The method of using the apparatus for exhibiting vibrations caused by heat, 1829. A description of a chemical vapour lamp furnace, 1834. And, an account of an experiment with chlorine gas, 1833 / by Arthur Trevelyan.

THE METHOD

OF

USING THE APPARATUS

FOR EXHIBITING

VIBRATIONS CAUSED BY HEAT.

1829.

A

DESCRIPTION

OF A

CHEMICAL VAPOUR LAMP FURNACE.

1834.

AND,

AN ACCOUNT

OF AN

EXPERIMENT WITH CHLORINE GAS.

1833.

BY

ARTHUR TREVELYAN.

"For every natural effect there must be a sufficient natural cause."

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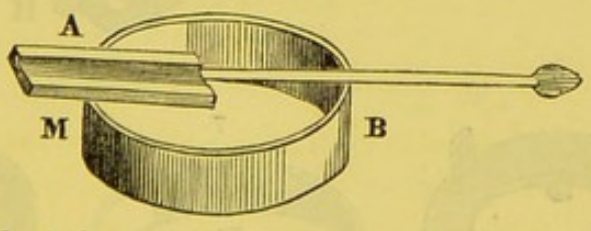
VIBRATIONS CAUSED BY HEAT.

SIMPLE as the method of making the following experiment is, I find so many individuals fail in the manipulation, that I have been induced to publish this account of the method of making the experiment, and description of the best form of apparatus for exhibiting the phenomenon.

The vibrations caused by placing certain metals, at a high temperature, upon those at a lower degree of heat, I discovered on the 9th February 1829. The cuts show the best form of apparatus for exhibiting this interesting experiment. The results of several metals are nearly equally good, but copper I prefer for the vibrating-bar (which is to be heated), having a brass-wire-rod attached at one end, to be used as a handle; and unalloyed or soft lead for the ring, or block. The contact surfaces *must* be kept quite bright—that is, free from oxide—as any tarnish is detrimental to the success of the experiment. The vibrations become intense enough to produce many musical notes, which vary in tone as the heat increases or decreases; the effect being very like that produced by an Æolian Harp. The apparatus may be of any size or weight, convenience and portability being the only limit.

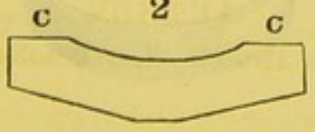
1. The best form of apparatus for producing the sounds.

1

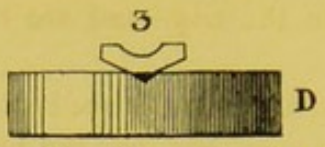


A. copper bar; B. lead ring.

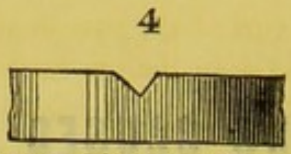
2



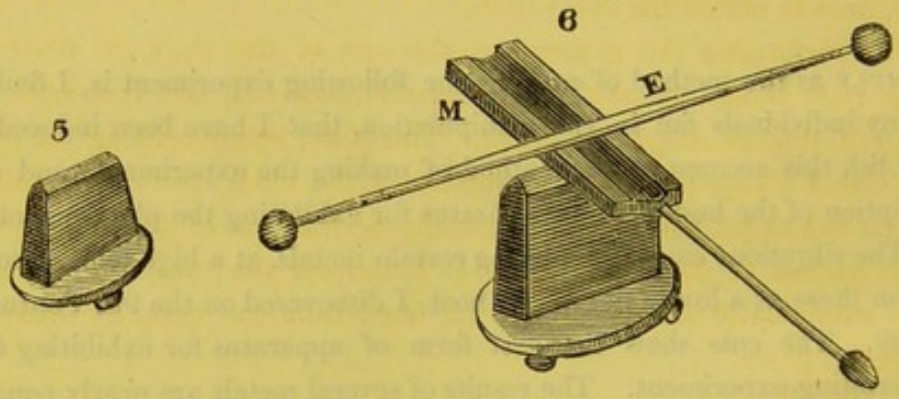
2. End view of bar. There being more weight at C.C. probably assists in some degree the vibratory movements; but almost any shape will vibrate.



