach the point of red heat, and to continue it at a red heat for any length of time destroys in the parts exposed to such continued red heat the whitening properties communicated to them by the application of a lower degree of heat. Now, the improvement for which the present Letters Patent have been granted to me consists in operating upon the animal charcoal or carbon in detail instead of heating it in a mass; that is, I cause a constant succession of the particles thereof to be exposed to a gradually increasing temperature, beginning at a moderate heat and thence proceeding upwards to nearly a red heat, in such manner that almost every part of the animal charcoal or carbon operated upon shall be gradually dried, and attain nearly (or quite, when necessary,) the temperature indicated by a red heat, while no part shall be suffered to retain such heat longer than is absolutely necessary.

And in further compliance with the said proviso, I, the said Frederick Bowman, do hereby describe a manner in which the said Invention may be performed, reference being had to the Drawing of a furnace which I have annexed for the purpose of explanation, and which I have found to answer the purpose. And note.—Through the remainder of this description I shall, to avoid repetition, use only the term animal charcoal, meaning thereby what is known to sugar refiners by the name of animal charcoal, and called by them and the makers thereof animal charcoal and frequently “carbon.”

DESCRIPTION OF THE FURNACE REPRESENTED IN THE DRAWING.

The dimensions thereof may be found by measuring them by the scale in the Drawing. At the end of the furnace is a brick arch (1), on the crown of it is formed a platform, on which is laid a plate of iron F, moveable upon hinge joints; the furnace A is set in the brickwork under the arch (1); from

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the back of the fire grate B a channel or flue D (1), D (2), rises, and thence goes away horizontally to the chimney E. The part D 1 of the said flue is covered with iron plates L, on which the recarbonization is effected, as will be herein-after more particularly described. The part D 2 of the flue is about six or seven inches higher than the part D 1; it is covered with plates of iron J, K, on which the animal charcoal that is to be recarbonized is spread out. The plates L, J, K rest and are firmly fixed to the side walls of the flue D 1, D 2, forming a close cover or roof to the said flue, and the several outer or side plates are turned up at the edges, so that they make a sort of long tray, covering the whole length of the flue D 1, D 2, in which the animal charcoal can be contained, see the Figures. The flame from the furnace A passes along the channel or flue D 1, D 2, and gives out its heat to the iron plates laid over it in proportion to the distances of the parts from the fire. The construction of this furnace is so simple and so apparent on the Drawing, that I need not enter into further description of it. In operating with it to effect the said improvement, the wet animal charcoal which has been exhausted or impaired by previous use, and which it is intended to recarbonize, is spread out on the plates K nearest the chimney E, which are of course the least heated, and it is raked forward thence by degrees along the plates, covering the flue towards the fire, the layer of animal charcoal being all the time stirred about, so as to expose all its particles to the heat to dry it, and also to the atmosphere, and to facilitate evaporation; an iron rake, such as is ordinarily used by stokers, will do very well for this purpose; as fast as the animal charcoal is raked away towards the fire end of the furnace, more wet animal charcoal must be laid on at the chimney or coolest end, to be in its turn moved onwards, and so on. The layer of animal charcoal laid on the plates K should not be above four inches thick, or thereabouts, and in working it along towards the hot plates L, and also in working it while on those plates, care should be taken to keep it evenly spread to about the thickness named, for if a much greater thickness of animal charcoal be laid on the plates, the period of attaining the requisite degree of heat for recarbonizing it will be retarded, and time and fuel consequently wasted. The operation must be conducted so that the animal charcoal shall get dried on the plates K and J, which I will call the drying plates, as it progresses along them, and shall be about dry by the time it gets to the end of the plates J, in order to be recarbonized on the hot plates L, which I will call the carbonizing plates, and if the animal charcoal has been properly worked on the drying plates, not more than a few minutes exposure to the heat of the plates L will be requisite to carbonize it. No particular time can be laid down as proper for the exposure of the animal

