



XXXV. An improved method of making muffles for chemical purposes

Mr. Edmund Turrell

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strong legal interference in the process of malting, yet in my humble judgment, that most improvident waste of the commodity and mischievous injury to the community, which certainly do result from the practice of watering malt upon the floors, furnish out a case of national grievance, equally deserving the consideration of the legislature.

Excise-Office, London,
March 3, 1807.

XXXV. *An improved Method of making Muffles for Chemical Purposes.* By Mr. EDMUND TURRELL*.

MY LORDS AND GENTLEMEN,

HAVING experienced much inconvenience in the common mode of moulding muffles on wooden blocks, for the use of chemists, enamellers, &c. I beg leave to lay before your praise-worthy Society, an improved method, possessing the following advantages : namely,

First, By this new method of moulding muffles, coarser and cheaper materials may be used than can be employed in the common mode ; and which also gives them the valuable property of resisting a greater degree of heat.

Secondly, That much time will be saved by this improved method of manufacturing them, must be allowed, when the two modes are compared.

Thirdly, The certainty of making them without cracks or flaws, and with coarser materials, will appear obvious, when it is considered, that by this improved method, they are *internally* moulded instead of *externally* ; by which means the strength of the operator may have its full effect, in firmly compressing the composition into the mould.

Whereas, in the old mode, the workman, after having spread the composition upon a cloth, guessing at its thickness, bends it over the block in the best way he can, and by thus disturbing the composition, he must needs make many

* From *Transactions of the Society for the Encouragement of Arts, Manufactures, and Commerce*, for 1807.—Ten guineas were voted for this communication.

cracks

cracks and flaws, which can be but imperfectly closed in smoothing the surface of the muffle, whilst upon the block; the evil consequence attending which is, its being subject to fly or crack when exposed to a great heat; and it will also be plainly seen, that, in the old mode, a great disadvantage is felt by the sides of the muffle, whilst in its wet state, hanging from its centre, and which also tends to crack it, as there can be nothing applied to assist it in this case, but by employing a greater proportion of cohesive clay in the composition, which, however, produces little if any advantage; whereas in the mode which I have invented, this fault is entirely obviated, and the composition, by its contraction in drying, assists the extrication of the muffle from the mould.

Fourthly, With respect to simplicity, this new mode will be found to possess a very great advantage, for a boy of twelve years of age may be taught to make them in a very short time.

The fifth advantage in this improvement, and of equal consideration, is the cheapness of the article; the price of which has been reduced nearly one-third to the consumer; and when the superior quality of them is taken into consideration, it may fairly be said to be full one-half. I mean, when regard is had to their superior quality; and that the muffles may be used over again when broken and ground, with a much less proportion of cohesive clay than in the old mode; and this I conceive to be no inconsiderable advantage; for it is well known, that when the old muffles or broken crucibles can be used without much fresh clay, they are far superior to new materials.

Sixthly, The muffles made in the old way are seldom of equal thickness; whereas those made according to the method which I have the honour to present before the Society, will be found to possess that necessary quality in perfection; for, if an hundred are made from the same mould, they will be all of the same thickness.

Description of the Moulds and Implements.

The first mould for this purpose is a tin one, Fig. 1,
(Plate

(Plate V.) which may be made from a piece of tin the size of the arch, being bent so as to form such a concavity as may best suit the purpose to which it is to be applied; this being done, two square pieces of tin, *aa*, must have an arch cut out of them, of such a size that the diameter thereof may be about three-fourths of an inch less than the diameter of the concave piece before stated; these being soldered to each end of the first-mentioned piece, will form a stand for the hollow part of the mould, and the thickness of the muffle moulded in this will be exactly determined by the edge at each end. A piece of hollow tin, *bb*, may be soldered along the top edge of the mould, to form a better resistance to the great pressure within. The next part of this mould is a flat piece of tin, Fig. 2, cut exactly to fit the inside of the mould, the use of which is, to form a solid back to the muffles used for chemical purposes.