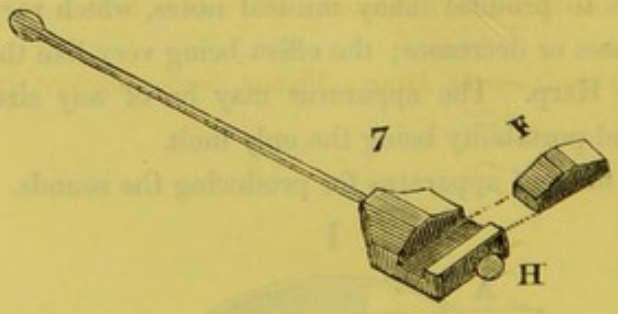
3. End view of bar, showing its mode of resting over an unequal notch in the ring D., being the most successful method of producing the sounds.

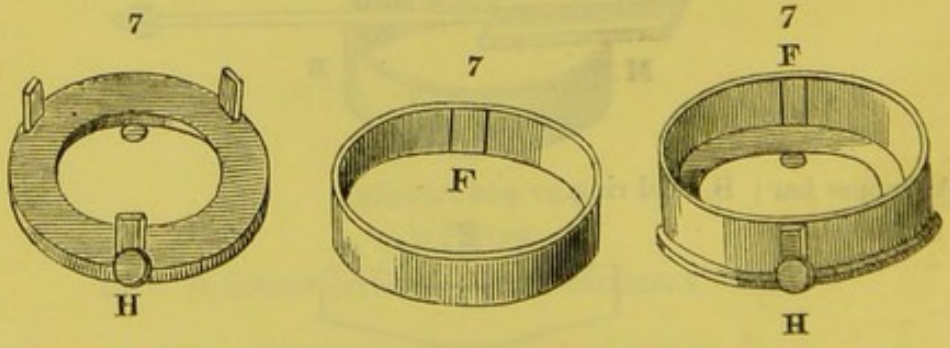


4. The unequal notch over which the vibratory bar rests.



5. Lead block, rounded at the part on which the bar rests, as seen at 6, being the best method of exhibiting the visible vibrations, unaccompanied by sounds. The arc of vibration is much increased by the brass balancing bar E. having a solid brass knob at each end, and flattened in the centre of the rod, to enable it to rest firmly on the vibratory bar.





7.7.7.7. A small apparatus of a convenient form for the experimentalist, but requiring nicety in its use; is not suited for the lecture-room. The wedges F.F.F. (of any metals) slip into grooves—the one kind into

the bar, the other into the ring—and are held fast by the pinching screws H.H.H.

Care must be taken not to increase the heat of the bar to the melting point of lead, or the chances are, that the block will be fused at the point of contact.

For continuous, or careful experiments, a spirit-lamp may be placed beneath the overhanging part of the bar, as at M. (fig. 1.); but, if the apparatus is large, it takes some time to raise it to a sufficient temperature for producing the phenomena. In some experiments the heat of boiling water was employed with success, but a *higher* temperature is required to obtain the best results.

In performing the experiment, the part of the block on which the bar rests should be *slightly* and *newly roughened*, and the contacting part of the bar *smooth* and *bright*. Therefore, before making the experiment, I always pass over the surface of the block, two or three times, a *fine* flat rasp; and rub longitudinally, with a piece of *fine* emery-paper, the surface of the bar, *after it is heated* for use; and it is advisable the manipulator should protect his hand from the heat, by wearing a woollen glove.

