However, with this method of support the self-weight of the board (over 20 kg) allowed it to distort, so that a frame was provided beneath the gauge plate from which the plate was jacked to be flat. Transverse levelling screws were provided between the cross-rod and its supports.

The camera was mounted on a frame attached to the manometer board so that the whole assembly rotated as a unit. Illumination of the board for photographic purposes was provided by fluorescent strip lamps in the plane of the manometer tubes, both on the sides and at the foot of the board. This gave a good overall distribution with particularly sharp illumination of the menisci.

4 Conclusions

The attention paid to detail in the design and construction of a multitube inclined manometer has produced a versatile instrument capable of displaying small differential pressures with the minimum of difficulty. Calibration and extensive usage suggest that the precautions taken were fully justified.

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Large conductance molecular leak for gas sampling at high pressure

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Abstract A thin metal sheet perforated with a large number of holes by means of laser techniques, and constituting a molecular leak for special purposes is described.

It is sometimes necessary to introduce large amounts of gases at relatively high pressure by molecular effusion into a vacuum system. This is the case in gas sampling inlets of mass spectrometers, used for special purposes. At pressures of a few torr the mean free path is of the order of 20 μm. A molecular effusion orifice must then have comparable maximum dimensions and, of course, its conductance is small. The only way to increase this conductance is to have a large number of holes.

To satisfy these conditions, a circular platinum sheet, having a diameter of 30 mm and a thickness l of 10 μm, was argon arc-welded on to a metallic flange. On the central part of the sheet, 780 holes with a maximum diameter of 20 μm were made by means of a ruby laser. The average radius a of the holes was 6 μm. Platinum was chosen for its chemical and electrical properties. The platinum sheet is perforated in its central part, with an approximately circular perforated area of 1 cm^2.

In order to know the conductance of the leak, the pressure decay in a volume (3600 cm^3) due to the gas flow through the holes was measured using conventional techniques. The results are summarized in figure 1. The observed conductance for argon is equal to 6 cm^3 s^{-1} and can be compared with the computed value which amounts to 5 cm^3 s^{-1} according to the relation (Dushman 1962)

$$F = KA\, 3638 \left(\frac{T}{M}\right)^{1/2} \text{cm}^3\,\text{s}^{-1}$$

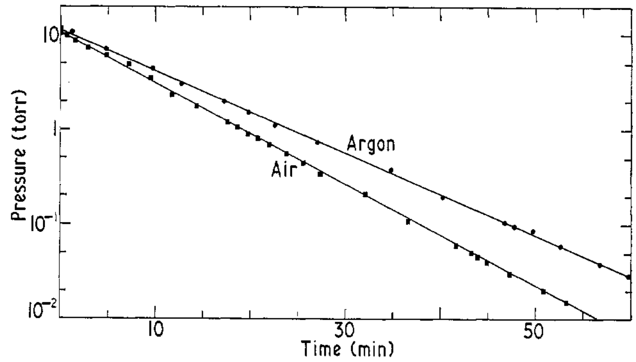

Figure 1 Pressure decay in a volume of 3600 cm^3 due to flow of gas through the platinum sheet

where K is Clausing's factor (0·55 for $l/a = 1{\cdot}7$), A is total area of the holes ($8{\cdot}8 \times 10^{-4}$ cm^2), T is temperature of the gas (300°K) and M is molecular weight of the gas (40).

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References

Dushman S 1962 *Scientific Foundations of Vacuum Technique* (New York London: Wiley) pp. 93–4

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The use of Teflon polishers for precision optical flats

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Abstract A new optical polisher is described, consisting of a Teflon coating on a grooved glass disk. Flats good to $\lambda/100$ can be produced more reliably with this polisher than with pitch polishers.

1 Introduction

A technique has been described earlier (Otte 1965) for producing optical flats good to 5 nm, that is, $\lambda/120$ for light of wavelength $\lambda = 550$ nm. The surfaces were flat to within about 1 nm of the edge of the disk and were produced by machine with no hand polishing.

The polisher used had a very thin pitch surface laid on a grooved disk of Pyrex glass. Once this polisher was made flat, it would produce optical flats up to 75 mm in diameter that were good to $\lambda/120$. The small thickness of the pitch layer (about 0·3 mm) on the firm glass support ensured that this polisher would retain its surface shape, or 'figure', for longer than a conventional polisher of thick pitch. However, experience has shown that the figure still changes during polishing more rapidly than is desirable. A further disadvantage is that the pitch becomes loaded with polishing powder