The writer of this note has also used an Owens jet dust counter in connection with artificial lightning, through the courtesy of Dr. Peek of the General Electric Company in the high tension laboratory at Pittsfield. Discharges three meters long, with voltage of over one million and amperage of 100,000, were employed. The slides do not, however, show the marked clarification of the air which was expected; but the experiments are not made in free air. Observations before and after real lightning flashes are under way at Blue Hill Observatory.

ALEXANDER MCADIE

SPECIAL ARTICLES

SENSITIVE FLAMES AND APPARENT FLAME PRESSURE[1]

ADJUSTMENT

THE disposition of apparatus is shown in figure 1, where UU' is the interferometer U-gauge, r and s the reentrant and salient pin holes, t the quill tube and F the fine conical gas jet about 1 mm in diameter (salient outward) for the sensitive flame. F is preferably placed vertically. The gas inlet G is at the middle of t so that r, s and F may function as nodes. G is provided with a stop cock to vary the gas pressure. Since this pressure acts at both U and U', it is only the acoustic pressure due to vibration within the quill tube which will influence the gauge, U, U'.

The pin holes r s are rarely quite of the same diameter. Hence the fringes will move for any sudden change of pressure at G, temporarily; but they soon return to zero. The flame F was very sensitive; but no acoustic pressure under any conditions could be observed. There was no effect even when the flame was purposely made turbulent by high gas pressure. This was also the case in a variety of other devices. Thus the sensitive flame phenomenon must be considered to exist outside of the quill tube t F and there is no corresponding vibration within.

TELEPHONIC EXCITATION

On removing t from r s and the gauge and joining it to a telephone excited by a little induction coil with a break of variable pitch, one gets a beautiful exhibition of König's flames at F. In this case a small sharp flame, 2 or 3 cm or less, is of course desirable. However, the attempt to detect the resonances in the quill tube in this way failed.

FLAME PRESSURE

Joining the quill tube t with the shank U only (s,

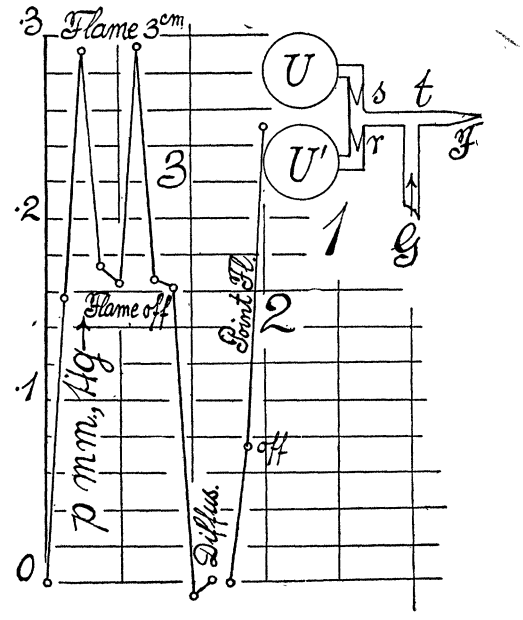

figure 1, may be left in place as it does not function, r, also inactive, may be open to the atmosphere), one observes an increased pressure within t (caet. par.), whenever the flame F is ignited. These pressures are in excess of the normal registry of the gauge so that small flames (from a point like a split pea to 2 or 3 cm) only, are to be used. Figures 2 and 3 give examples of the results. The curve, Fig. 2 (points spaced horizontally to show different conditions), beginning with no pressure (mm of mercury) when the cock is closed, registers about .075 mm with the gas cock just open, owing to the resistance at the jet, and .25 mm after the flame is lit. The point flame, therefore, acts like a stopper, virtually narrowing the jet. Figure 3 gives a more extended series, with a flame 2–3 cm long. Hence the gas pressure at t in the absence of flame is larger, about .16 mm. With the flame lit, the pressure reaches nearly .3 mm. It is not, however, as much larger as in the case of the point flame. When the flame is blown out the intermediate gas pressure is restored, first at a rapid rate, finally very gradually, the progress obviously corresponding to a case of cooling of the mouth of the jet. The phenomenon is remarkably steady and the experiment may be repeated indefinitely, two cases being given in figure 3. When the gas is finally shut off, the fringes dip below zero, which however is regained in the lapse of time. This is optic evidence of the diffusion of hydrocarbon gas into the U-gauge and of the subsequent diffusion outward.

REMARKS

I was at first inclined to believe that an actual pressure increment within the flame locus had been ob-

[1] Advance note from a Report to the Carnegie Institution of Washington, D. C.

served. What happens, however, is probably no more than a large increase of the viscosity of the gas at the jet. Because of the high temperature there, the jet with the flame lit temporarily conveys a much more viscous gas current. Thus the asymptotic cooling effects in figure 2 are accounted for (hot jet tube) as well as the striking steadiness of the phenomenon when the flame is on, and the disproportionately great effect of point flames. For in the latter, the colder blue base is lacking.