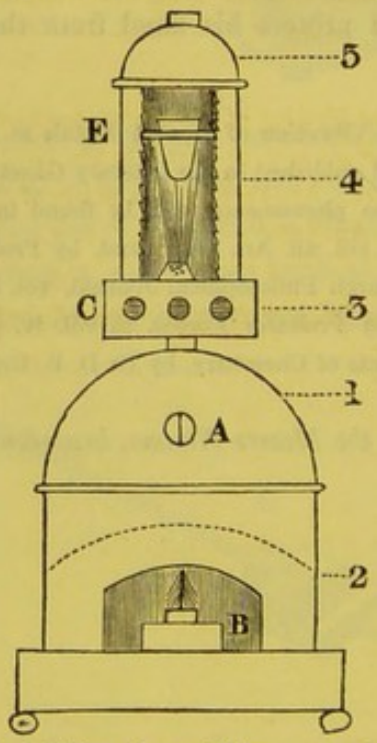
A paper was read on the Vibration of Heated Metals at the Meeting of the British Association, 1833; and published in the Literary Gazette same year.

And papers on the same phenomenon will be found in the Transactions of the Royal Society, Edinburgh, vol. xii. An. 1832; and, by Professor Forbes, ibid. 1833; in the London and Edinburgh Philosophical Journal, vol. iii. p. 321, An. 1833; vol. vi. p. 85, An. 1835; and, by Professor Forbes, in vol. iv. p. 15 and 182, An. 1834; also, a notice in the Elements of Chemistry, by Dr D. B. Reid, p. 659, An. 1839, &c.

Apparatus made by the Messrs Nimmo, brassfounders, Edinburgh.

VAPOUR LAMP FURNACE.

In 1834, I invented a Lamp peculiarly adapted for the use of the Analytical Chemist, both on account of its convenient form and its great heating power. In fifteen minutes (not under the most favourable circumstances), it fused 500 grains of bicarbonate soda, as liquid as water. The Chemist had better get a Lamp made to suit the size of the platina crucible he intends working with. The accompanying cuts and description will explain the apparatus in its complete form:—



1. *Copper boiler for holding the spirit*—concave at bottom, as seen by the dotted line. At the joining of the two halves there is a flange, which keeps it steady in its seat. A. Opening with a screw-cap, for introducing the spirit; instead of the cap, a conical safety-valve, with a spiral-spring, may be attached, if desired; but as long as the holes of the burner are free, no accident can happen.

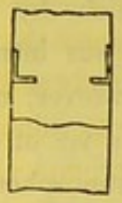
2. *Copper or sheet-iron stand*—the pedestal of brass. B. Spirit-lamp, with a small flat wick, for generating the vapour in the boiler. The action of the furnace can be instantly stopped by withdrawing this lamp.

3. *Gallery for holding the chimney*—the openings C., to admit the air,

can be closed, or reduced in size, by moving round the chimney. The gallery (which is made of brass), screws on the stalk, on which the burner screws.

4. *Sheet-iron chimney*—a part removed, to show the argand burner D., having 10 holes (quite sufficient) and the platinum crucible E. The chimney must be of *sufficient capacity* to admit the flame *freely round* the crucible. As it is the property of platinum to keep the vapour of hydrogen gas ignited, when the crucible is removed, the flame is immediately extinguished.

5. *Brass cupola*—to throw the flame down on the crucible. The opening at the top must be small, to allow as little waste of heat as possible.



6. Part of chimney removed, to show the iron-brackets on which the crucible (iron) holder F. rests.

Exhibited at the Meeting of the British Association in 1835.

A paper on the Lamp Furnace will be found in the London and Edinburgh Philosophical Journal, vol. vi. p. 292, An. 1835; also a notice of it in Dr D. B. Reid's Elements of Chemistry, p. 280, An. 1839.

Lamp made by the Messrs Nimmo, brassfounders, Edinburgh.

AN EXPERIMENT WITH CHLORINE GAS.

In 1833, when attending a practical class of chemistry, conducted by that original Chemist, the late K. T. Kemp, I suggested an experiment, exhibiting partly the phenomenon, which, by analogy, I expected, that, when a freshly blown out candle was introduced into a jar of chlorine gas, it would be rekindled; however, unlike the effects that follow the withdrawal of a candle from a jar of oxygen gas, the flame is extinguished when returned into the atmosphere; but again, like the effect with the latter gas, the candle is reignited, on being returned into the jar of chlorine.

Noticed in the London and Edinburgh Philosophical Journal, An. 1833.