the carbonyl group comes from the fact that the strongest vibration frequencies accompanying the excitation were found to have values lying between 1400 and 1500 cm.$^{-1}$. A consideration of the intensity distribution in the progressions shows that they correspond to the vibration 1647 cm.$^{-1}$, of the unexcited state[3]. This is the valence frequency of the C=O bond. Thus we have both the vibration and the excitation occurring in the carbonyl group.

In addition to the bands reported above, some very diffuse (pre-ionized) bands were found in the region below 1100 A. superimposed on the ionization continuum. These may well be due to the excitation of non-bonding electrons from the O–H group. However, it was not possible to make sufficiently accurate measurements on them to justify an analysis.

W. M. EVANS.

University College,
Swansea.

W. C. PRICE.

Physical Chemistry Laboratory,
Cambridge.

[1] Price, W. C., *J. Chem. Phys.*, **3**, 256 (1935).
[2] Mulliken, R. S., *J. Chem. Phys.*, **3**, 564 (1935).
[3] Hibben, J. H., *Chem. Rev.*, **18**, 1 (1936).

A Sensitive Adaptation of the Spoon Gauge

THE spoon gauge is probably the most satisfactory and easily constructed instrument available for the accurate measurement of pressure differences when the use of a manometric liquid is not permissible. Its sensitivity, however, is limited to a pointer movement of about one millimetre for each millimetre of mercury pressure, or perhaps a little more with very fragile gauges. We describe below an effective design which shifts the sensitivity several decimal places into the high vacuum range.

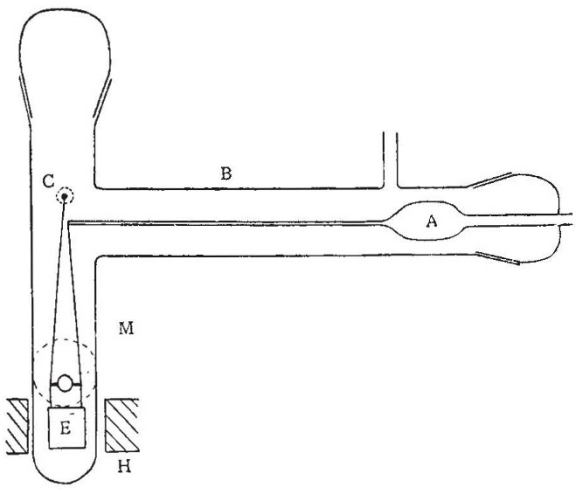

Fig. 1.

The essential feature of the device is a special form of bifilar suspension, which permits amplification of the movement of the pointer end. This suspension consists of unequal and non-parallel threads, the supports of which, placed one above the other, can be brought as closely as desired to the same vertical line. One support is the pointer end, and the other is a movable arm controlling the sensitivity. The threads, spreading out downwards, so as to clear the lower obstructing arm, carry on their ends a horizontal beam to which is attached a mirror and damping device.

The sensitivity depends on the effective horizontal separation of these supports, and this distance can be reduced to less than the thread diameter. Using comparatively rough methods and the usual mirror and scale distances, a magnified movement of about ten thousand-fold is obtainable. With refined methods this figure could be considerably improved.

The particular gauge described below, although simple and convenient in construction, had a sensitivity exceeding one ten thousandth of a millimetre of mercury, and was almost entirely free from vibrational disturbances. A large vertical tube *M* in Fig. 1, housing the suspension, carries two horizontal tubes at right angles, the lower one *B* containing the 20 cm. spoon gauge *A*, and the upper one *C* ending in a ground joint. In this joint could be rotated a slightly eccentric glass arm ending above the tip of the gauge pointer. Long fibres of silk are first attached to the suspension unit, which is lowered into the tube *M*. With each thread touching a support, the beam is adjusted to oscillate axially in the tube about a line parallel with the gauge pointer. The fibres are then sealed to the respective supports with apeison wax and the upper superfluous portions cut short with a hot wire. The sensitivity is raised by rotating sufficiently the cranked rod, and finally all joints are sealed with apeison wax.

The suspension unit consists of a light glass beam, carrying a galvanometer mirror facing a window, and below is fixed a light cylinder of aluminium foil *E*. This rotates in the field of the electromagnet *H*. With critical damping a pressure change is registered with the required accuracy in about two seconds—the natural period of the suspension. The spot light remains stationary within half a millimetre even with the thermostat stirrer running vigorously.

It was found that the zero reading varied somewhat with the magnetic field, due presumably to the magnetic properties of the aluminium vane. For critical damping this amounted to sixty millimetres, and care was taken to maintain a constant field.

This spoon gauge had normally a sensitivity of 8 mm. movement of pointer tip for a pressure change of 10 mm. of mercury. When erected with the scale at two metres from the mirror, the gauge had a sensitivity of 1 mm. deflection for 4×10^{-5} mm. of mercury pressure. This indicated a horizontal separation of the points of suspension of 0·13 mm., which distance is about the minimum that can be easily obtained with the simple arrangement described.

This principle may be used to magnify any horizontal movement.

ALKIN LEWIS.
D. W. G. STYLE.

Chemical Department,
King's College,
London.

Molecular, Nematic and Crystal States of 1 : 1′-Diethyl-ψ-Cyanine Chloride

ATTENTION has been directed in NATURE[1] to a recent publication by Scheibe, Kandler and Ecker[2] concerning the narrow absorption and fluorescence band exhibited by certain solutions of the dye 1 : 1′-diethyl-ψ-cyanine* chloride, in which these authors, on the basis of viscosity measurements,

* This dye is termed 1 : 1′diethyl-ψ-isocyanine in the German publication.