It follows from the above that if for any reason the flame is removed, there is an instantaneous excessive outrush of gas from the jet. When the flame is restored, this excess is at once cut off. Here then is a mechanism that contributes to periodic motion of flame and must be effective in turbulent flames. Since pin holes are sensitive at nodes, I have supposed that temperature occurrences might here be effective also; but this can not be the case in a phenomenon which is symmetrically either positive or negative, depending on the slope of the pin hole.

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THE ROYAL SOCIETY OF CANADA

AT the annual meeting of the Royal Society of Canada, held in the city of Quebec, on May 19, 20, 21 and 22, the following papers were presented in Section V:

SECTION V—BIOLOGICAL SCIENCES

Presidential Address

Historical review of the red discoloration of foodstuffs: F. C. HARRISON.

Botanical

Luminous leaves: A. H. REGINALD BULLER.

Sphaerobolus stellatus and the dispersion of its spores by herbivorous animals: A. H. REGINALD BULLER.

The fresh-water algae of Central Canada: C. W. LOWE (presented by A. H. REGINALD BULLER).

Identity of the organism causing black-rot disease of the potato—Part I: B. T. DICKSON and G. A. SCOTT (presented by F. C. HARRISON).

Identity of the organism causing black-rot disease of the potato—Part II: B. T. DICKSON and G. A. SCOTT (presented by F. C. HARRISON).

The effect of various smut control treatments on the germination of oats: B. T. DICKSON and W. L. GORDON (presented by F. C. HARRISON).

The bacteriology of the Kingston cheese: C. D. KELLY (presented by F. C. HARRISON).

A study of the moulds in blue-veined cheese: N. S. GOLDING (presented by F. C. HARRISON).

Microbiological relationships in frozen soils: A. G. LOCHHEAD (presented by F. C. HARRISON).

Psychrophilic soil bacteria: A. G. LOCHHEAD (presented by F. C. HARRISON).

The toxic action of distilled water and the antagonism to it of cations: G. W. SCARTH (presented by F. E. LLOYD).

General

The origin of karyokinesis: A. B. MACALLUM.

Medical

After-effects of feeding thyroid to young rats: A. T. CAMERON and J. CARMICHAEL.

The action of absorbable intestinal toxins on metabolism: A. T. CAMERON.

The cranio-facial axis of Huxley—Part I, embryological considerations: JOHN CAMERON.

A further study of the question of utilization ("fermentation") of saccharose by B. diphtheriae: J. G. FITZGERALD and DOROTHY G. DOYLE.

The effect of insulin on the percentage of sugar in blood from different regions of the body: J. J. R. MACLEOD, J. HEPBURN, J. K. LATCHFORD and N. A. MCCORMICK.

The influence of insulin on the glycogen content of the liver and muscles during hyperglycemia: J. J. R. MACLEOD, E. C. NOBLE and M. K. O'BRIEN.

The soluble carbohydrates of liver and muscle and the influence of insulin on them: G. S. EADIE, J. J. R. MACLEOD and M. D. ORR.

Further observations on depancreatized animals: F. N. ALLAN and S. S. SOKHEY (presented by J. J. R. MACLEOD).

The effect of insulin on chloridzin diabetes in dogs: S. U. PAGE (presented by J. J. R. MACLEOD).

The behavior of the diastases in diabetic animals treated with insulin: J. MARKOWITZ (presented by J. J. R. MACLEOD).

Viscero-motor reflexes: FREDERICK R. MILLER and H. M. SIMPSON.

Pulse and cardiac records obtained with electropolygraph: FREDERICK R. MILLER and R. A. WAUD.

Amplification of heart sounds by radio apparatus: G. A. RAMSAY (presented by FREDERICK R. MILLER).

Classification of tumors arising from the trophoblast with illustrative cases: JAMES MILLER.

Zoological

Acaulis primarius Stimpson: C. MCLEAN FRASER.

Some results of the Belle Isle Strait Expedition, 1923: A. G. HUNTSMAN.

The distribution of pile borers on the Canadian Atlantic coast: R. H. MCGONIGLE (presented by A. G. HUNTSMAN) (read by title).

Certain features in the life-history of the shad: A. H. LEIM (presented by A. G. HUNTSMAN) (read by title).

Resistance of marine animals to high temperatures and their distribution in nature: A. G. HUNTSMAN and M. I. SPARKS (read by title).

A list of the nudibranchiate mollusca recorded from the Pacific coast of North America, with a note on their distribution: CHARLES H. O'DONOGHUE (read by title).