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charcoal upon the drying plates, as that will depend on the degree of moisture on the animal charcoal, and many other circumstances; all that can be said is, that the workman must not pass it on to the carbonizing plates L until it has become dry, or nearly so, and he must continually turn it over and over, 5 and stir it about with his rake while it is being dried, an essential object of the process being that, as nearly as possible, every particle of the animal charcoal shall pass over the whole length of the drying plates K and J so as to get dried gradually; and also that, as nearly as possible, every such particle shall be exposed in its turn to the action of the atmosphere to evaporate its 10 moisture. It is only the carbonizing plates L which are nearest to the fire that are allowed to get red hot, and the fire should be so regulated as to keep them just red hot, and not much more. The animal charcoal which is brought on to the carbonizing plates L nearly or quite dry, requires only a little additional heat beyond what it will have taken up from the drying plates K 15 and J to decompose the animal, vegetable, or other decomposable matter which it contains, and to allow the escape of the gases formed by such decomposition. The animal charcoal must be constantly stirred about on the carbonizing plate L, as well as on the drying plates, to prevent it from getting quite red hot, which it ought not in general to do, although it may be sometimes 20 necessary to heat it to a red heat for a very short time. As a general rule, it must be exposed to the heat of the carbonizing plates until it gives out no more smell or visible vapor. This will generally be found to be the case when it is on the point of becoming red hot, but, as stated, it may be sometimes requisite to raise it actually to a red heat before it will cease to give out smell 25 or visible vapor, when it ceases to do so it will be recarbonized, so as to have recovered its whitening properties, and must then be immediately moved off of the carbonizing plates on to the plates F, and the workmen will tilt that up about its hinges to turn off the recarbonized animal charcoal from it into suitable receivers. Two workmen are sufficient to manage this furnace; the 30 most careful and intelligent should be employed to attend to the working of the animal charcoal on the red hot or carbonizing plates L, and keep it stirred, and clear it off thence on the plate F, and into the receiving jars, when it is completely recarbonized, and he must watch it very carefully, observing particularly not to leave it exposed to the heat of the said carbonizing 35 plates beyond the instant when it is carbonized, which, as stated, will be known by its ceasing to emit vapor and smell; for if the animal charcoal be left to get red hot, and remain so for any time exposed to the atmosphere, its whitening properties will be injured. Note.—The plate F may be made as above described, to move about hinge joints, or it may be

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fixed, being merely conveniently placed for the carbonized animal charcoal to be easily cleared off from it with a rake; or in fact, it may be entirely dispensed with, and the animal charcoal cleared off from the carbonizing plates L direct into the receivers as soon as it is recarbonized. The second workman will take charge of laying the wet animal charcoal on the drying plates near 5 the chimney, and gradually working it along towards the red-hot plates L, observing the directions already given. I need not enter into any further description of the furnace, since it will be apparent by the foregoing description, that it contains nothing new as a furnace, and also because the aforesaid improvement consists, as I have already pointed out, in the process or method 10 of exposing the animal charcoal to the required heat. I may, however, observe that, when a furnace such as I have described is used, whatever be its form, the fire-grate must be of sufficient area, and to keep the carbonizing plates to a red heat, and drying plates to a gradually diminishing heat, the heat of the said plates of the chimney end being just sufficient to cause evaporation of the 15 moisture of the animal charcoal laid upon them, and the several drying and carbonizing plates should be arranged so as to form a convenient receptacle for a layer of animal charcoal of about the thickness I have mentioned, and so as to admit of the charcoal being worked or stirred about, as I have described. 20

Now, whereas, having described the said "Improvement in the Process of Renewing the Virtues of Animal Charcoal when Exhausted or Impaired," I hereby declare that I claim as constituting the said improvement and Invention, the process herein-before described of exposing the animal charcoal in detail, either by spreading it in thin layers, constantly moved or otherwise kept in 25 motion, to the heat of a succession of heating surfaces, disposed so that as the charcoal is brought on to each successive surface it receives more heat than from the preceding one, the hottest of such surfaces being maintained at or a little above a red heat, and of keeping the said animal charcoal as much as possible in motion, while being dried and carbonized in manner herein-before described, 30 and never suffering any part of it to obtain a red heat if it is sufficiently recarbonized before attaining that heat, or to retain such red heat longer than is necessary for producing complete carbonization, as I have herein-before set forth.

And the said Invention being, to the best of my knowledge and belief, 35 entirely new in England, Wales, and the Town of Berwick-upon-Tweed, and in all His Majesty's Colonies and Plantations, and never having been practised therein by any other person or persons whomsoever to my knowledge or belief, I do hereby declare this to be my Specification of the same, and that

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I do verily believe this my said Specification doth comply in all respects fully and without reserve or disguise with the proviso in the said herein-before in part recited Letters Patent contained; wherefore I do hereby claim to maintain exclusive right and privilege to the said Invention.

5 In witness whereof, I have hereunto set my hand and seal, this Fifteenth day of February, in the sixth year of the reign of His said most Excellent Majesty William the Fourth, by the grace of God of the United Kingdom of Great Britain and Ireland King, Defender of the Faith, and in the year of our Lord One thousand eight hundred and
10 thirty-six.

FRED. (L.S.) BOWMAN.