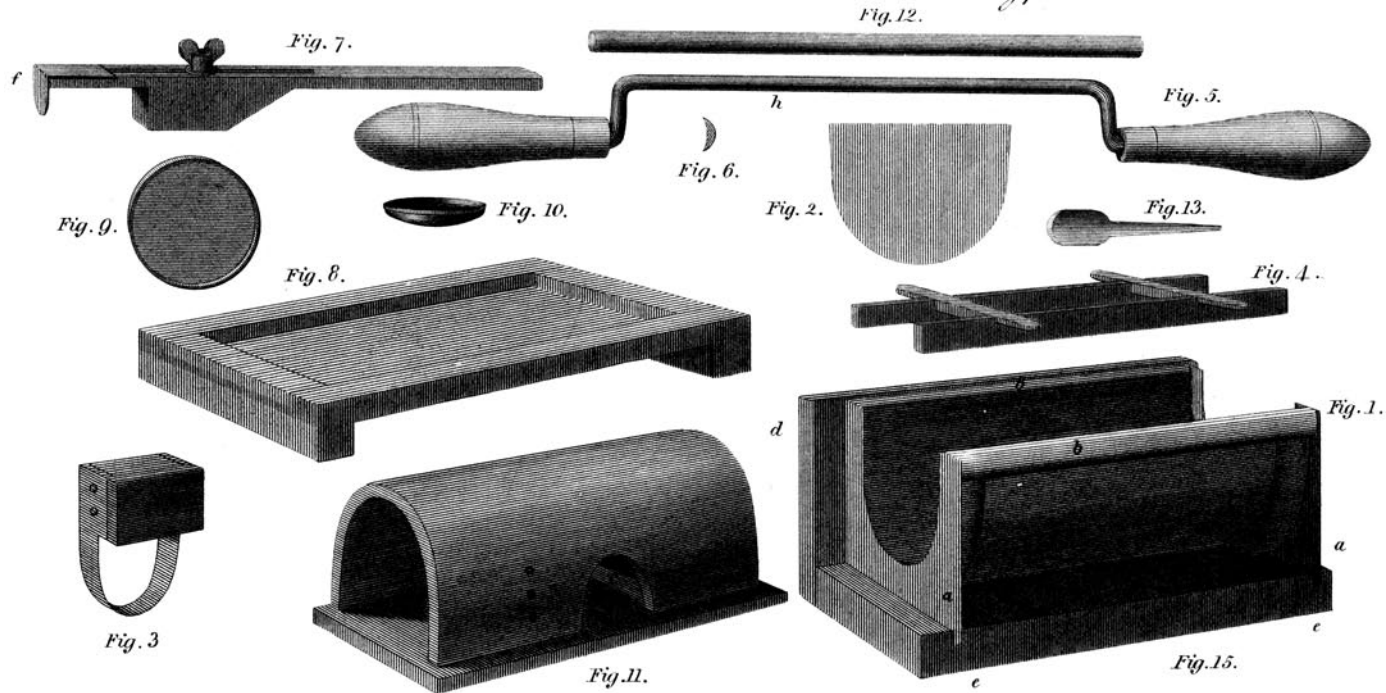
The second tool for this purpose is a piece of sheet brass, Fig. 3, about six inches long and one broad, which being bent in a semicircular form, and screwed to a piece of wood extending beyond its breadth about an inch, is used for cutting the small air holes *c* (Fig. 11), in the aforesaid muffles.

The third is the tool or frame, Fig. 4, for preventing the contraction of the muffles in drying, which is made of four pieces of beech, about three quarters of an inch broad, and half an inch thick; the length must be adjusted to the mould of the muffle; two of these being laid parallel within the inside of the mould, and being joined across by the other two, the ends of which should extend so far beyond the outer edges of the other two, that they may rest upon the edges of the muffle mould, and thereby prevent its falling into the mould.

The fourth is the tool for spreading the composition into the moulds, which is formed of iron or steel, (Fig. 5), about thirteen inches in length, one inch and a half broad, and about one-eighth thick; its face under *h* being rounded in such a manner that its curve may exactly fit the inner curve of the muffle mould (Fig. 6, is a section of it); this should likewise have a point or tongue, extending from each end,

Mr. E. Turrell's Construction of Chemical Muffles.

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end, long enough to be bent in the form of a bricklayer's trowel, and by the wooden handles which must be put on, hanging down, it will be found, that, as it is moved either backwards or forwards, it will always present an edge to smooth the composition, and condense it in the mould.

The fifth is a frame (*dd*), Fig. 15, of which the bottom and farthest side only are shown, and in which frame the tin mould, Fig. 1, is placed, simply constructed by joining two pieces of wood, the one as broad as the bottom of the muffle mould, and having two narrow groves (*ee*), cut in it, so that the edges of the tin mould may be confined therein; the other board being joined to this, at its edge, should come up so high as just to be under the edge of the mould.

