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same period of growth. It was a thick-set red wheat, sown in December on a light and good turnip soil, to which an unusually large quantity of guano (4 cwt. per acre) had been applied as a manure. About one-tenth of the whole quantity was diseased, while several other kinds of wheat, sown in the same field, but to which no guano had been applied, were perfectly sound.

The ears had a much greener appearance than the same kind of wheat in a healthy condition, and emitted a very disagreeable smell, which is not easily described.

On close examination the grains were found filled with a black unctuous powder in place of the milky pulp of the healthy seed. This powder was separated in quantity by bruising the ears in a mortar and sifting through fine muslin, and submitted to chemical examination. It had the same disagreeable smell as the ears, but stronger; it was oily to the touch, and heavier than alcohol and water. When heated in the air it burned with a bright flame, leaving a residue of charcoal, and eventually a trace of white ash. When heated in a tube, it gave off water, empyreumatic and oily matters, and a little ammonia. It was insoluble in a solution of potash and in hydrochloric acid; nitric acid made it yellow, and hot sulphuric acid dissolved it with purplish-red colour. Boiled with water, it yielded merely a little gum and bitter brown extractive matter, the greater part remaining undissolved. Alcohol extracted a fat oil, and a waxy or resinous matter; the undissolved portion appeared to consist of lignin mixed with charcoal. The black powder greedily absorbed oxygen from the air when in a moistened condition, giving rise to carbonic acid.

A carefully conducted proximate analysis of the substance led to the following results:—

Wax or resin with fixed oil	7·0
Gum and extractive matter, &c.	7·8
Lignin and charcoal	82·7
Ashes	2·5
	100·

The ash consisted chiefly of earthy phosphates and silicate of potash.

XXII. *Description of a Chemical Lamp-Furnace.* *By* Edward Solly, *Esq.**

AT the meeting of the British Association last September in York, the Rev. W. Vernon Harcourt exhibited a hydrogen lamp-furnace, the object of which was to afford a

* Communicated by the Chemical Society; having been read November 18, 1844.

steady, uniform heat to a platinum vessel, sufficiently high to effect the ready fusion of vitreous substances by means of a fuel, free from those objections attending the use of one containing solid carbonaceous matter. Mr. Harcourt's furnace consisted of a number of jets arranged round the crucible to be heated, which, to ensure uniformity of temperature, was suspended by three platinum wires from a watch movement, which caused it to rotate slowly on its vertical axis; the fuel employed was hydrogen, generated in a strong iron reservoir, and burnt under a pressure of from 10 to 30 atmospheres. The mechanical arrangements of this lamp-furnace were very beautiful, and the heat produced by the combustion of the jets of compressed hydrogen directed against the bottom and sides of the revolving crucible was steady, intense, and apparently manageable; but the instrument was of course very expensive, and required considerable care in its use.

The exhibition of this apparatus suggested to me the possibility of constructing a lamp on a similar principle, but far less expensive, and sufficiently simple for ordinary use; which, though it might not afford so high or pure a source of heat as the arrangement of Mr. Harcourt, might yet constitute a useful instrument in the laboratory: as, on trial, I found my plan perfectly successful, I am led to think that a brief description of the lamp will be interesting to others.

It is well known that when coal-gas is mixed with a certain proportion of air it burns with a pale blue flame containing no solid carbon, and therefore giving only a very feeble light, but possessing a very high temperature, so much so, that the large pale flame of gas mixed with air and burnt above a diaphragm of wire gauze is very commonly employed when a higher temperature is required than can be obtained by the mere use of an Argand lamp. It appeared probable, after seeing Mr. Harcourt's lamp, that a very high temperature might be obtained by burning a mixture of air and coal-gas, in place of hydrogen, in a suitable arrangement of jets. The form of lamp which, after a few trials, I found best adapted for this purpose, consists of two circles of jets, one vertical and the other horizontal, the latter being raised nearly two inches higher than the former. The vertical circle consists of a metal ring, about an inch in diameter, pierced on its upper side by six small holes or jets; the horizontal circle consists of a hollow metal ring, having an internal diameter of rather more than three inches, with twelve holes drilled on its inner side, so as to form altogether a series of eighteen little jets of flame, six vertical and twelve horizontal, all converging to a common centre, which is of course the point of the greatest heat. The mixture of coal-gas and air burnt in this lamp, is made by injecting a sufficient quantity of air into the pipe which supplies the coal-gas. To the end of a common gas-cock connected with the street main, a piece of copper pipe about four inches long is attached, having a diameter of about a quarter of an inch; outside this is another piece of copper tube, of considerably larger diameter, and six inches longer than the internal tube. The air which is to mix with the coal-gas is admitted into this longer external tube, the quantity being regulated by cocks. The object of this is to effect the mixture of the air and coal-gas under the most favourable circumstances; if mixed otherwise than as two currents flowing in the same direction, a diminution of pressure is caused; whilst by causing them to mix in the manner just described, the pressure of the whole current is rather augmented.