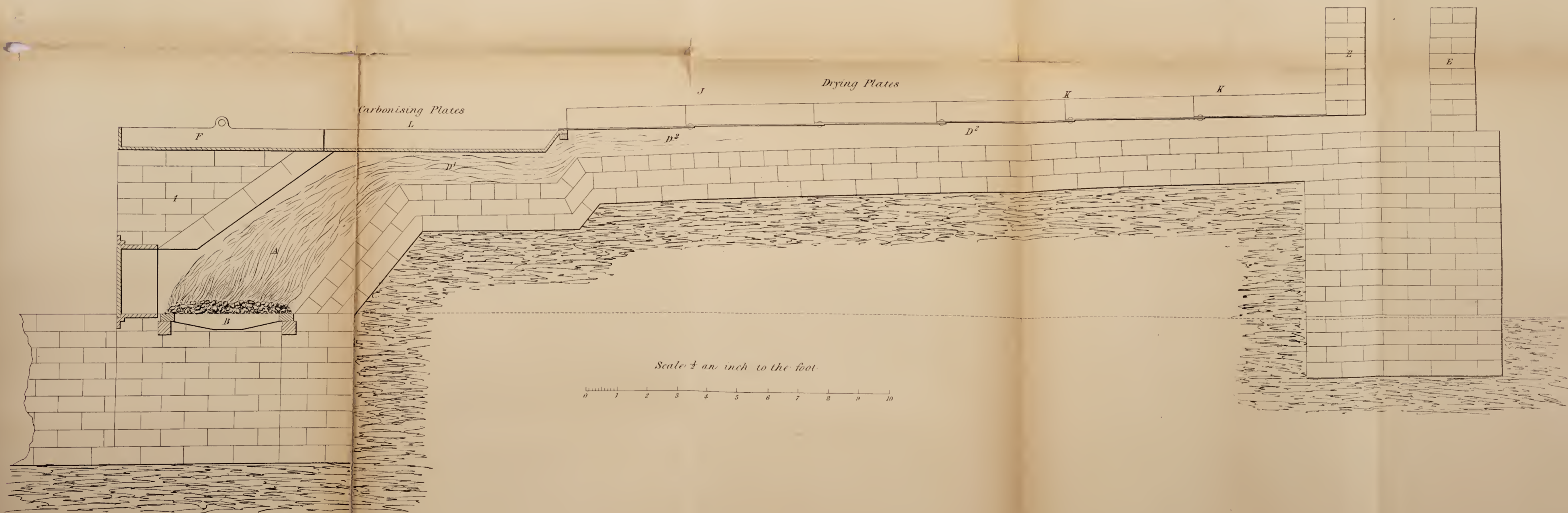
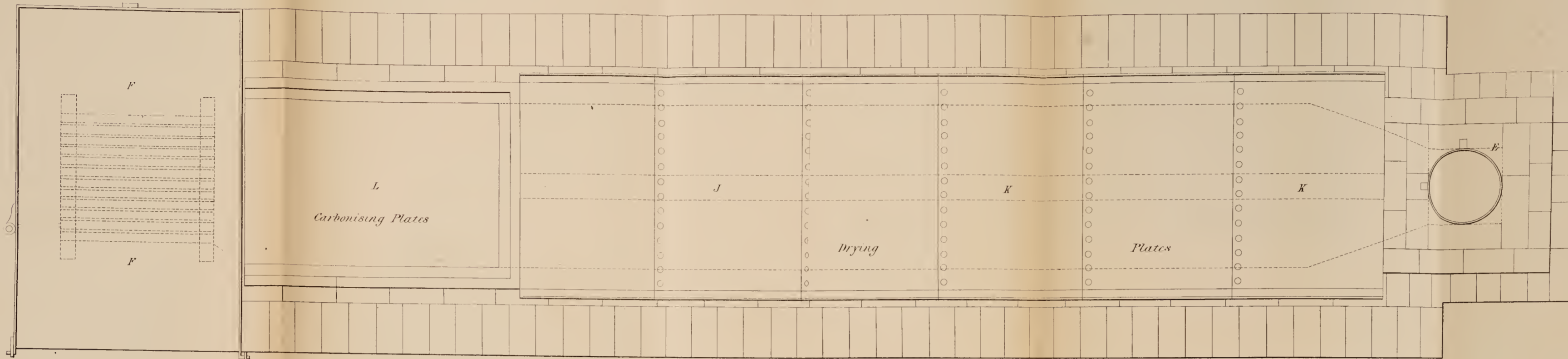
AND BE IT REMEMBERED, that on the Fifteenth day of February, in the year of our Lord 1836, the aforesaid Frederick Bowman came before our said Lord the King in His Chancery, and acknowledged the Specification
15 aforesaid, and all and every thing therein contained and specified, in form above written. And also the Specification aforesaid was stamped according to the tenor of the Statute made for that purpose.

HENLEY.

Inrolled the Fifteenth day of February, in the year of our Lord One thousand eight hundred and thirty-six.

LONDON:

Printed by GEORGE EDWARD EYRE and WILLIAM SPOTTISWOODE,
Printers to the Queen's most Excellent Majesty. 1857.



Scale $\frac{1}{4}$ an inch to the foot