The sixth is the tool for cutting the muffles of different lengths (Fig. 7), and is made of a piece of wood, to the end of which is fixed a thin piece of brass (*f*), which extending about one inch and one-fourth beyond the top of the wood, is bent at right angles, and made thinner at the end, that it may the more conveniently cut the muffle; under this piece of wood is used another straight piece (*g*), with two steady pins, which, being shifted at the will of the workman, will cut them of any length.

The seventh is the mould for forming the bottom of the close muffle (Fig. 8), which is made of a mahogany or oak plank, about sixteen inches long, ten wide, and about three-eighths of an inch thick; upon this is fixed a ledge on each side, one inch broad, and nearly half an inch thick, and at each end a ledge of the same kind is placed, at such a distance as is best suited to the length of the bottom required. Fig. 9 and 10, are circular moulds for muffle bottoms of dial plates. Fig. 11, a complete muffle standing on its bottom. Fig. 12, a roller for rolling the composition in the first mould. Fig. 13, a tool for making small holes in the muffle.

The usual composition for making muffles is as follows: viz. two parts pipe clay and one part sand, such as is used by the bricklayers, sifted, and mixed together to a proper consistence;

consistence; this is very expensive, on account of the high price of pipe clay, which is about ten shillings the hundred weight, whereas I employ in my improved mode of making them the coarser kind of Stourbridge clay, which can be had at the glass-houses, in the ground state, for six shillings the hundred weight, and this I sift also, to separate the finer part, which I employ for making other smaller articles necessary in my business; using only the grosser or coarser part for muffles, to which I add one-eighth part only of pipe clay, mixing them well together with water, so as to form a mass of a pretty thick consistence. The tin mould being first greased, I place it in the frame Fig. 15, shown under Fig. 1, and having spread the composition in the mould, and smoothed it with the spreader, Fig. 5, till the mould is quite full, the flat piece of tin is then to be well greased, and thrust in at one end of the mould, and the back of the muffle is then formed by spreading the composition, and firmly pressing it against the part already formed. The next thing to be done is to cut the holes in the sides of the muffle, which is done by pressing the semicircular cutter, Fig. 3, into the sides thereof, while it is yet wet, and bringing the piece out entire; the tin mould must now have the frame, Fig. 4, put in to keep the sides of the muffle from contracting, and being set up end-ways, and a little inclined, it must be dried in the sun, until it has shrunk sufficiently to leave the mould, after which it must be completely dried and burned in the usual manner.

The composition of the smaller implements, or muffle bottoms for dial plates, for the mould Figs. 9 and 10, is made of the finer part of the Stourbridge clay, with a small proportion of pipe clay.

The rings are made from two parts of Dutch black lead pots, powdered, and one part of pipe clay. I have made repeated trials of English black lead, in various states, as a substitute for the Dutch black lead pots, but without finding it to answer properly.

Should any difficulty appear in any part of my process, I shall be happy in attending the committees, and performing the whole operation before them, whenever they shall

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shall be pleased to appoint ; when the great simplicity and advantage will appear evident.

I am, my lords and gentlemen,
your most obedient and respectful servant,
EDMUND TURRELL.

No. 40, Westmoreland Street, Goswell Road,
April 10, 1806.

*To the Members of the Society of
Arts, &c.*

Certificates from Messrs. J. Haynes and Son, Westmoreland Buildings ; John Kelly, Hooper Street, Clerkenwell ; John Foster, Author-Street, St. Luke's, and William Foster, Author-Street, St. Luke's, state, that they have been in the habit of using for upwards of twelve months, Mr. Turrell's muffles, and that they are greatly superior to any they have hitherto been able to procure, and that it is their opinion their durability may be completely attributed to his improved method of moulding them.

XXXVI. *Description of a Machine for raising Coals or other Articles from Mines.* By Mr. GILBERT GILPIN*.

SIR,
THE improvement of the machines in use for raising coal and ore from the mines, has long been a desideratum of the Society for the Encouragement of Arts, Manufactures, and Commerce, and they have repeatedly offered a premium for that purpose.

Those in general use (from the increased expense of horse labour), are worked by a steam engine, attached to a crank of twenty-one inches radius, wedged on a shaft along with a fly wheel, eleven or twelve feet in diameter, and pinion wheel, of eleven teeth, which latter works in another of sixty-four teeth, on the shaft of which is a plain cylindrical barrel, from four to six feet diameter, and nine or ten feet

* From *Transactions of the Society for the Encouragement of Arts, Manufactures, and Commerce*, for 1807.—Twenty guineas were voted by the Society to Mr. Gilpin for this invention.

long ;