The pressure of the ordinary street gas does not, I believe, generally exceed two inches; if the air was introduced by a pipe entering the gas-pipe at right angles, and if the pressure of the air at all exceeded that of the gas, it was very apt to stop the current of gas altogether, the air forcing the gas back into the pipe; by using the above double pipe this was obviated, and it was found possible slightly to increase the pressure of the air over that of the gas without at all diminishing its force. At first a gasometer was employed as a source of air, but after a few trials it was found that a common double bellows was more convenient; when the lamp is used, the crucible to be heated is supported on the top of the horizontal circle of jets by a triangle of platinum wire, so as to place it in the centre of greatest heat. If only the gas is lighted, it of course burns with a large and very smoky flame, depositing abundance of solid carbon; but the moment the air is admitted, the flame begins to diminish in size and also in brilliancy, burning, when a sufficient proportion of air is allowed to enter, with a pale blue colour, and perfectly free from solid carbon. The crucible is, in fact, heated by eighteen little blowpipes, and of course becomes brightly ignited in a few seconds, the heat continuing to increase as the ignited platinum facilitates the more complete combustion of the gas and air, causing the blue flame of each jet to be edged with pale yellow, and considerably increasing them in size; lastly, the furnace is rendered complete by a thin cylinder of sheet iron, three inches in diameter and two high, which is placed above the horizontal circle to prevent the flames being blown about by draught of air, and a circular disc of the same metal, having a hole in its centre of an inch across, to place at the top of the cylinder:

this causes the heated air to pass round the upper edges and over the lid of the crucible, so as to bring the whole to the same temperature.

With this arrangement it is easy to keep a platinum crucible two inches high and an inch and a half across at a bright red or yellow heat for any required time; the heat is perfectly manageable, the gas may be turned off at any moment, and as quickly lighted; hence any operation is far more under control than in a furnace. The heat obtained with a crucible of the size just mentioned is rather above the melting-point of silver, for a piece of that metal is easily fused in a porcelain crucible placed in the interior of the platinum one. It is of course equal to the fusion of mixtures of silicates with carbonate of soda, three or four hundred grains of a mixture of carbonate of soda and a siliceous compound being perfectly fused in about eight minutes, whilst from the entire command at all times had over the source of heat, it is easy to moderate it when the evolution of carbonic acid is too rapid, and to stop it as soon as the operation is complete; in fact, the progress of the experiment may be watched from the commencement to the end with the greatest facility.

The object which I had originally in view in the construction of this lamp, was to obtain a cheap, simple and efficacious method of heating a platinum crucible to bright redness without exposing it to the contact of solid fuel, and in this the attempt was perfectly successful. The decomposition of earthy silicates may, it is true, be very easily effected in an ordinary furnace; the crucible being protected from contact with the fuel by placing it in an earthen one, or by wrapping it in a thin piece of platinum foil, which preserves the crucible very perfectly from the action of the fuel in a cheap and very convenient method; but still, the above lamp-furnace is decidedly superior to that or indeed any other mode I have tried. Independent even of the question of œconomy, I prefer it to the Argand spirit-lamp.

As the use of such a lamp must in part depend on its simplicity, I was anxious not to complicate it more than was absolutely necessary; but I have no doubt that its power might be very greatly augmented; in its present state, however, it is useful for several purposes besides the mere ignition of a crucible, such as, for example, glass-blowing and bending large or thick tubes; in fact, in all cases where a bright red or yellow heat is required, and where an ordinary furnace is inapplicable.